Documents of the World Radiocommunication Conference (WRC-2000) (Istanbul, 2000)

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 1-E
20 January 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Note by the Secretary-General

AGENDA OF THE CONFERENCE

The agenda of the World Radiocommunication Conference (WRC-2000) is contained in Resolution 1130 adopted by the Council.

The text of the resolution is attached.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

RESOLUTION 1130

(approved at the twelfth Plenary Meeting)

AGENDA FOR THE WORLD RADIOCOMMUNICATION CONFERENCE (WRC-2000)

The Council,

noting

that Resolution 721 of the World Radiocommunication Conference (Geneva, 1997):

a) resolved to recommend to the Council that a world radiocommunication conference be held in Geneva in late 1999 for a period of four weeks;

b) recommended its agenda, and invited the Council to finalize the agenda and arrange for the convening of WRC-99 and to initiate as soon as possible the necessary consultation with Member States,

resolves

to convene a World Radiocommunication Conference (WRC-2000) in Istanbul (Turkey) from 8 May - 2 June 2000, with the following agenda:

1 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, taking account of the results of the 1997 World Radiocommunication Conference (WRC-97), and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following topics:

1.1 requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution **26 (Rev.WRC-97)**;

1.2 to finalize remaining issues in the review of Appendix **S3** to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation **66 (Rev.WRC-97)** and the decisions of WRC-97 on adoption of new values, due to take effect at a future time, of spurious emissions for space services;

1.3 to consider the results of ITU-R studies in respect of Appendix **S7/28** on the method for the determination of the coordination area around an earth station in frequency bands shared among space services and terrestrial radiocommunication services, and take the appropriate decisions to revise this Appendix;

1.4 to consider issues concerning allocations and regulatory aspects related to Resolutions **126 (WRC-97)**, **128 (WRC-97)**, **129 (WRC-97)**, **133 (WRC-97)**, **134 (WRC-97)** and **726 (WRC-97)**;

1.5 to consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution **122 (WRC-97)**;

1.6 issues related to IMT-2000;

1.6.1 review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary;

1.6.2 identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000;

1.7 review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting operational, distress and safety communications, taking into account Resolution **346 (WRC-97)**;

1.8 to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700 - 4 200 MHz and 5 925 - 6 425 MHz, including their coordination with other services allocated in these bands;

1.9 to take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service (MSS) in a portion of the 1 559 - 1 567 MHz frequency range, in response to Resolutions **213 (Rev.WRC-95)** and **220 (WRC-97)**;

1.10 to consider results of ITU-R studies carried out in accordance with Resolution **218 (WRC-97)** and take appropriate action on this subject;

1.11 to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions **214 (Rev.WRC-97)** and **219 (WRC-97)**;

1.12 to consider the progress of studies on sharing between feeder links of non-GSO MSS networks and GSO FSS networks in the bands 19.3 - 19.7 GHz and 29.1 - 29.5 GHz, taking into account Resolution **121 (Rev.WRC-97)**;

1.13 on the basis of the results of the studies in accordance with Resolutions **130 (WRC-97)**, **131 (WRC-97)** and **538 (WRC-97)**:

1.13.1 to review and, if appropriate, revise the power limits appearing in Articles **S21** and **S22** in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services;

1.13.2 to consider the inclusion in other frequency bands of similar limits in Articles **S21** and **S22**, or other regulatory approaches to be applied in relation to sharing situations;

1.14 to review the results of the studies on the feasibility of implementing non-GSO MSS feeder links in the 15.43 - 15.63 GHz in accordance with Resolution **123 (WRC-97)**;

1.15 issues related to the radionavigation-satellite service:

1.15.1 to consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments;

1.15.2 to consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the bands 1 215 - 1 260 MHz and 1 559 - 1 610 MHz;

1.15.3 to consider the status of allocations to services other than the radionavigation-satellite service (Nos. **S5.355** and **S5.359**) in the band 1 559 - 1 610 MHz;

1.16 to consider allocation of frequency bands above 71 GHz to the earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution **723 (WRC-97)**;

1.17 to consider possible worldwide allocation for the earth exploration-satellite (passive) and space research (passive) services in the band 18.6 - 18.8 GHz, taking into account the results of the ITU-R studies;

1.18 to consider the use of new digital technology for the maritime mobile service in the band 156 - 174 MHz and consequential revision of Appendix **18/S18**, taking into account Resolution **342 (WRC-97)**;

1.19 to consider the report of the inter-conference representative group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system;

1.19*bis* in accordance with Article S14, to consider objections expressed by administrations with respect to the Radio Regulations Board's Rules of Procedure relating to the application of RR 2674/S23.13 in order for the Bureau to modify its findings in accordance with the conclusions of the Conference;

1.20 to consider the issues related to the application of Nos. **S9.8**, **S9.9** and **S9.17** and the corresponding parts of Appendix **S5** with respect to Appendices **S30** and **S30A**, with a view to possible deletion of Articles 6 and 7 of Appendices **S30** and **S30A**, also taking into consideration Recommendation **35 (WRC-95)**;

1.21 to consider the report from the Radiocommunication Bureau on results of the analysis in accordance with Resolution **53 (WRC-97)** and take appropriate actions;

2 to examine the revised ITU-R recommendations incorporated by reference in the Radio Regulations in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution **27 (Rev.WRC-97)**;

3 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the Conference;

4 in accordance with Resolution **95 (WRC-97)**, to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

5 to review, and take appropriate action on, the report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the Convention (Geneva, 1992);

6 to identify those items requiring urgent action by the radiocommunication study groups in preparation for the next world radiocommunication conference;

7 in accordance with Article 7 of the Convention (Geneva, 1992):

7.1 to consider and approve the report of the Director of the Radiocommunication Bureau on the activities of the Radiocommunication Sector since WRC-97;

7.2 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent Conference and on possible agenda items for future conferences,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-2000,

instructs the Secretary-General

1 to make all the necessary arrangements, in agreement with the Director of the Radiocommunication Bureau, for the convening and holding of the Conference;

2 to communicate this Resolution to concerned international and regional organizations.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 2-E
21 January 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Note by the Secretary-General

CREDENTIALS OF DELEGATIONS TO CONFERENCES

The provisions of the Convention of the International Telecommunication Union relating to credentials, as amended by the Plenipotentiary Conference (Minneapolis, 1998), are contained in Article 31, the text of which is attached.

Particular attention should be given to the following numbers:

		Nos.
–	the office of the signatory of the instruments of accreditation:	326
–	the wording of the instruments of accreditation, criteria to be employed:	328 to 331
–	credentials sent by telegram shall not be accepted:	338
–	the depositing of instruments of accreditation:	334

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

ARTICLE 31

Credentials for Conferences

324 **PP-98** 1 The delegation sent by a Member State to a plenipotentiary conference, a radiocommunication conference or a world conference on international telecommunications shall be duly accredited in accordance with Nos. 325 to 331 below.

325 2 1) Accreditation of delegations to Plenipotentiary Conferences shall be by means of instruments signed by the Head of State, by the Head of Government or by the Minister for Foreign Affairs.

326 2) Accreditation of delegations to the other conferences referred to in No. 324 above shall be by means of instruments signed by the Head of State, by the Head of Government, by the Minister for Foreign Affairs or by the Minister responsible for questions dealt with during the conference.

327 **PP-98** 3) Subject to confirmation prior to the signature of the Final Acts, by one of the authorities mentioned in Nos. 325 or 326 above, a delegation may be provisionally accredited by the head of the diplomatic mission of the Member State concerned to the host government. In the case of a conference held in the Swiss Confederation, a delegation may also be provisionally accredited by the head of the permanent delegation of the Member State concerned to the United Nations Office at Geneva.

328 3 Credentials shall be accepted if they are signed by one of the competent authorities mentioned in Nos. 325 to 327 above, and fulfil one of the following criteria:

329 – they confer full powers on the delegation;

330 – they authorize the delegation to represent its government, without restrictions;

331 – they give the delegation, or certain members thereof, the right to sign the Final Acts.

332 **PP-98** 4 1) A delegation whose credentials are found to be in order by the Plenary Meeting shall be entitled to exercise the right to vote of the Member State concerned, subject to the provisions of Nos. 169 and 210 of the Constitution, and to sign the final acts.

333 2) A delegation whose credentials are found not to be in order by the Plenary Meeting shall not be entitled to exercise the right to vote or to sign the Final Acts until the situation has been rectified.

334 **PP-98** 5 Credentials shall be deposited with the secretariat of the conference as early as possible. The committee referred to in No. 23 of Rules of Procedure of conferences and other meetings* be entrusted with the verification thereof and shall report on its conclusions to the Plenary Meeting within the time specified by the latter. Pending the decision of the Plenary Meeting thereon, any delegation shall be entitled to participate in the conference and to exercise the right to vote of the Member State concerned.

335 **PP-98** 6 As a general rule, Member States should endeavour to send their own delegations to conferences of the Union. However, if a Member State is unable, for exceptional reasons, to send its own delegation, it may give the delegation of another Member State powers to vote and sign on its behalf. Such powers must be conveyed by means of an instrument signed by one of the authorities mentioned in Nos. 325 or 326 above.

336 7 A delegation with the right to vote may give to another delegation with the right to vote a mandate to exercise its vote at one or more meetings at which it is unable to be present. In such a case it shall, in good time, notify the Chairman of the conference in writing.

337 8 A delegation may not exercise more than one proxy vote.

338 9 Credentials and transfers of powers sent by telegram shall not be accepted. Nevertheless, replies sent by telegram to requests by the Chairman or the secretariat of the conference for clarification of credentials shall be accepted.

339 **PP-98** 10 A Member State or an authorized entity or organization intending to send a delegation or representatives to a telecommunication standardization assembly, a telecommunication development conference or a radiocommunication assembly shall so inform the Director of the Bureau of the Sector concerned, indicating the names and functions of the members of the delegation or of the representatives.

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* Note by the General Secretariat - The word "shall" should be inserted between the words "meetings" and "be".

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

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21 January 2000
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PLENARY MEETING

Note by the Secretary-General

THE CPM REPORT TO THE 2000 WORLD RADIOCOMMUNICATION CONFERENCE

At the request of the Director of BR, I have the honour to submit to the Conference the Report of the CPM, prepared in response to ITU Council Resolution 1130 and as approved by the CPM Plenary Meeting on 26 November 1999.

Yoshio UTSUMI
Secretary-General

Annex: CPM Report to WRC-2000

ANNEX
(to WRC-2000, Document 3)

CPM Report on technical, operational and regulatory/procedural matters to be considered by the 2000 World Radiocommunication Conference

GENEVA, 1999

PREFACE

This CPM Report to the 2000 World Radiocommunication Conference (WRC-2000) was prepared in response to Resolution 1130 of the ITU Council to assist those who will be involved in the preparations for and deliberations at the WRC-2000. The Report was prepared and approved by the CPM at its second meeting, 15 - 26 November 1999. The Report is structured to generally follow the topics of the WRC-2000 Agenda and its contents follow the outline approved by the first meeting of the CPM which was held during the week following the WRC-97. A cross-reference list is provided to facilitate finding specific topics within the framework of the WRC-2000 Agenda. This Report comprises eight Chapters and one Annex.

The Report represents the best information on technical, operational and regulatory/procedural issues relevant to the WRC-2000 agenda available at the time of its preparation and should provide a good basis for the discussions at the Conference.

Robert W. Jones
Director Radiocommunication Bureau

Cross-reference between the WRC-2000 agenda items and the chapters of the CPM Report

WRC-2000 agenda item		Section of the CPM Report to WRC-2000
1	On the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, taking account of the results of WRC-97, and with due regard to the requirements of existing and planned services in the bands under consideration, to consider and take appropriate action in respect of the following topics:	
1.1	requests from administrations to delete their country footnotes or to have their country's name deleted from footnotes, if no longer required, in accordance with Resolution **26 (Rev.WRC-97)**;	Not in scope of CPM
1.2	to finalize remaining issues in the review of Appendix **S3** to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation **66 (Rev.WRC-97)** and the decisions of WRC-97 on adoption of new values of spurious emissions for space services taking effect at a future time;	Chapter 7, § 7.1
1.3	to consider the results of ITU-R studies in respect of Appendix **S7 [28]** on the method for the determination of the coordination area around an earth station in frequency bands shared among space services and terrestrial radiocommunication services and take the appropriate decisions to revise this Appendix;	Chapter 7, § 7.2
1.4	to consider issues concerning allocations and regulatory aspects related to Resolution **126 (WRC-97)** (the title may be found in § 7.4), Resolution **128 (WRC-97)** (the title may be found in § 7.4), Resolution **129 (WRC-97)** (the title may be found in § 7.4), Resolution **133 (WRC-97)** (the title may be found in § 7.4), Resolution **134 (WRC-97)** (the title may be found in § 7.4), Resolution **726 (WRC-97)** (the title may be found in § 7.4);	Chapter 6, § 6.1 § 6.1.1 § 6.1.4 § 6.1.5 § 6.1.2 § 6.1.5 § 6.1.3
1.5	to consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution **122 (WRC-97)**;	Chapter 6, § 6.2
1.6	issues related to the IMT-2000;	Chapter 1
1.6.1	review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications, and priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary;	Chapter 1, § 1.1.1
1.6.2	identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000;	Chapter 1, § 1.1.2
1.7	review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting operational, distress and safety communications, taking into account Resolution **346 (WRC-97)**;	Chapter 1, § 1.2
1.8	to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands;	Chapter 6, § 6.3
1.9	take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions **213 (WRC-97)** and **220 (WRC-97)**;	Chapter 2, § 2.2

1.10	to consider results of ITU-R studies in accordance with Resolution **218 (WRC-97)** and take appropriate action on this subject;	Chapter 2, § 2.1
1.11	to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-GSO/MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions **214 (Rev.WRC-97)** and **219 (WRC-97)**;	Chapter 2, § 2.3
1.12	to consider the progress of studies on sharing between feeder links of non-geostationary-satellite networks in the mobile-satellite service and geostationary-satellite networks in the fixed-satellite service in the bands 19.3-19.7 GHz and 29.1-29.5 GHz taking into account Resolution **121 (Rev.WRC-97)**;	Chapter 6, § 6.4
1.13	on the basis of the results of the studies in accordance with Resolutions **130 (WRC-97)**, **538 (WRC-97)** and **131 (WRC-97)**:	Chapter 3
1.13.1	review and if appropriate, revise the power limits appearing in Articles **S21** and **S22** in relation to the sharing conditions among NGSO FSS, GSO FSS, GSO BSS, space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services;	Chapter 3
1.13.2	consider the inclusion in other frequency bands of similar limits in Articles **S21** and **S22**, or other regulatory approaches to be applied in relation to sharing situations;	Chapter 3
1.14	review the results of the studies on the feasibility of implementing non-GSO MSS feeder links in the 15.43-15.63 GHz in accordance with Resolution **123 (WRC-97)**;	Chapter 6, § 6.5
1.15	issues related to the radionavigation-satellite service:	Chapter 2, § 2.4
1.15.1	to consider new allocations to the radionavigation-satellite service required to support developments in the range from 1 to 6 GHz;	Chapter 2, § 2.4.1
1.15.2	to consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the 1 215-1 260 MHz and 1 559-1 610 MHz frequency bands;	Chapter 2, § 2.4.2
1.15.3	to consider the status of allocations to services other than the radionavigation-satellite (Nos. **S5.355** and **S5.359**) in the 1 559-1 610 MHz band;	Chapter 2, § 2.4.3
1.16	to consider allocation of frequency bands above 71 GHz to the earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution **723 (WRC-97)**;	Chapter 4, § 4.1
1.17	to consider possible worldwide allocation for the earth exploration-satellite (passive) and space research (passive) services in the band 18.6-18.8 GHz taking into account the results of the ITU-R studies;	Chapter 4, § 4.2
1.18	consider the use of new digital technology for the maritime-mobile service in the band 156-174 MHz and consequential revision of Appendix **S18 [18]** taking into account Resolution **342 (WRC-97)**;	Chapter 1, § 1.3
1.19	to consider the report of the IRG submitted by the Director of the BR and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system;	Chapter 5
1.19 *bis*	in accordance with Article S14, to consider objections expressed by Administrations with respect to the Radio Regulations Board's Rules of Procedure relating to the application of RR 2674/S23.13 in order for the Bureau to modify its findings in accordance with the conclusions of the Conference;	
1.20	to consider the issues related to the application of Nos. **S9.8**, **S9.9** and **S9.17** and the corresponding parts of Appendix **S5** with respect to Appendices **S30** and **S30A**, with a view to possible deletion of Articles 6 and 7 of Appendices **S30** and **S30A**, also taking into consideration Recommendation **35 (WRC-95)**;	Chapter 5

1.21	consider report from the Radiocommunication Bureau on results of the analysis in accordance with Resolution **53 (WRC-97)** and take appropriate actions;	Chapter 5
2	to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations which have been communicated by the associated Radiocommunication Assembly, in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution **27 (Rev.WRC-97)**;	Chapter 7, § 7.3
3	to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the Conference;	Not in scope of CPM
4	in accordance with Resolution **95 (WRC-97)**, to review the Resolutions and Recommendations of the previous Conferences with a view to their possible revision, replacement or abrogation;	Chapter 7, § 7.4
5	to review, and take appropriate action on, the report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the Convention (Geneva, 1992);	Not in scope of CPM
6	to identify those items requiring urgent actions by the radiocommunication study groups in preparation for the next world radiocommunication conference;	Not in scope of CPM
7	in accordance with Article 7 of the Convention (Geneva, 1992):	
7.1	to consider and approve the report of the Director of the Radiocommunication Bureau on the activities of the Radiocommunication Sector since WRC-97;	Not in scope of CPM
7.2	to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent Conference and on possible agenda items for future conferences,	Chapter 8

INTRODUCTION TO THE CPM REPORT TO WRC-2000

This CPM Report to WRC-2000 is provided to assist the ITU Member States and the Radiocommunication Sector Members who will be involved in the deliberations of the 2000 World Radiocommunication Conference. It represents the best information on technical, operational and regulatory/procedural issues relevant to the WRC-2000 agenda, available at the time of its preparation.

I.1 Origin and purpose of CPM-99

In accordance with Article 3, No.42 of the ITU Convention, the Council, at its 1998 session, resolved in Resolution 1130 (see Appendix I.1) to hold a World Radiocommunication Conference (WRC-2000) from 8 May to 2 June 2000 in Istanbul (Turkey) with an agenda modified with respect to the one proposed by WRC-97 as contained in Resolution 721 (WRC-97). These proposals have been accepted as a result of a consultation of the ITU Member States.

At the same time, the Council instructed the Director of the Radiocommunication Bureau " to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-2000,".

In addition, four topics have been included for consideration by the CPM following the decisions of the 1998 Plenipotentiary Conference:

- the evaluation of the administrative due diligence procedure for satellite networks adopted by WRC-97;
- the simplification of coordination and notification procedures for satellite networks;
- the role of the notifying administration in the case of an administration notifying on behalf of a named group of administrations; and
- the implementation of processing charges for satellite network filings and administrative procedures.

The 1997 Radiocommunication Assembly by its Resolution ITU-R 2 re-confirmed that preparatory studies for a WRC are to be carried out by a Conference Preparatory Meeting (CPM) and nominated Mr. T. Boe (Norway) as the Chairman of CPM-99, Mr. E. Behdad (Islamic Republic of Iran) and Mr. R. Barton (Australia) as the Vice-Chairmen.

Mr. T. Boe, due to other obligations, was no longer available to chair the CPM. Consequently, following consultations with both Vice-Chairmen of the CPM, it was proposed that Mr. R Barton act as Chairman of the CPM for WRC-2000.

All administrations of the ITU Member States and the Radiocommunication Sector Members were invited to participate in the preparation of the CPM Report to WRC-2000.

I.2 Organization of the ITU-R of the preparation for the conference

The Radiocommunication Assembly shall provide the necessary technical bases for the work of radiocommunication conferences. Organization of the conference preparatory work is shown in Figure I-1.

According to Resolution ITU-R 2-2, on the basis of contributions from administrations, the Radiocommunication Study Groups, the Special Committee, and other sources concerning the technical, operational and regulatory/procedural matters to be considered by radiocommunication conferences, the CPM prepares a consolidated report for such conferences.

The first Conference Preparatory Meeting (Geneva, 26-27 November 1997) organized preparatory studies for WRC-2000 and identified studies for the following WRC. A structure for the CPM Report to WRC-2000 was agreed together with a preparatory process, working procedures and a chapter structure. The meeting appointed a Rapporteur for each chapter to assist the Chairman in managing the development and flow of draft report contributions.

The meeting also decided that all appropriate regulatory/procedural studies on relevant agenda items would be carried out by the Special Committee on Regulatory/Procedural matters (SC) on the basis of proposals from the membership of the ITU and the relevant ITU-R Working Party/Task Group/Joint Rapporteur Group. According to Resolution ITU-R 38-1 the results of the studies shall be submitted as contributions to the work of the CPM in preparing its report to the relevant WRC.

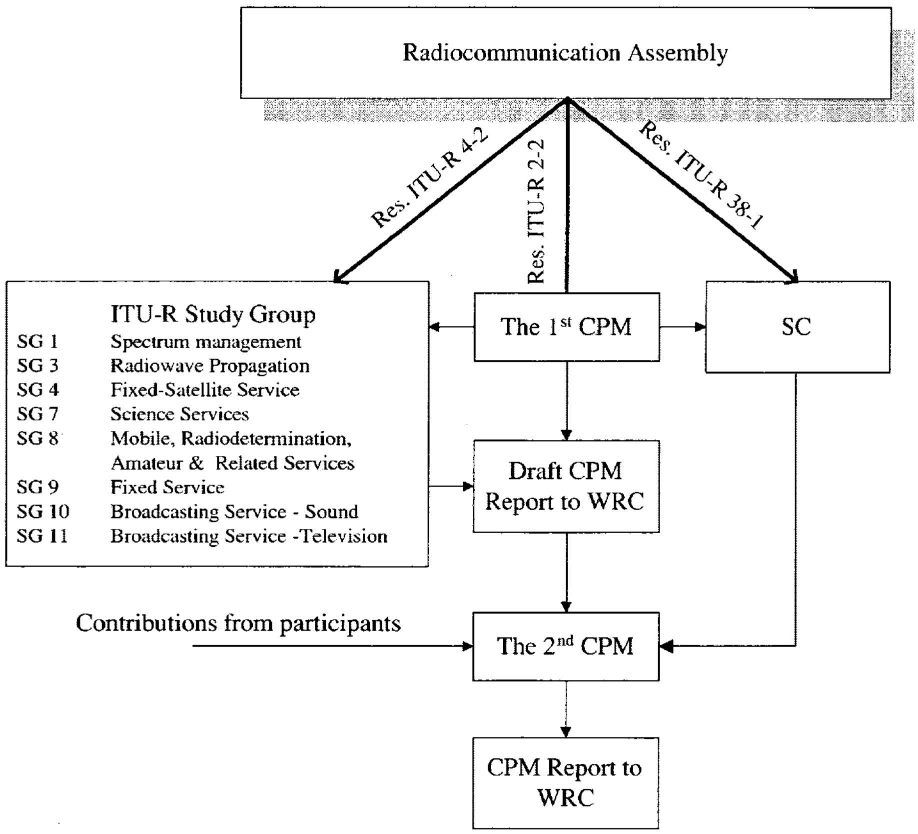

FIGURE I-1

Organization of the ITU-R conference preparatory work

The ITU-R preparations for WRC-2000 were concentrated in the following Task Groups and Working Parties (listed in the order of the Study Groups):

Study Group 1 chaired by Mr. R. Mayher (USA), TG 1/5 chaired by Mr. M. Dhamrait (UK), TG 1/6 chaired by Mr. G. Chan (Canada);

Study Group 3 chaired by Mr. D.G. Cole (Australia), WP 3J chaired by Mr. G. Brussaard (Netherlands), WP 3K chaired by Mr. E.J. Haakinson (USA), WP 3M chaired by Mr. M.P.M. Hall (UK);

Study Group 4 chaired by Mr. Y. Ito (Japan), WP 4A chaired by Mr. A.G. Reed (UK), WP 4-9S chaired by Mr. W. Rummler (USA), JTG 4-9-11 chaired by Mr. J. Leary (Japan);

Study Group 7 chaired by Mr. R.M. Taylor (USA), WP 7B chaired by Mrs. S. Taylor (USA), WP 7C chaired by Mr. L. Ruiz (France), JRG 7D-9D chaired by Mr. J. Miller (USA), WP 7D chaired by Mr. J.B. Whiteoak (Australia);

Study Group 8 chaired by Mr. E. George (Germany), WP 8B chaired by Mr. R.L. Swanson (USA), WP 8D chaired by Mr. T. Mizuike (Japan), TG 8/1 chaired by Mr. M.H. Callendar (Canada);

Study Group 9 chaired by Mr. M. Murotani (Japan), WP 9B chaired by Mr. A. Hashimoto (Japan), WP 9D chaired by Mr. G.F. Hurt (USA);

Study Group 10 chaired by Mr. A. Magenta (Italy), WP 10-11S chaired by Mr. R. Zeitoun (Canada);

Study Group 11 chaired by Mr. M. Krivosheev (Russia), WP 10-11S chaired by Mr. R. Zeitoun (Canada); and

Special Committee for Regulatory/Procedural Matters chaired by Mr. R.N. Agarwal (India).

I.3 Preparation of the CPM Report to WRC-2000

A draft CPM Report had been prepared by the Chapter Rapporteurs and the Chairmen of the relevant SGs/TGs/WPs on the basis of contributions from the relevant groups. The work was coordinated by Mr. R. Barton (Australia), Acting Chairman of CPM-99 and Mr. E. Behdad (Islamic Republic of Iran), Vice-Chairman of CPM-99. Staff of the Radiocommunication Bureau provided the required assistance. The draft CPM Report was distributed to all Members of the ITU and to members of the Radiocommunication Sector wishing to participate in the CPM as Document CPM 99-2/1.

The CPM-99 met in Geneva from 15 to 26 November 1999 under Chairmanship of Mr. R. Barton (Australia), Mr. E. Behdad, Vice-Chairman (Iran), assisted by Mr. A. Nalbandian, ITU Counsellor to consider the draft CPM Report (Document CPM 99-2/1), together with contributions from the ITU membership and additional material submitted by the Radiocommunication Bureau.

XXX delegates participated from **YY** ITU Member States, **ZZ** Radiocommunication Sector Members, including **UU** international organizations.

AAA contributions including the draft CPM Report (Document CPM99-2/1) and the SCPRM Report (Document CPM99-2/2) were submitted for consideration by the CPM-99.

At CPM-99 the contributions were attributed to Working Groups 1 – 7 for preparation of the final text for each Chapter according to the following adopted structure.

Chairman, CPM-99: Mr. R. Barton (Australia)
Secretary, CPM-99: A. Nalbandian (BR)

	Topic	Rapporteur	SC Assistant	BR Secretary
WG 1	**IMT-2000, maritime and aeronautical issues**	C. Van Diepenbeek (Netherlands)	R. Amero (Canada)	F. Leite
WG 2	**MSS and RNSS**	S. Jones (UK)	Not required	Y. Henri
WG 3	**Non-GSO FSS issues**	V. Rawat (Canada)	E. Davison (USA)	J. Li
WG 4	**Space science services and radio astronomy**	R. Jacobsen (Australia)	Not required	A. Matas
WG 5	**Appendices S30 and S30A**	E. Behdad (Iran)	F. Rancy (France)	G. Mesias
WG 6	**FS and FSS**	H. Kimball (USA)	A. Ashman (Australia)	L. Casado
WG 7	**Other matters**	N. Kisrawi (Syria)	F. Williams (USA)	K. Hughes

Chairman, SC Mr. R. Agarwal (India)
Secretary, SC Mr. P. Lundborg (ITU BR)

Editorial work was carried out by a Group chaired by Mr.L. Bourgeat, France and involving Prof. L. Barclay, United Kingdom, Sr. D. Celestino Menéndez, Spain and Mr. C. Langtry, BR Secretary.

The meeting was successful in approving the CPM Report to WRC-2000.

I.4 Presentation and structure of the Report

The Report is structured to follow the topics of the WRC-2000 agenda. Its outline was developed and approved by the first CPM at its meeting in November 1997. A cross-reference list is provided to facilitate finding specific topics within the framework of the WRC-2000 agenda.

The Report comprises eight Chapters and Annex.

Chapter 1 contains material relating to the **IMT-2000, maritime and aeronautical issues (agenda items 1.6, 1.7 and 1.18)**.

Chapter 2 contains material relating to the **Mobile-satellite and radionavigation-satellite services (agenda items 1.9, 1.10, 1.11 and 1.15 (1.15.1 – 1.15.3))**.

Chapter 3 contains material relating to the **Non-GSO FSS issues (Agenda item 1.13 (1.13.1 and 1.13.2))**.

Chapter 4 contains material relating to the **Space science services and radio astronomy (Agenda items 1.16 and 1.17)**.

Chapter 5 contains material relating to **RR Appendices S30 and S30A (Agenda items 1.19, 1.19bis, 1.20 and 1.21)**.

Chapter 6 contains material relating to the **Fixed and fixed-satellite services (Agenda items 1.4, 1.5, 1.8, 1.12 and 1.14)**.

Chapter 7 contains material relating to spurious emissions **(Agenda item 1.2)**, RR Appendix S7/28 **(Agenda item 1.3)**. It also contains information for action by WRC-2000 on the revised ITU-R Recommendations incorporated by reference in the Radio Regulations in accordance with Resolution on 28 (WRC-95) **(Agenda item 2)**, on Resolutions and Recommendations pertaining to issues arising from consideration of Resolution 95 (WRC-97) **(Agenda item 4)** and on **Resolutions of the ITU Plenipotentiary Conference, 1998**.

Chapter 8 contains material relating to the **Progress of studies for future conferences (Agenda item 7.2)**.

The Annex contains a list of the ITU-R Recommendations including certain draft new Recommendations which are referred to in the text of this Report. The final version of this list reflecting the decisions of the 2000 Radiocommunication Assembly will be prepared by the Radiocommunication Bureau and made available to the 2000 World Radiocommunication Conference.

NOTE 1 - As regards Agenda items 4 and 7.1 reports will be submitted by the Director, Radiocommunication Bureau to the WRC-2000.

NOTE 2 – The following terms used in Article S5:

"Designated"

"Identified"

"Intended for use"

"Available for use"

are used with apparently similar and/or different meanings. It was suggested that it would be useful to draw the attention of the Conference to this matter for its consideration.

APPENDIX I.1

RESOLUTION 1130

(APPROVED AT THE TWELFTH PLENARY MEETING)

AGENDA FOR THE WORLD RADIOCOMMUNICATION CONFERENCE (WRC-2000)

The Council,

noting

that Resolution 721 of the World Radiocommunication Conference (Geneva, 1997):

a) resolved to recommend to the Council that a world radiocommunication conference be held in Geneva in late 1999 for a period of four weeks;

b) recommended its agenda, and invited the Council to finalize the agenda and arrange for the convening of WRC-99 and to initiate as soon as possible the necessary consultation with Member States,

resolves

to convene a World Radiocommunication Conference (WRC-2000) in Istanbul (Turkey) from 8 May - 2 June 2000, with the following agenda:

1 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, taking account of the results of the 1997 World Radiocommunication Conference (WRC-97), and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following topics:

1.1 requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution **26 (Rev.WRC-97)**;

1.2 to finalize remaining issues in the review of Appendix **S3** to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation **66 (Rev.WRC-97)** and the decisions of WRC-97 on adoption of new values, due to take effect at a future time, of spurious emissions for space services;

1.3 to consider the results of ITU-R studies in respect of Appendix **S7/28** on the method for the determination of the coordination area around an earth station in frequency bands shared among space services and terrestrial radiocommunication services, and take the appropriate decisions to revise this Appendix;

1.4 to consider issues concerning allocations and regulatory aspects related to Resolutions **126 (WRC-97)**, **128 (WRC-97)**, **129 (WRC-97)**, **133 (WRC-97)**, **134 (WRC-97)** and **726 (WRC-97)**;

1.5 to consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution **122 (WRC-97)**;

1.6 issues related to IMT-2000;

1.6.1 review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary;

1.6.2 identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000;

1.7 review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting operational, distress and safety communications, taking into account Resolution **346 (WRC-97)**;

1.8 to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands;

1.9 to take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service (MSS) in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions **213 (Rev.WRC-95)** and **220 (WRC-97)**;

1.10 to consider results of ITU-R studies carried out in accordance with Resolution **218 (WRC-97)** and take appropriate action on this subject;

1.11 to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions **214 (Rev.WRC-97)** and **219 (WRC-97)**;

1.12 to consider the progress of studies on sharing between feeder links of non-GSO MSS networks and GSO FSS networks in the bands 19.3-19.7 GHz and 29.1-29.5 GHz, taking into account Resolution **121 (Rev.WRC-97)**;

1.13 on the basis of the results of the studies in accordance with Resolutions **130 (WRC-97)**, **131 (WRC-97)** and **538 (WRC-97)**:

1.13.1 to review and, if appropriate, revise the power limits appearing in Articles **S21** and **S22** in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services;

1.13.2 to consider the inclusion in other frequency bands of similar limits in Articles **S21** and **S22**, or other regulatory approaches to be applied in relation to sharing situations;

1.14 to review the results of the studies on the feasibility of implementing non-GSO MSS feeder links in the 15.43-15.63 GHz in accordance with Resolution **123 (WRC-97)**;

1.15 issues related to the radionavigation-satellite service:

1.15.1 to consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments;

1.15.2 to consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the bands 1 215-1 260 MHz and 1 559-1 610 MHz;

1.15.3 to consider the status of allocations to services other than the radionavigation-satellite service (Nos. **S5.355** and **S5.359**) in the band 1 559-1 610 MHz;

1.16 to consider allocation of frequency bands above 71 GHz to the earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution **723 (WRC-97)**;

1.17 to consider possible worldwide allocation for the earth exploration-satellite (passive) and space research (passive) services in the band 18.6-18.8 GHz, taking into account the results of the ITU-R studies;

1.18 to consider the use of new digital technology for the maritime mobile service in the band 156-174 MHz and consequential revision of Appendix **18/S18**, taking into account Resolution **342 (WRC-97)**;

1.19 to consider the report of the inter-conference representative group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system;

1.19*bis* in accordance with Article S14, to consider objections expressed by administrations with respect to the Radio Regulations Board's Rules of Procedure relating to the application of RR 2674/S23.13 in order for the Bureau to modify its findings in accordance with the conclusions of the Conference;

1.20 to consider the issues related to the application of Nos. **S9.8**, **S9.9** and **S9.17** and the corresponding parts of Appendix **S5** with respect to Appendices **S30** and **S30A**, with a view to possible deletion of Articles 6 and 7 of Appendices **S30** and **S30A**, also taking into consideration Recommendation **35 (WRC-95)**;

1.21 to consider the report from the Radiocommunication Bureau on results of the analysis in accordance with Resolution **53 (WRC-97)** and take appropriate actions;

2 to examine the revised ITU-R recommendations incorporated by reference in the Radio Regulations in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution **27 (Rev.WRC-97)**;

3 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the Conference;

4 in accordance with Resolution **95 (WRC-97)**, to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

5 to review, and take appropriate action on, the report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the Convention (Geneva, 1992);

6 to identify those items requiring urgent action by the radiocommunication study groups in preparation for the next world radiocommunication conference;

7 in accordance with Article 7 of the Convention (Geneva, 1992):

7.1 to consider and approve the report of the Director of the Radiocommunication Bureau on the activities of the Radiocommunication Sector since WRC-97;

7.2 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent Conference and on possible agenda items for future conferences,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-2000,

instructs the Secretary-General

1 to make all the necessary arrangements, in agreement with the Director of the Radiocommunication Bureau, for the convening and holding of the Conference;

2 to communicate this Resolution to concerned international and regional organizations.

CPM Report to WRC-2000

CONTENTS

CHAPTER 1

IMT-2000, maritime and aeronautical issues

(WRC-2000 agenda items 1.6, 1.7 and 1.18)

CONTENTS

IMT-2000, maritime and aeronautical issues

1.1 Agenda item 1.6

"Issues related to IMT-2000"

§ 1.1 is subdivided into 3 parts. Part A contains a general introduction to IMT-2000. Part B describes the spectrum requirements for IMT-2000, subdivided into part B.1 relating to the terrestrial component and part B.2 relating to the satellite component. Part C provides information to the readers on agenda items 1.6.1 and 1.6.2.

Part A - General introduction to IMT-2000

International Mobile Telecommunications-2000 (IMT-2000) is the ITU vision of global mobile access in the 21st century. Scheduled to start service around the year 2000 subject to market and other considerations, IMT-2000 is an advanced mobile communications concept intended to provide telecommunications services on a worldwide scale regardless of location, network, or terminal used. Through integration of terrestrial mobile and mobile-satellite systems, different types of wireless access will be provided globally, including services available through the fixed telecommunication networks and those specific to mobile users. IMT-2000 proposes a range of mobile terminal types, linking to terrestrial and/or satellite-based networks, and the terminals may be designed for mobile or fixed use.

The key features of IMT-2000 are:

a) high degree of commonality of design worldwide;

b) compatibility of services within IMT-2000 and with the fixed network;

c) high quality;

d) small terminals for worldwide use;

e) worldwide roaming capability;

f) capability for multimedia applications and a wide range of services (e.g. video-teleconferencing, high speed Internet, speech and high rate data).

As the ITU provides the best means of ensuring that IMT-2000 will meet the telecommunications needs of all regions across the world, the ITU-R and ITU-T Sectors are developing a set of interdependent Recommendations pursuant to IMT-2000.

At WARC-92, 230 MHz of spectrum[1] was identified for FPLMTS[2] via a provision (No. **S5.388**) in the Radio Regulations (RR). However, due to the tremendous growth in mobile communications since then, and the demand for wideband multimedia capability, the expected demand for additional IMT-2000 spectrum after the initial deployment must be considered.

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[1] This frequency spectrum was identified based on calculations that are now documented in Recommendation ITU-R M.687-2.

[2] IMT-2000 was formerly known as FPLMTS (Future Public Land Mobile Telecommunications Systems).

WRC-97 decided that WRC-2000 should review the spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that "... there is an urgent need to provide spectrum for the terrestrial component".

In addition, WRC-97 decided that WRC-2000 should address agenda item 1.6.2, "the identification of a global radio control channel, to facilitate multimode terminal operation and worldwide roaming of IMT-2000". Resolution **212 (Rev.WRC-97)**, originally devised at WARC-92, summarizes the developmental, spectrum, and regulatory issues pertinent to IMT-2000.

Part B - Spectrum requirements for IMT-2000

In line with continuing technological advancements, more and more users will demand more and more capabilities from mobile services. Future mobile services must support not only speech but also a broad range of new telecommunication services that will serve a wide range of applications, as described in Recommendation ITU-R M.816. Bearer services supporting applications such as multimedia, internet access, imaging and videoconferencing will be needed in IMT-2000.

Forecasts of the spectrum requirements of the terrestrial and satellite components of IMT-2000 have been developed in Report ITU-R M.[IMT.SPEC]: "Spectrum requirements for IMT-2000". This Report uses expected market forecasts and assumptions on the operations of IMT-2000, for different environments and services, to determine the projected overall and additional spectrum requirements for IMT-2000.

For technical reasons (for instance propagation factors and terminal design), consideration of the additional spectrum requirements for IMT-2000 have focused on the same general frequency range as the original spectrum identified for IMT-2000; that is, below 3 GHz. For higher data rates, and where the user is stationary or nearly stationary, it may be desirable to utilize frequency bands above 3 GHz.

Part B.1 - Terrestrial component

Spectrum requirements for the terrestrial component of IMT-2000 were estimated in the CCIR Report to WARC-92, and those calculations are now documented in Recommendation ITU-R M.687-2. The estimation of a minimum requirement of about 230 MHz was the basis for the WARC-92 decision to identify spectrum in No. **S5.388**. At the time, speech services were considered to be the major source of traffic, and only low data rate services were additionally considered. Furthermore, usage of the mobile services has increased substantially since 1992, and has overtaken the estimations of that time.

Since WARC-92, the market for personal communications has expanded significantly, and, as well, it has become apparent that data applications, in particular multimedia applications, would play a major role in mobile radiocommunication services in the 2000-2010 time-frame. This will create a requirement for additional spectrum for IMT-2000 in the latter portion of the decade. Data rates up to 2 Mbit/s are anticipated in IMT-2000 Phase 1. The total spectrum requirement for terrestrial mobile services, calculated according to the methodology in Report ITU-R M.[IMT.SPEC], has assumed services with bit rates up to 2 Mbit/s only.

Report ITU-R M.[IMT.SPEC] concludes that there is a forecasted need for 160 MHz of additional spectrum for the terrestrial component of IMT-2000, beyond the spectrum already identified in No. **S5.388** and beyond the spectrum used in the three Regions for first and second generation mobile systems.

In calculating this forecasted spectrum need for geographical areas where the traffic is the highest, Report ITU-R M.[IMT.SPEC] applies the detailed methodology provided in Recommendation ITU-R M.1390 to the expected deployment of mobile systems in the three Regions for the year 2010.

The forecast used in Report ITU-R M.[IMT.SPEC] is a composite of information submitted in 1998 to ITU-R by several administrations from the three Regions.

Because IMT-2000 will provide high data rate services in addition to those services that are already provided by second generation mobile systems, it was not considered feasible to delineate in the forecasts IMT-2000 usage from existing systems' usage. Report ITU-R M.[IMT.SPEC] notes that these new services may have asymmetrical spectrum requirements. To determine the additional IMT-2000 terrestrial component spectrum requirement in the year 2010, it is necessary to subtract not only the spectrum already identified in No. **S5.388** for terrestrial IMT-2000, but also the spectrum used for first and second generation mobile systems from the total forecasted terrestrial mobile spectrum requirement. This is summarized in Table 1-1 below. There are some countries with different amounts of existing spectrum.

TABLE 1-1

Forecasted requirements for terrestrial spectrum

Region	**Total forecasted requirement for terrestrial mobile spectrum for the year 2010 (MHz)**	**Identified total for terrestrial mobile spectrum (including No. S5.388 IMT-2000 spectrum) (MHz)**	**Forecasted additional requirement for IMT-2000 terrestrial component spectrum for the year 2010 (MHz)**
Region 1	555	395	160
Region 2	390	230	160
Region 3	480	320	160

NOTE - The figures in the table above represent the requirement in those geographic areas where the traffic is the highest.

It is apparent that the frequency bands identified in No. **S5.388** are not likely to be used in a harmonized way globally in the short term due to the use of parts of this spectrum by pre-IMT-2000 systems in some countries. This is also the case at some other frequency bands (e.g. 800/900 MHz, and 1 800 MHz) where some countries will not make spectrum available for IMT-2000 before the long term, as it is used for first or second generation cellular systems with high level of investments, considerable amounts of traffic and different frequency plans. This therefore complicates the adoption of harmonized frequency plans (same uplink/downlink bands, duplex separation etc.) in these parts of the spectrum. Due to the need of having some globally harmonized frequency plans to ease roaming, it is particularly important to identify some additional spectrum for IMT-2000 where there is a reasonable chance of achieving a common frequency plan worldwide.

The spectrum forecasts are based on IMT-2000 traffic estimates up to the year 2010. The frequency bands for IMT-2000 would need to be identified for deployment well in advance of the year 2010 to allow adequate time for administrations to conduct domestic consultations, to license new radio systems, to transition, where required, existing systems from the affected bands and to deploy advanced mobile applications in the context of IMT-2000.

Part B.2 - Satellite component

The Report of the CPM to WRC-95 indicated that a total allocation for MSS of between 2 x 75 MHz and 2 x 150 MHz would be required by 2005 (Chapter 2, part A.2, § 3). Two years later, the Report of the CPM to WRC-97 indicated that 2 x 250 MHz would be necessary by 2010 (§ 4.2.6). A large number of satellite systems have been published in advance by ITU for the MSS frequency bands between 1 and 3 GHz; more than 150 systems in the 1.5/1.6 GHz bands, more than 50 systems in the 1.6/2.4 GHz bands, almost 100 systems in the 2 GHz band and about 75 systems in the 2.5/2.6 GHz bands. Some of these systems have been filed in more than one of the bands. It is expected that some systems will not be implemented due to financial or other reasons. Nevertheless, the number of filings demonstrate the very large interest in providing MSS in the 1-3 GHz range.

Report ITU-R M.[IMT.SPEC] concluded that there is a forecasted need for mobile-satellite spectrum as shown in Table 1-2. In calculating this spectrum need, Report ITU-R M.[IMT.SPEC] applies the detailed methodology provided in Recommendation ITU-R M.1391 to traffic estimates on the future demand for mobile satellite communications. The total MSS spectrum requirement is larger than that for the satellite component of IMT-2000 alone (see Table 1-2 and in the Introduction to Chapter 2).

TABLE 1-2

Forecasted requirements for global mobile-satellite spectrum, including IMT-2000 satellite component (MHz)

	Year 2005	**Year 2010**
IMT-2000 (satellite component)	2 x 31.5	2 x 67
Total MSS (including IMT-2000 satellite component)	2 x 123	2 x 145

NOTE - The figures in the table above represent the requirement in those geographic areas where the traffic is the highest.

In the various Regions, consideration should be given to the existing spectrum assigned for pre-IMT-2000 MSS services. Because the "Total MSS" spectrum calculation includes both pre-IMT-2000 and IMT-2000 services, a subtraction of the existing satellite spectrum allocated to the pre-IMT-2000 services must be performed to determine the additional satellite spectrum required for the IMT-2000 satellite component in the years 2005 and 2010. This subtraction has not been done in Report ITU-R M.[IMT.SPEC], due to the variation across Administrations of the spectrum allocated to pre-IMT-2000 satellite services.

Part C - Detailed information on agenda items 1.6.1 and 1.6.2

1.1.1 Agenda item 1.6.1 - terrestrial component

"review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary"

1.1.1.1 Spectrum vision for IMT-2000 terrestrial component

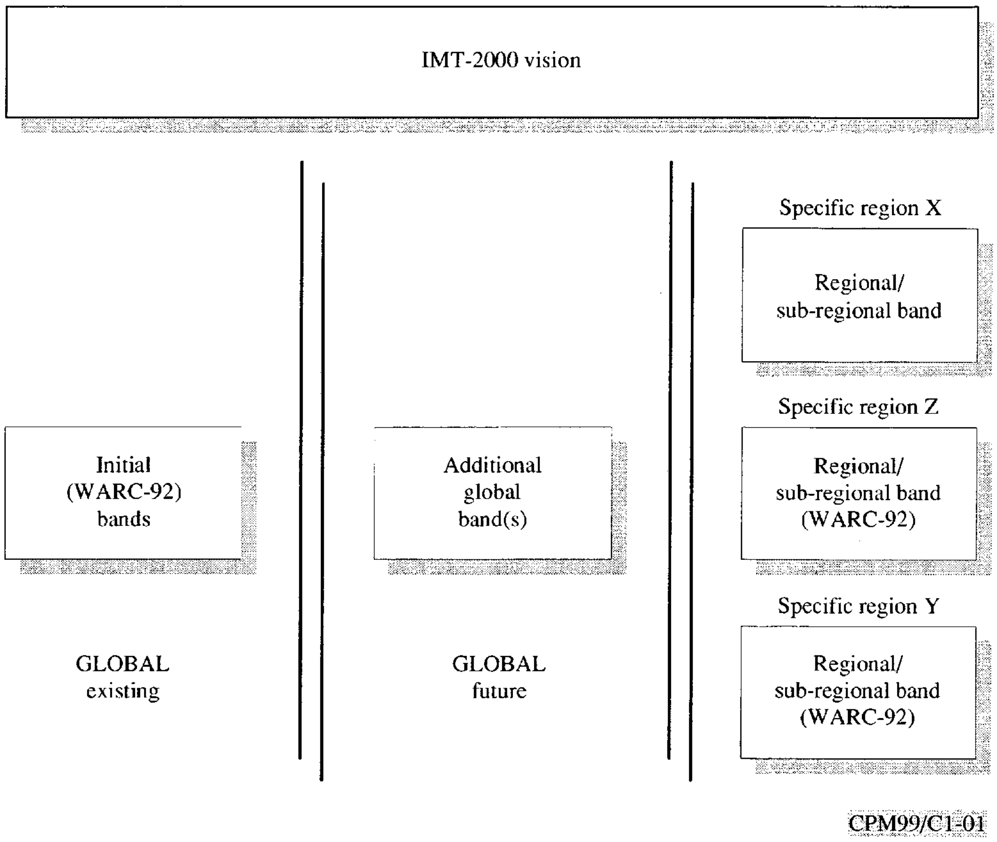
As explained in part B.1, there is a projected requirement for additional spectrum beyond that identified in No. **S5.388**. Although highly desirable it must be recognized that it will be difficult to find a global band or bands to meet the total additional spectrum demand. It may however be feasible to find a portion of this total demand on a global basis and the remainder on a regional basis. The concept in Fig. 1-1 provides a possible solution for a flexible use of spectrum for IMT-2000.

It is desirable to meet the projected IMT-2000 spectrum requirement of an additional global 160 MHz, as concluded in the studies undertaken in ITU-R, by identifying a limited number of contiguous global bands. This will reduce the cost, size and complexity of IMT-2000 terminal and network equipment and deployment, and provide the economies of scale for the mass market.

Equipment manufacturers recommend that administrations should not rely on future, possibly costly, technological advancements (e.g. multimode, multiband reconfigurable or fully digitized "software" radios, and adaptive antennas) to provide sufficient spectrum management flexibility and address the difficulties caused by band fragmentation, in order to offer global services without global spectrum. Manufacturers also considered that to do so may lead to unnecessary delay in implementing global services and result in roaming complications for customers, manufacturers and operators.

The need for additional spectrum for IMT-2000 may be met either from those bands already allocated to the mobile service or from new allocations to the mobile service or both, taking into account ITU-R studies and the needs of existing radio services. In considering a new allocation to the mobile service, account should be taken of sharing constraints associated with the current and potentially future uses of the services currently allocated.

FIGURE 1-1
Spectrum vision



Existing frequency bands allocated to the mobile service in which first or second generation mobile systems are in operation could be used for IMT-2000, via evolution. Indeed, because most existing mobile system technologies are already deployed in a variety of frequency bands, it is likely that first and second generation mobile system operators will eventually wish to implement IMT-2000 technology. This assumes that IMT-2000 meets operators' marketplace needs and provides an evolution path that facilitates implementation from pre-IMT-2000 systems. Providing compatibility between the frequency plans of first and second generation systems and those of future IMT-2000 systems will allow operators to evolve their networks without service disruption or imposing an unnecessary cost burden on network operators while minimizing possible interference.

Therefore, frequency bands used for first and second generation systems are natural candidates for IMT-2000 extension. However, as pointed out in part B.1, in some countries these bands will be made available for IMT-2000 only in the long term. In addition, these bands are not harmonized worldwide, and the timing of introduction of IMT-2000 systems in these bands will vary amongst countries, making it difficult to implement a single frequency plan on a global basis.

Any provision of IMT-2000 spectrum at WRC-2000 should be based on meeting the estimated spectrum requirement for geographic areas where the traffic is the highest, so that administrations which are expecting to have such requirements can adequately meet their projected IMT-2000 spectrum needs. However, it should be recognized that some administrations may not be able to, nor need to implement all of the IMT-2000 spectrum requirements on a national level, in the projected time-frame, owing to the structure of their own national market and the needs of other services in their countries. In such cases, in order to facilitate global operation of IMT-2000 it would be possible to consider identifying those portions of the IMT-2000 bands which can be globally harmonized so that administrations will be able to give first consideration to the use of those global bands.

It is most likely that the spectrum identified for IMT-2000 will consist of initial spectrum and additional frequency bands, which should be made available on a global basis to the maximum extent possible.

Initial (WARC-92) bands (1 885-2 025 MHz and 2 110-2 200 MHz): These initial bands are defined in No. **S5.388** where initial deployment of IMT-2000 systems could preferably be made. These are the bands currently identified in the RR for use by all administrations wishing to implement IMT-2000. Many countries are transitioning existing services in this spectrum and have planned introduction of IMT-2000. However, some Administrations may deploy IMT-2000 systems through an evolutionary process in bands other than those defined in No. **S5.388** (see Fig. 1-1).

Additional global bands: These bands are envisaged as worldwide bands for IMT-2000. Additional global bands are intended for the traffic demand which could not be accommodated in the initial bands. It would be desirable that the expansion of traffic estimated for 2010 could be absorbed by these bands. At least a portion of the global band(s) could be used in a harmonized way to facilitate global roaming (see Fig. 1-1).

Regional and subregional bands[3]: These additional bands may differ in frequency range and size from region to region. Such bands could be used as an overflow band for regions where higher capacity is needed, because of high population density and high penetration rate regarding mobile communications or for fixed applications using IMT-2000 standards. To promote the global concept of IMT-2000, these bands should be identified, as far as possible, as an exception and not as a rule (see Fig. 1-1).

1.1.1.2 Summary of technical and operational studies

a) List of relevant ITU-R Recommendations addressing sharing studies that are relevant to this agenda item

Sharing between IMT-2000 and other services: Recommendations ITU-R M.687-2 and ITU-R M.1036-1;

Sharing between space research, space operations or earth-exploration services and the mobile service: Recommendation ITU-R SA.1154;

Sharing between radionavigation and other services: Recommendation ITU-R M.[RAD.PROC];

Performance characteristics and operational conditions for HAPS providing IMT-2000: Recommendation ITU-R M.[IMT.HAPS].

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[3] Regional and subregional bands relate to bands not identified globally, but rather to bands that are available either in one or more of the ITU Regions 1, 2 or 3, or in a part of an ITU Region only.

b) List of ITU-R Recommendations containing interference protection criteria and operational and technical characteristics that directly address the candidate bands for additional IMT-2000 spectrum (§ 1.1.1.3.3)

- Radiodetermination service: Recommendation ITU-R M.[RAD.CHAR2];
- Radio astronomy service: Recommendation ITU-R RA.769-1;
- Fixed service: Recommendation ITU-R F.758-1.

c) Additional relevant technical information

A number of the ITU-R Recommendations contain information on interference protection criteria and other information that, while not directly addressing potential IMT-2000 spectrum usage, may be useful for IMT-2000 sharing, evolution of first and second generation to IMT-2000, technical and operational studies:

- Radio astronomy service: Recommendation ITU-R RA.1031-1;
- Fixed service: Recommendations ITU-R F.1242, F.1098-1, F.1243, F.283-5, F.382-7, F.701-2, F.759, F.389-2, F.755, F.758-1, F.1334, F.1094-1, F.1241, F.1331, F.1245, F.1336 and F.699-4;
- Broadcasting service*: Recommendations ITU-R BT.1368-1, BT.417-4, BT.798-1, BT.655-1 and ITU-R IS.851-1;
- Broadcasting-satellite service (sound): Recommendation ITU-R BO.1130-1;
- Mobile service: Recommendation ITU-R M.1040 and draft new Recommendation ITU-R M.[8B/XA];
- Amateur service: Recommendation ITU-R M.1044;
- Earth exploration-satellite, space research and meteorological aids services: Recommendations ITU-R SA.1016, SA.1027-2 and SA.1157;
- Radiodetermination service: Recommendations ITU-R M.1313, M.629, M.[RAD.CHAR3] and M.[RAD.CHAR4];
- Evolution to IMT-2000: Recommendations ITU-R M.1308, M.1033 and M.1073.

1.1.1.3 Analysis of the results of studies

Limited sharing studies conducted to date within ITU-R indicate that IMT-2000 systems generally cannot share spectrum in the same geographical area with other radio operations in the mobile, mobile-satellite and other radio services. Use of spectrum on a co-channel basis with other radio operations may be feasible only through geographic separation. Nevertheless, it is recognized that the frequency bands most suitable for IMT-2000 are already heavily utilized by other operations in some geographic areas. It would be desirable for ITU Member States and Sector Members to undertake studies, and submit them to the ITU prior to WRC-2000, to determine whether certain IMT-2000 applications (e.g. indoor) are able to share spectrum with other IMT-2000 applications (e.g. outdoor vehicular).

* In relation to the broadcasting service, ITU-R is performing studies to assess spectrum requirements for these services in the light of their transition to digital technology.

1.1.1.3.1 Relevant ITU-R sharing studies

Recommendation ITU-R M.687-2 contains the conclusions of studies relating to the possibilities for IMT-2000 to share with other operations in the mobile, mobile-satellite and other radio services. From these studies, IMT-2000 may be able to share band allocations with fixed and possibly other services only where there is suitable geographic separation (e.g. urban/rural) between operations, or where neither operation requires the total allocated bandwidth. The economic cost associated with sharing has not been included in these considerations. The IMT-2000 with adaptive channel assignment will greatly facilitate sharing and will simplify the introduction of IMT-2000 into bands currently used by other radio operations. The relative geographic separation will depend on detailed system parameters. However, it is emphasized that co-channel sharing between the fixed service and IMT-2000 requires adequate geographic separation. Considering these factors, any Recommendation of the ITU-R F-series on fixed service channelling arrangements for potential IMT-2000 frequency bands may be useful in determining how to facilitate IMT-2000 deployment in bands that are co-located to the fixed service.

No. **S5.391** emphasizes that high-density mobile systems shall not be introduced in the bands 2 025-2 110 MHz and 2 200-2 290 MHz. Regarding the use of these bands by space science service missions, the demand for access to these bands continues to grow for both developed and developing countries. Several years of extensive studies within ITU-R have led to the adoption of a number of Recommendations which provide a stable long-term sharing environment between the space science services on one side, and various fixed service systems and some specific mobile service systems on the other side. The results of these studies were considered by WRC-97 which prepared Recommendation **622 (WRC-97)** for consultation when considering any changes in the regulatory provisions in the 2 025-2 110 MHz and 2 200-2 290 MHz bands. Any change in the present regulatory status would affect all the systems currently sharing these bands. In view of the above and the continuing extensive use of these bands by space services over the entire bandwidth as well as the terrestrial services, the allocation status of these bands should not be changed.

In the band 2 290-2 300 MHz, there are currently around ten very sensitive earth stations operating in the deep space research service. This number is expected to increase by a factor of two in view of planned new deep space activities. Studies carried out in ITU-R have revealed that sharing on a geographical separation distance may be feasible but would involve large coordination distances (1 400 km for Zone C locations, 390 km for Zone A locations) and practical separation distances of approximately 400 km based on interference from a single transmitter. Interference from a large number of transmitters has not been studied yet but will increase required separation distances.

The large separation distances required to protect earth stations operating in the space research (deep space) service would impose significant constraints on IMT-2000 systems. IMT-2000 operations would not be possible in all geographical areas. An appropriate footnote may be required to assure protection and continued availability of the use of this band by the space research service.

Recommendations ITU-R M-series (§ 1.1.1.2 a)) contain technical and operational characteristics and protection criteria of radiodetermination systems for use when assessing the compatibility of these services with other services in frequency bands under consideration as candidate bands for IMT-2000 (§ 1.1.1.3.4). It is vital to note that the radionavigation service operating in these bands is a safety service as specified by No. **S4.10** and provides a safety of life function, therefore requiring special measures to ensure their freedom from harmful interference. Appropriate technical and operational characteristics are required to determine the feasibility of introducing new types of systems or services in the bands between 420 MHz and 3.4 GHz, in particular the band 2 700-2 900 MHz that is identified in this report as an IMT-2000 candidate band, used by radionavigation and meteorological radars. Because the radiodetermination and meteorological radars perform indispensable functions and because their missions have requirements for large bandwidths in particular frequency bands, it is necessary to show by comprehensive studies that potential reallocations of radiodetermination and/or meteorological radar allocations will not erode their ability to perform their essential functions.

Given the technical characteristics of the radionavigation, radiolocation and meteorological radars (e.i.r.p. in the order of 1 GW in some systems and the trend towards high duty cycles) and the need to operate in accordance with the protection criteria contained in the Recommendations ITU-R M-series referenced in § 1.1.1.2 c), sharing with IMT-2000 systems is considered to be feasible only when explicitly confirmed by ITU-R sharing studies.

Regarding High Altitude Platform Stations (HAPS)[4], preliminary studies based on certain assumptions concluded that co-channel sharing and coordination with other IMT-2000 services operating according to Recommendation ITU-R M.1036-1, appears feasible under certain circumstances using terrestrial coordination procedures where the HAPS employs high performance antennas, CDMA radio interface with FDD access formats, and metropolitan size coverage areas, where similar CDMA radio interface with FDD access formats are used in the ground-based terrestrial systems. HAPS systems can be designed using filters or guardbands that limit out-of-band emission levels in compliance with permissible interference levels of receiving mobile stations or mobile earth stations. Recommendation ITU-R M.[IMT.HAPS] provides minimum performance requirements for HAPS for operation within IMT-2000, together with methods to evaluate the impact of interference caused by transmission of these HAPS. The impact of IMT-2000 terrestrial systems on HAPS operation and the possibility of sharing between HAPS providing IMT-2000 and services other than fixed and mobile has not been studied.

1.1.1.3.2 Considerations on sharing and transitional arrangements for the IMT-2000 candidate bands

It is expected that the use of IMT-2000 mobile applications will be most prominent in urban areas. Fixed systems operating in possible IMT-2000 candidate bands in rural areas or in areas with sufficient separation distance from IMT-2000 service areas may not be impacted and may be able to share. Fixed systems operating in or near highly congested IMT-2000 service areas may be able to re-establish service in other bands (for example, see Recommendation ITU-R F.1098 for point-to-point fixed systems). It should be noted that the deployment of IMT-2000 systems will take place over a period of time, giving time for the affected systems to migrate to another band, if necessary.

In cases where there is concern about potential interference to space operations and space research systems in possible IMT-2000 candidate bands, practical mitigation techniques may be available. In addition, where aggregate interference problems are anticipated, space operations/research facilities could possibly migrate to other bands, noting this transition period could be significant. (See section 1.1.1.3.1, paragraph 2, NOTE - Reference to space science services includes space operations and space research.)

In certain countries, where frequency bands are used for aeronautical-mobile telemetry operations, and where aggregate interference to these systems from existing mobile and/or fixed systems, and/or IMT-2000 systems is of concern, it may be possible to develop operational and technical mitigation

[4] It should be noted that issues related to HAPS, other than those concerning IMT-2000, are to be considered by the WRC under agenda item 1.5 (see § 6.2 of this report).

measures to address the situation, or to consider migration of aeronautical-mobile telemetry systems to other bands.

In those cases where sharing is impossible (in particular for aeronautical and meteorological radars) the only way to solve the problem of implementing IMT-2000 would be transition of the existing services to other frequency bands.

Significant financial investment may be required for the migration of systems to other bands. In addition, considerable effort may be required to locate suitable spectrum for these systems. However, it should be noted that geographical sharing may minimize transition costs.

1.1.1.3.3 Relevant ITU-R studies on evolution of first and second generation systems to IMT-2000

Recommendation ITU-R M.1308 provides guidelines for developers of pre-IMT-2000 systems who intend to evolve their systems towards IMT-2000. ITU-R M.1308 does not directly address the selection of additional bands for IMT-2000. However, it presents important information about the ability of earlier generation systems to evolve/migrate to IMT-2000, the coexistence issues and compatibility between second and third generation systems, and the need for flexibility to provide for multi-environment, multimode, and multiband capabilities.

1.1.1.3.4 Candidate bands for additional IMT-2000 terrestrial spectrum

Possible candidate bands for additional terrestrial IMT-2000 spectrum are given in Table 1-3 below.

Further information regarding the use of these bands (and others) may be found in Report ITU-R M.[IMT.SURVEY].

TABLE 1-3

Possible candidate bands for the terrestrial component of IMT-2000

Frequency band **470-806** MHz
This band is allocated to the broadcasting service worldwide. In addition, the band is also allocated on a co-primary basis in Region 3 to the fixed and mobile services and in Region 1, 790-806 MHz is also allocated to the fixed service on a co-primary basis. This band is mainly used for analogue broadcasting at the present time. The introduction of digital television is planned in many countries. This will be accomplished by introducing digital transmission in the currently used channel spacing and this is expected to facilitate the implementation of other radio services, including mobile, over a period of time. A transition period of perhaps 10-15 years is foreseen during which both digital and analogue transmissions will be in parallel. One administration has already planned to allow non-broadcasting use of parts of this band (i.e. 698-746 MHz and 746-764/776-794 MHz), possibly for cellular mobile service.

The frequency band 606-614 MHz (or 608-614 MHz) is allocated to radio astronomy in several countries (Nos. **S5.304**, **S5.305**, **S5.306** and **S5.307**). Several terrestrial services are also allocated in various part of the bands (see also Nos. **S5.291** to **S5.302** and **S5.309** to **S5.316**). In particular, there is heavy use of the lower part of the band (470-520 MHz) by fixed and mobile applications in some countries.

Due to the nature of analogue television planning the vacant channels in specific areas have found widespread application of low-power services such as wireless microphones and biomedical telemetry.

In most countries, television channels are assigned on the basis of regional or bilateral agreements. Digital television plans have to be established and new regional or bilateral agreements made.

Studies have been initiated in ITU-R to establish the future spectrum requirements for digital broadcasting.

Advantages

Introduction of digital broadcasting (with better spectrum efficiency) in the band and the ultimate phase-out of analogue TV should allow future consideration of other services in spectrum not required for digital television. In the contrary case, where identification of harmonized spectrum would not be possible, harmonized frequency plans should be developed in the whole band allowing compatible operation of IMT-2000 independently from the different sub-bands made available in different countries.

Coordinated transitioning to digital TV might facilitate the possibility of identifying harmonized spectrum within this frequency range for IMT-2000.

Disadvantages

Parts of the band are already used in some countries by some other services and such use may continue.

In most countries, the availability of TV spectrum, following phasing out of analogue TV is uncertain. Furthermore, the phasing out of analogue TV will vary between countries and is not expected to occur in many countries until after the 2005-2010 time-frame.

It is expected that spectrum demands for TV broadcasting will be greater during the transitional period and possibly beyond, on account of parallel operation of these services.

Frequency band **806-960** MHz

This band is allocated worldwide to the fixed, mobile and broadcasting services on a co-primary basis, except that in Region 2 the allocations in the bands 890-902 MHz and 928-960 MHz are to the fixed and mobile services only, and in the band 902-928 MHz it is to the fixed service.

A large part of this band is currently used for mobile systems for both PMR and cellular. Timing of availability for IMT-2000 will vary in different countries, from short-term availability to longer-term availability for regulatory, economic and other reasons.

Cellular systems in this band are using various frequency plans such as:

824-849 MHz paired with 869-894 MHz

880-915 MHz paired with 925-960 MHz

810-828 MHz and 860-885 MHz paired with 915-958 MHz; 893-895 MHz paired with 838-840 MHz; and 843-846 MHz paired with 898-901 MHz.

In those countries currently using part of this band for analogue broadcasting (up to 862 MHz), the transition to digital broadcasting may allow future use of this spectrum for IMT-2000.

Different portions of this band are used in various countries for fixed, amateur and radiolocation services. Also, the frequency band 902-928 MHz is an ISM band in Region 2.

Due to the nature of analogue television planning the vacant channels in specific areas have found widespread application of low-power services such as wireless microphones and biomedical telemetry.

In most countries, television channels are assigned on the basis of regional or bilateral agreements. Digital television plans have to be established and new regional or bilateral agreements made. Studies have been initiated in ITU-R to establish the future spectrum requirements for digital broadcasting. In many countries, in particular in some developing countries, transition to digital broadcasting is envisaged to start in this frequency range. **Advantages** IMT-2000 could be introduced in some bands currently used by existing systems, such as cellular. The use of the same frequency bands for IMT-2000 can assist in the evolution of first and second generation cellular systems to IMT-2000. **Disadvantages** Parts of this band are already used in some countries by some other services and such use may continue e.g. TETRA, railway-GSM, television broadcasting, ancillary broadcasting services, radiolocation and tactical radio relay and fixed wireless access in rural areas. In countries where this band is currently used extensively for existing mobile services, availability of this band for IMT-2000 can only be made progressively in the longer term as existing use decreases. Time-scales for availability of this band for IMT-2000 may differ. Different band plans for existing cellular mobile systems are currently used in different countries. Administrations are likely to want to retain the same band plan for IMT-2000. If administrations decide to retain the same band plans, it is likely to be a barrier to achieve worldwide harmonization of band plans for IMT-2000. In some countries, the availability of TV spectrum following phasing out of analogue TV is uncertain. Furthermore, the phasing out of analogue TV might not occur in the 2005-2010 time-frame.
Frequency band **1 429-1 501** MHz
This band is allocated worldwide to the fixed and mobile services on a co-primary basis. The band 1 452-1 492 MHz is allocated worldwide on a co-primary basis to the broadcasting and broadcasting-satellite services. This band is used for fixed service (such as subscriber multi-access radios for backbone rural telecommunication service), mobile aeronautical telemetry and telecommand. **Advantages** In two countries in Region 3, in the long term, there is a possibility to introduce IMT-2000, based upon an existing second generation mobile system and by phasing out of other existing services in the bands 1 429-1 453/1 477-1 501 MHz. **Disadvantages** The present and planned usage for aeronautical mobile telemetry, FS and digital audio broadcasting, both terrestrial and satellite, may preclude its use for IMT-2000 in many parts of the world. In general, phasing out of existing services would have cost/operational implications.

Several countries in Region 3 have indicated to ITU-R their intention to launch satellite digital sound broadcasting services in the band 1 452-1 492 MHz in accordance with Resolution **528 (WARC-92)**. Being the only worldwide allocation, it provides opportunities to bring broadcasting services to large areas including under-served rural and remote communities. Due to the importance of this band to the international and national infrastructure of many countries, it may not be considered as a viable band for an additional global band for IMT-2000 and may have limited usefulness for IMT-2000.
Frequency band **1 710-1 885** MHz
This band is allocated worldwide to the fixed and mobile services on a co-primary basis. Large parts of this band are used in many countries for second generation mobile systems: 1 850-1 885 MHz: portion of the PCS band, 1 710-1 785 (mobile station transmit)/1 805-1 880 (base station transmit) MHz: GSM 1800, and 1 880-1 885 MHz: portion of the DECT band. Parts of this band are also used by other operations (fixed systems, license-exempt applications). The band 1 755-1 850 MHz is used in some countries for such services as air traffic control, telemetry (ground and airborne) and space operations (see No. **S5.386**). Timing of spectrum availability for IMT-2000 will vary in different countries, from short-term availability to longer-term availability for regulatory, economic and other reasons. **Advantages** As 2nd generation mobile systems have been implemented in this band in many countries, it is a natural candidate for IMT-2000 deployment in those countries, with availability varying from short term to long term. If this band were to be identified for IMT-2000, it is possible that a harmonized frequency plan could be developed for many countries, based upon the 2nd generation mobile systems plans e.g., 1 710-1 755 MHz paired with 1 805-1 850 MHz, with duplex directions as indicated above. Spectrum is contiguous with the currently identified IMT-2000 bands in footnote No. **S5.388**. **Disadvantages** The few countries using a different cellular plan in this band other than the PCS or GSM 1800 indicated above may want to retain their existing cellular band plan for IMT-2000, noting that it might still be possible for countries utilizing a different plan to implement a portion of the 1 710-1 755/1 805-1 850 MHz band. Part of the bands are already used in some countries by some other services and some administrations have indicated that such use may continue for the foreseeable future. One Region 2 and one Region 3 administration have indicated that the band 1 755-1 850 MHz is extensively used for fixed, mobile, including aeronautical mobile and space operations services and is not available for IMT-2000. Existing satellite uplink operations will make the utilization of the band 1 755-1 850 MHz for IMT-2000 difficult in some countries. Coordination of these sites has been completed in accordance with No. **S5.386** for several sites throughout the world.
Frequency band **2 290-2 300** MHz
This band is allocated on a worldwide basis to the fixed, mobile, and space research (deep space) services on a co-primary basis. About ten earth stations are used for deep space research worldwide. The number of earth stations is planned to increase up to 20 within the next decade.

Advantages In some countries, this band is part of the fixed service channel plan which covers the 2.1-2.3 GHz band. Some administrations intend to relocate the fixed service in order to make available the No. **S5.388** bands identified for IMT-2000. Therefore, this band could also be made available following relocation of the fixed service. Coordination with earth stations for deep space research is feasible for licensed applications, although the exact procedure needs to be defined. **Disadvantages** The size of this band is limited, particularly if guardbands are needed to protect adjacent services. Studies to address protection of earth stations for deep space research have indicated that large separation distances of the order of several hundred kilometres are required. IMT-2000 cannot be deployed around these stations. Some administrations have indicated that this band will not be available due to existing uses (space research and fixed services). Introduction of IMT-2000 will result in restrictions on future deployment of space research systems. The use of this band by license-exempt applications is not feasible.
Frequency band **2 300-2 400** MHz
The allocation is to the fixed and mobile services in all Regions on a co-primary basis. In Regions 2 and 3 there is also a primary allocation to the radiolocation service. The band 2 310-2 360 MHz is allocated to the broadcasting-satellite service (sound) in three countries. (See No. **S5.393**). This band is used for aeronautical mobile telemetry and fixed service applications including multipoint distribution systems. This band is allocated worldwide on a secondary basis to the amateur service. **Advantages** Some Region 3 administrations consider this band as a possible candidate for IMT-2000 extension. **Disadvantages** There are a variety of uses of this band throughout the world. Several countries use all or part of these bands extensively for aeronautical mobile telemetry, which is considered vital to support test flight. Telemetry applications cannot be relocated at higher frequencies for a number of reasons, e.g., inability to use directive antennas, increased propagation loss and possibility of non-visibility events. Therefore countries employing telemetry are unlikely to be able to make this band available for IMT-2000. Relocation of the fixed services may be difficult in some countries.
Frequency band **2 520-2 670** MHz
This band is allocated on a co-primary basis to the fixed and mobile (except aeronautical mobile), and broadcast-satellite services in all three Regions. FSS (s-E) is allocated in this band in Region 2 and parts of this band, 2 520-2 535 MHz (s-E) and 2 655-2 670 MHz (E-s) in Region 3. The MSS can also use parts of this band according to Nos. **S5.403** and **S5.420**; some parts of this band are allocated to the broadcasting-satellite service (sound) and complementary terrestrial broadcasting service on a primary basis according to No. **S5.418**. BSS services have been operating in several Region 1 and Region 3 countries for the last two decades, covering large areas in these Regions and MSS services are used in some Region 3 countries.

Satellite broadcasting in this band is used as a complementary broadcasting system of choice, by countries covering many island territories, with particular benefits under high rainfall conditions. This band is used for different services and applications in different countries e.g. for fixed, Electronic News Gathering (ENG)/Outside Broadcasting (OB), fixed wireless access and multipoint distribution applications. **Advantages** Where and when the existing services can be phased out, this band could contribute a significant portion of the required additional spectrum. Since existing BSS and MSS allocations can only be used in a limited way this should not preclude the identification of this band for IMT-2000 under similar provision as contained in No. **S5.388**. Geographical sharing (urban/rural) might facilitate the transition or even enable, in the longer term, remaining operation of other services. Many Region 1 administrations have indicated that they could make this band or portions of it available for the IMT-2000 terrestrial component. Some administrations expressed the view that their ENG and outside broadcast operations are typically tuneable over a large frequency range which may give some flexibility if introducing the terrestrial component of IMT-2000 in this band. **Disadvantages** In a number of countries this band is used for multipoint distribution systems (in some countries extensively) that have been deployed in urban as well as in rural areas. Licenses for this service have been recently granted for extended periods of up to 20 years. Phasing out of these services and BSS and MSS will therefore be very difficult for the foreseeable future. Therefore the use of these bands may be precluded for IMT-2000 in these countries. Some administrations expressed the view that their use of this band for ENG, outside broadcast applications and fixed wireless access backhaul networks would conflict with its use for the terrestrial component of IMT-2000.
Frequency band **2 700-2 900** MHz
This band is allocated, worldwide on a primary basis to the aeronautical radionavigation service (ARNS) and on a secondary basis to the radiolocation service. Meteorological radars can also operate in this band with equality to the ARNS, based on No. **S5.423**. This band is used extensively for radar systems in some countries (aeronautical radionavigation systems and meteorological radars). Unlike other bands in this table, this band is not currently allocated to the mobile service. Since the ARNS is a safety service, the appropriate sharing studies and impact assessment would have to be undertaken to ensure the necessary protection to this service. Initial sharing studies conducted to date have led to different conclusions. Some members support a sharing study between ARNS and meteorological radars and IMT-2000 systems in the 2 700-2 900 MHz band conducted in accordance with Recommendations ITU-R M.[RAD.PROC], [RAD.CHAR2], [IMT.RKEY] and [IMT.RSPC], and Recommendation ITU-R M.687. This initial study places the usability of this band by IMT-2000 systems into question. These members have the view that further comprehensive ITU-R studies are required before this band is considered for IMT-2000.

Some other members support a study that shows that sharing is technically feasible between radars in the ARNS and IMT-2000. This study addressed high traffic areas for IMT-2000, which could have adequate geographical separation from the radars. In addition to the geographical separation, the studies indicated that co-channel sharing would not be possible, and that a frequency separation of at least 5 to 10 MHz would be needed depending on the selectivity of the ARNS radar system.

Advantages

In some countries, a limited number of radar systems are deployed in this band and future usage is under consideration. Therefore, in countries where either existing usage can be phased out or usage is limited and geographical sharing with existing services is possible, this band could possibly be made available for IMT-2000.

Disadvantages

There is uncertainty about the potential impact that IMT-2000 operations would have on the existing aeronautical radionavigation and meteorological use of this band.

A number of administrations have indicated that this band is the primary band for air traffic control and primary airport surveillance radars as well as for meteorological radars. Some administrations as well as some intergovernmental organizations are of the view that the use of this band for aeronautical radionavigation and meteorological radars, at present low in some countries, is expected to increase. In addition, some administrations are of the view that this band will be unavailable for IMT-2000.

Airport surveillance and meteorological radars operating in this band are typically located in or near densely populated areas, where IMT-2000 (terrestrial) spectrum is most needed, which may preclude geographical sharing within some countries. In the view of some administrations IMT-2000 use of this band would lead to spectrum that is not globally available, which is inconsistent with the goals of IMT-2000.

Further ITU-R sharing studies between the potential use of this band by IMT-2000 and incumbent radar systems need to be undertaken.

Band(s) for further study

Some Region 3 countries have indicated their intention to study the allocation in the 3 000-3 400 MHz band, because of high existing usage of the frequency bands below 3 000 MHz in their countries.

Band(s) considered not suitable for IMT-2000

It should be noted that the bands 2 025-2 110/2 200-2 290 MHz are considered not suitable for IMT-2000 since they are and continue to be extensively used by space services as well as the terrestrial services.

1.1.1.3.5 HAPS in IMT-2000 systems operating in bands identified in No. S5.388

No. **S4.15A** limits transmission to and from HAPS to bands specifically identified in the Table of Frequency Allocations. So far, the only bands which are identified as such by No. **S5.552A** are 47.2-47.5 GHz and 47.9-48.2 GHz. The use of HAPS to provide IMT-2000 is therefore conditioned to the identification of the bands identified for IMT-2000 as available for use by HAPS. If such identification is undertaken, it should be limited to those bands currently identified in No. **S5.388.** This is because new bands to be identified for IMT-2000 under this agenda item may have to share with various services having primary and/or secondary allocations. Until now sharing has only been investigated in the existing bands with a primary focus on sharing the delivery of IMT-2000 applications by both terrestrial-based and HAPS-based systems. However, the sharing studies did not thoroughly address some existing applications, such as PCS, MMDS, etc. currently operating in the bands identified in No. **S5.388**.

As a land station in the land mobile service, a HAPS providing IMT-2000 is a base station (No. **S1.69**). There should be no difference between the notification of a HAPS providing IMT-2000 and a conventional base station. It appears that the items required in Annex 1 to RR Appendix **S4** for base stations provide sufficient information for administrations to evaluate the probability of interference according to Recommendation ITU-R M.[IMT.HAPS].

Recommendation ITU-R M.[IMT.HAPS] provides guidance to administrations evaluating the probability of interference from HAPS IMT-2000 systems. It provides a co-channel spectral power flux-density limit on HAPS emissions at an administration's borders. This limit is independent of the exact use of the band by the neighbouring administration. However, as this limit represents a trigger value for coordination purposes, this Recommendation also provides coordination distance at which the interference level is permissible, depending on the HAPS coverage area and on each of the possible uses of the band by the neighbouring administration.

HAPS providing IMT-2000 should not receive any notification or regulatory priority, such as No. **S11.26**, over existing or future IMT-2000 base stations. No. **S11.26** should not apply to the bands identified for IMT-2000.

However, it might be necessary to request the notification of HAPS for information purposes, in order to inform all administrations of assignments that potentially could cause interference.

1.1.1.4 Methods to satisfy the agenda item and their advantages and disadvantages

With regards to the identification of additional spectrum for IMT-2000 to satisfy the agenda item 1.6.1, it is considered that there are two methods. These methods are described below.

Method 1

Additional global or regional/subregional bands could be listed through footnotes in Article **S5**, with appropriate reference to Resolution **212 (Rev.WRC-97)**. The formulation of these footnotes for identification of additional spectrum for IMT-2000 could either be similar to No. **S5.388** or adopt the format of footnotes such as No. **S5.547**, which is used for identification of the High Density Fixed Systems (HDFS) bands.

One alternative in this method is to modify No. **S5.388** to include the additional global bands, and a new No. **S5.YYY** (see § 1.1.1.5.1) would be needed to include the additional regional/subregional bands; both footnotes should have a link to the revised version of Resolution **212 (Rev.WRC-97)** or a new Resolution.

Another alternative is to modify No. **S5.388** to reflect the revised Resolution **212 (Rev.WRC-97)** in combination with the addition of footnotes **S5.XXX** and **S5.YYY** (see § 1.1.1.5.1), specifying the additional global bands and the additional regional/subregional bands respectively, both footnotes having a link to the updated version of Resolution **212 (Rev.WRC-97)** or a new Resolution.

In both alternatives the different dates of availability for the additional IMT-2000 bands could be given in the revised version of Resolution **212 (Rev.WRC-97)** or in the new Resolution.

Advantages

- Having a footnote in the Table of Frequency Allocations for the IMT-2000 additional bands is consistent with the regulatory format adopted at WARC-92 to identify frequency bands for IMT-2000 in No. **S5.388.** The reference to IMT-2000 in the Table of Frequency Allocations highlights the use of these frequencies for IMT-2000 and could therefore facilitate the worldwide implementation of IMT-2000 and global roaming, without preventing administrations to allow other advanced mobile applications in these bands if they wish.
- The harmonization of IMT-2000 spectrum globally is an extremely important issue. There is preference to clearly indicate all IMT-2000 global and regional/subregional frequency bands in a footnote(s) in Article **S5** of the Radio Regulations.

Disadvantage

- This different regulatory format for IMT-2000 systems compared to other mobile systems or radio services which are not footnoted in the RR, could be misinterpreted as giving a different regulatory status to IMT-2000 compared with other systems.

Method 2

Additional global and regional/subregional bands could be listed in a new WRC Resolution or Recommendation, without any specific identification in a footnote to the RR. Different dates of availability for additional IMT-2000 bands could be given in this new WRC Resolution or Recommendation. Administrations may implement IMT-2000 systems in any appropriate frequency bands allocated to the mobile service, therefore footnotes in Article **S5** of the RR are not essential.

One alternative in this method is to maintain unchanged No. **S5.388** and Resolution **212 (Rev.WRC-97)** and to develop a new Resolution listing the additional frequency bands and their of availability.

Another alternative would be to suppress both No. **S5.388** and Resolution **212 (Rev.WRC-97)**, and to develop a new Resolution or Recommendation listing both the initial and additional frequency bands for IMT-2000 and their dates of availability.

Advantages

- Avoids misinterpretation of the regulatory status of IMT-2000 by disassociating any additional spectrum identification for IMT-2000 from the Table of Frequency Allocations.
- Similar to Method 1, the reference to IMT-2000 in a WRC Resolution or Recommendation highlights the use of these frequencies for IMT-2000 without preventing administrations to allow other advanced mobile applications in these bands if they wish.

Disadvantages

- Listing the additional IMT-2000 frequency bands in a new WRC Resolution or Recommendation, without a corresponding reference in a footnote in the Table of Frequency Allocations, gives a different regulatory format to the additional bands compared to the WARC-92 bands identified in No. **S5.388.**
- This might imply a different status between the existing spectrum identified at WARC-92 and the additional IMT-2000 bands. There is also the danger that the Resolution or Recommendation, if not referenced in a footnote, be disregarded by administrations. Furthermore, changing the regulatory format in this way might cause misconceptions that the worldwide implementation of IMT-2000 is becoming a lower priority than originally

envisaged. Although it is not unique, some administrations question whether a Resolution, which does not address a transitional measure, is appropriate without any reference in Article **S5**.

- Concerning HAPS, proposed changes to the RR are given in § 1.1.1.5.2.

1.1.1.5 Regulatory and procedural considerations

1.1.1.5.1 Regarding IMT-2000, exclusive of HAPS

Different methods to satisfy agenda item 1.6.1 are presented in § 1.1.1.4 above.

Some common regulatory provisions are required for the methods proposed whereas for some of the proposals additional specific regulatory provisions are needed. Additionally, there are a number of possible options available to satisfy the methods indicated in § 1.1.1.4 above:

- Specific regulatory provision will be needed for frequency bands not already allocated to the mobile service, in order to allocate them to the mobile service on a primary basis. Where bands are allocated to the mobile service on a primary basis, consideration needs to be given to the method of identifying these bands for IMT-2000, as indicated in § 1.1.1.4 above.
- It is possible that the additional IMT-2000 bands can be indicated either in a new Conference Resolution or Recommendation or through modification of Resolution **212 (Rev.WRC-97)**. This may lead to the suppression or modification of footnote No. **S5.388**.

If following the format of No. **S5.388**, the required footnotes could be structured as follows:

ADD S5.XXX *(Additional global bands for terrestrial IMT-2000)*: The bands [...] are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of these bands by other services to which these bands are allocated. The band should be made available for IMT-2000 in accordance with Resolution **212 (Rev.WRC-2000)** or a new Resolution.

ADD S5.YYY *(Additional regional/subregional bands for terrestrial IMT-2000)*: In [region XYZ/countries ...], the band [...] is also intended for use by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of these bands by other services to which these bands are allocated. The bands should be made available for IMT-2000 in accordance with Resolution **212 (Rev.WRC-2000)** or a new Resolution.

1.1.1.5.2 Regarding HAPS

Concerning the possible implementation of HAPS in an IMT-2000 system, the following regulatory changes could be considered:

ADD S5.HHH In Regions 1 and 3, the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, and in Region 2 the bands 1 885-1 980 MHz and 2 110-2 160 MHz, may be used by high altitude platform stations as base stations to provide IMT-2000. The minimum performance characteristics and operational conditions shall be as defined in Recommendation ITU-R M.[IMT.HAPS].

Though Recommendation ITU-R M.[IMT.HAPS] provides for specific pfd (SPFD) limits at the boundary of neighbouring administrations, unless agreed otherwise between the administrations concerned, it is considered that these matters will need to be adequately addressed in the regulatory texts to be adopted at WRC-2000.

If considered necessary, the WRC may decide to request notification of HAPS.

ADD S11.8A *g)* if it is a high altitude platform station.

For purposes of enabling HAPS operation in the bands identified in No. **S5.HHH**, No. **S11.26** should not apply to the bands identified for IMT-2000.

1.1.2 Agenda item 1.6.1 - satellite component

1.1.2.1 Spectrum vision for IMT-2000 satellite component

WRC-2000 agenda item 1.6.1 includes the satellite component since it is an integral part of IMT-2000, as indicated in Resolution **212 (Rev.WRC-97)**. There must be a viable and operational satellite component to enable IMT-2000 to achieve the objectives stated in Recommendation ITU-R M.687-2, particularly regarding true global coverage.

The IMT-2000 terrestrial component will not be able to provide global coverage, and large geographic areas will remain without terrestrial coverage. The satellite component will provide IMT-2000 services in these geographic areas. Of the population within terrestrial coverage, some IMT-2000 customers will travel for both business and pleasure, to areas without terrestrial coverage. The high penetration expected for IMT-2000 means that some customers will want communications and high mobility anywhere and everywhere they travel. It is only through the combination of IMT-2000 terrestrial and satellite components that true global coverage can be accomplished.

It is also important to note that regions where high terrestrial coverage is anticipated may not be the driving force for determining spectrum requirements for the satellite component of IMT-2000. Rather, the areas of low terrestrial coverage are likely to be the main drivers for satellite IMT-2000 spectrum.

Availability of global spectrum is particularly important for the satellite component. If global spectrum is not available, deployment costs could be prohibitive.

The spectrum vision developed for the terrestrial component in Fig. 1-1 in § 1.1.1.1 is also applicable to the IMT-2000 satellite component. The bands for the satellite component identified in Resolution **212 (Rev.WRC-97)** are 1 980-2 010 MHz and 2 170-2 200 MHz.

As the spectrum needed to support the IMT-2000 satellite component is discussed, it is useful to examine the situation of the 2 GHz MSS allocations identified by No. **S5.388** and Resolution **212 (Rev.WRC-97)** that are intended to be used by the IMT-2000 satellite component. Resolution **212 (Rev.WRC-97)** identifies the bands 1 980-2 010 MHz and 2 170-2 200 MHz for the satellite component of IMT-2000. However, the portion 1 980-1 990 MHz is not available in many countries in Region 2 for the MSS as per No. **S5.389B**. The MSS is also allocated in Region 2 to the 2 010-2 025 MHz and 2 160-2 170 MHz bands.

Non-IMT-2000 MSS systems are not precluded from using these allocations and are likely to do so, thereby reducing the amount of spectrum potentially available to support the IMT-2000 satellite component in this band. Sufficient frequency spectrum needs to be made available, in the year 2005-2010 time-frame, to allow for the possibility of competition.

An important question for WRC-2000 to decide is whether the provision of additional satellite IMT-2000 spectrum comes from frequency bands already allocated to the MSS or if new allocations to the MSS should be made for such purposes. Consideration should be given to identifying existing MSS allocations between 1 and 3 GHz for satellite IMT-2000 applications. It is foreseen that most of the MSS bands between 1 and 3 GHz could be used for IMT-2000 in the longer term. However, the requirement for spectrum for other types of MSS systems also needs to be taken into account.

An important factor when looking at spectrum for mobile-satellite systems is the system replacement and evolution. Satellite systems equipment ages and must ultimately be replaced; however, replacement of this equipment is inherently a long-term process and can be difficult to accomplish. Therefore, use of currently occupied MSS spectrum for future satellite IMT-2000 systems will require substantial planning, investment and coordination with the current operators.

It should be noted that, while future MSS systems will employ advanced techniques, resulting in greater spectrum efficiency than hitherto possible, this improvement has already been accounted for in the satellite spectrum requirements given in part B.2.

1.1.2.2 Summary of technical and operational studies

There are Recommendations listed under the terrestrial component (§ 1.1.1.2) which may also be relevant.

1.1.2.2.1 List of relevant ITU-R Recommendations

Recommendations ITU-R M.1141-1 and M.1142-1 contain or address sharing studies that are relevant to this agenda item.

1.1.2.2.2 Additional relevant technical information

Recommendations ITU-R F.1335 and M.1184 contain information on interference protection criteria and other information that, while not directly addressing potential IMT-2000 spectrum usage, may be useful for IMT-2000 sharing, technical and operational studies.

Other ITU-R Recommendations containing useful information and characteristics for the MSS are: ITU-R M.1091, M.1143-1 and M.1183.

1.1.2.3 Analysis of the results of studies

1.1.2.3.1 Relevant ITU-R sharing studies

It is noted that agenda item 1.9 of WRC-2000 deals specifically with the frequency band 1 559-1 610 MHz (Resolution **220 (WRC-97)**) and 1 675-1 710 MHz (Resolution **213 (Rev.WRC-95)**), which is addressed in § 2.2 of this report. These two bands are not considered further in this section.

1.1.2.3.2 Possible candidates for additional satellite IMT-2000 bands

Consideration on candidates for additional IMT-2000 satellite bands has revealed that the following bands are potential candidates for IMT-2000 (see Table 1-4).

Further information regarding the use of these bands (and others) may be found in Report ITU-R [IMT.SURVEY].

TABLE 1-4

Possible candidate bands for the satellite component of IMT-2000

Frequency bands **1 525-1 559/1 626.5-1 660.5** MHz
These bands are allocated to the MSS on a global basis. 1 525-1 535 MHz is also allocated on a co-primary basis to the space operation service (s-E). 1 525-1 530 MHz is also allocated in Regions 1 and 3 to the fixed service on a co-primary basis. 1 660-1 660.5 MHz is allocated on a worldwide basis to the radio astronomy service on a co-primary basis. In the bands 1 525-1 559/1 626.5-1 660.5 MHz, MSS systems have been in operation for more than ten years. With an increasing number of new operators and increasing demand for MSS services, the bands are now rapidly approaching saturation, as is evident from the continuing regional multilateral coordination activities. Safety communications have priority in the bands 1 530-1 544/1 626.5-1 645.5 MHz as per No. **S5.353A**, and in the 1 545-1 555/1 646.5-1 656.5 MHz band, as per No. **S5.357A**. The bands 1 544-1 545/1 645.5-1 646.5 MHz are limited to distress and safety communications according to Article **S31**. **Advantages** Although the systems currently operating in these bands were state-of-the-art when launched, technological advancements will continue to lead to new systems being even more spectrum efficient. Hence, as the current MSS systems are eventually replaced by new systems, potentially including satellite IMT-2000 systems, such systems may be able to use these bands. These bands are allocated to the MSS on a global basis. **Disadvantages** The implementation of the satellite component of IMT-2000 in these bands will have to take into account the possibility of spectrum congestion (see Chapter 2, part A, § 5). Portions of the band 1 525-1 559 MHz and 1 626.5-1 660.5 MHz are subject to safety communications constraints. Deployment of IMT-2000 in these bands must take into account that usage in the sub-band 1 544-1 545/1 645.5-1 646.5 MHz is limited to distress and safety communications.
Frequency bands **1 610-1 626.5/2 483.5-2 500** MHz
These bands are currently allocated on a global basis to the MSS. The band 1 610-1 626.5 MHz is also allocated worldwide to the aeronautical radionavigation service on a co-primary basis. The band 1 610-1 626.5 MHz is in Region 2 and and some Regions 3 countries also allocated on a co-primary basis to the radiodetermination-satellite service. The sub-band 1 610.6-1 613.8 MHz is also allocated in all three Regions to the radio astronomy service on a co-primary basis. The band 2 483.5-2 500 MHz is also allocated worldwide on a co-primary basis to the fixed and mobile services. This same band is also allocated to the radiolocation service on a co-primary basis in Regions 2 and 3, and in Region 2 and some Region 3 countries the band is also allocated on a co-primary basis to the radiodetermination-satellite service. These bands are used or planned to be used by several mobile satellite PCS systems using non-GSO satellites. **Advantages** These bands are currently allocated to the MSS on a global basis. **Disadvantages** These bands are being used by MSS systems that have either just started or are about to start operation. The bands may only be available for satellite IMT-2000 in the longer term.

Frequency bands **2 500-2 520/2 670-2 690** MHz
The bands are allocated to the MSS on a global basis. Both bands are also allocated on a worldwide co-primary basis to the fixed and mobile services, and in Regions 2 and 3 the bands are also allocated on a co-primary basis to the fixed-satellite service. The allocation of these bands to the MSS is effective 1 January 2005. (No. **S5.414** and No. **S5.419**) These bands are used for different terrestrial applications in different countries. Studies that have been conducted within ITU-R have established pfd and FDP trigger values for coordination between the MSS and the fixed service in the band 2 500-2 520 MHz in the space-to-Earth direction. **Advantages** If other services can be phased out, these bands would contribute a significant portion of the required satellite IMT-2000 spectrum. These bands are already allocated to the MSS on a global basis and used or planned for use by the MSS in some countries. Making these bands available for satellite IMT-2000 would reduce the need for any additional MSS allocations to satisfy the satellite IMT-2000 spectrum requirements. Some administrations expressed the view that their ENG and outside broadcast operations are typically tuneable over a large frequency range which may give some flexibility if introducing the satellite component of IMT-2000 in this band. **Disadvantages** In a number of countries these bands are used for multipoint distribution systems (in some countries extensively) that have been deployed in urban as well as in rural areas. Licenses for this service have been recently granted for extended periods of up to 20 years. Phasing out of these services will therefore be very difficult for the foreseeable future and therefore may preclude its use for IMT-2000 in these countries. Some administrations expressed the view that their use of this band for ENG and outside broadcast applications would conflict with its use for the satellite component of IMT-2000.

According to Nos. **S5.403** and **S5.420**, the bands 2 520-2 535 MHz and 2 655-2 670 MHz may be used for MSS (except AMSS, see also Nos. **S5.515A** and **S5.420A**) for operation within national boundaries, and subject to agreement obtained under No. **S9.21**. These bands have been identified as possible candidate bands for the terrestrial component of IMT-2000, and are therefore not identified as suitable for satellite component. However, it is envisaged that these bands may be used for MSS in some areas, where the demand for satellite services is high.

The frequency bands 2 010-2 025 MHz (E-s) and 2 160-2 170 MHz (s-E) are allocated to the MSS, but only in Region 2. These bands are not available to the MSS in Regions 1 and 3. These bands are included in the spectrum identified in No. **S5.388** for IMT-2000, and are adjacent to the global 2 GHz MSS allocations. However, these bands are not global MSS bands and their status as part of the satellite component of IMT-2000 is not addressed in Resolution **212 (Rev.WRC-97)**.

1.1.2.4 Methods to satisfy the agenda item and their advantages and disadvantages

The spectrum requirements given in part B.2 might not be fulfilled in the existing MSS allocations and it is noted that other proposals will be considered by WRC-2000 under Resolution **220**, **(WRC-97)**, Resolution **213 (WRC-95)** and agenda item 1.9.

With regards to the identification of additional spectrum for IMT-2000 to satisfy the agenda item 1.6.1, it is considered that there are two methods. These methods are described below.

Method 1

Additional global or regional/subregional bands could be listed through footnotes in Article **S5**, with appropriate reference in Resolution **212 (Rev.WRC-97)**. The formulation of these footnotes for identification of additional spectrum for IMT-2000 could either be similar to No. **S5.388** or adopt the format of footnotes such as No. **S5.547**, which is used for identification of the High Density Fixed Systems (HDFS) bands.

One alternative in this method to modify No. **S5.388** to include the additional frequency bands; this footnote should have a link to the revised version of Resolution **212 (Rev.WRC-97)** or a new Resolution.

Another alternative is to modify No. **S5.388** to reflect the revised Resolution **212 (Rev.WRC-97)** in combination with the addition of a footnote **S5.XXX** (see § 1.1.2.5), specifying the additional bands, this footnote having a link to the updated version of Resolution **212 (Rev.WRC-97)** or a new Resolution.

In both alternatives the different dates of availability for the additional IMT-2000 bands could be given in the revised version of Resolution **212 (Rev.WRC-97)** or in the new Resolution.

Advantages

- Having a footnote in the Table of Frequency Allocations for the IMT-2000 additional bands is consistent with the regulatory format adopted at WARC-92 to identify frequency bands for IMT-2000 in No. **S5.388**. The reference to IMT-2000 in the Table of Frequency Allocations highlights the use of these frequencies for IMT-2000 and could therefore facilitate the worldwide implementation of IMT-2000 and global roaming, without preventing administrations to allow other advanced mobile satellite applications in these bands if they wish.
- The harmonization of IMT-2000 spectrum globally is an extremely important issue. There is preference to clearly indicate all IMT-2000 global and regional/subregional frequency bands in a footnote(s) in Article **S5** of the Radio Regulations.

Disadvantage

- This different regulatory format for IMT-2000 systems compared to other mobile-satellite systems or radio services which are not footnoted in the RR, could be misinterpreted as giving a different regulatory status to IMT-2000 compared with other systems.

Method 2

Additional global and regional/subregional bands could be listed in a new WRC Resolution or Recommendation, without any specific identification in a footnote to the RR. Different dates of introduction for additional IMT-2000 bands can be given in this new WRC Resolution or Recommendation. Administrations may implement IMT-2000 systems in any appropriate frequency bands allocated to the MSS, therefore footnotes in Article **S5** are not essential.

One alternative in this method is to maintain unchanged No. **S5.388** and Resolution **212 (Rev.WRC-97)** and to develop a new Resolution listing the additional satellite frequency bands and their dates of availability.

Another alternative would be to suppress both No. **S5.388** and Resolution **212 (Rev.WRC-97)**, and to develop a new Resolution listing both the initial and additional satellite frequency bands for IMT-2000 and their dates of availability.

Advantages

- Avoids misinterpretation of the regulatory status of IMT-2000 by disassociating any additional spectrum identification for IMT-2000 from the Table of Frequency Allocations.
- Similar to Method 1, the reference to IMT-2000 in a WRC Resolution or Recommendation highlights the use of these frequencies for IMT-2000 without preventing administrations to allow other advanced mobile applications in the bands if they wish.

Disadvantages

- Listing the additional IMT-2000 frequency bands in a new WRC Resolution or Recommendation, without a corresponding reference in a footnote in the Table of Frequency Allocations, gives a different regulatory format to the additional bands compared to the WARC-92 bands identified in No. **S5.388**. This might imply a different status between the existing spectrum identified at WARC-92 and the additional IMT-2000 bands. There is also the danger that the Resolution or Recommendation, if not referenced in a footnote, be disregarded by administrations. Furthermore, changing the regulatory format in this way might cause misconceptions that the worldwide implementation of IMT-2000 is becoming a lower priority than originally envisaged. Although it is not unique, some administrations question whether a Resolution, which does not address a transitional measure, is appropriate without any reference in Article **S5**.
- Regardless of which method would be chosen, the following additional provision should be taken into consideration.

Additional provision

Where services other than the MSS operate in frequency band candidates identified in Table 1-4 above, transitional arrangements could be introduced to make these bands fully available for use by the satellite component of IMT-2000.

Advantage

- Facilitates introduction of the satellite component of IMT-2000.

Disadvantage

- Affects other services operating in the bands in question.

1.1.2.5 Regulatory and procedural considerations

Several different methods to satisfy agenda item 1.6.1 are presented in § 1.1.2.4 above.

Some common regulatory provisions are required for all the methods proposed whereas for some of the proposals additional specific regulatory provisions are needed. Additionally, there are a number of possible options available to satisfy the methods indicated:

- Specific regulatory provision will be needed for frequency bands not already allocated to the MSS, in order to allocate them to the MSS on a primary basis. Where bands are allocated to the MSS on a primary basis, consideration needs to be given to the method of identifying these bands for IMT-2000, as indicated in § 1.1.2.4 above.
- It is possible that the additional IMT-2000 bands can be indicated either in a new Conference Resolution or Recommendation or through modification of Resolution **212 (Rev.WRC-97)**. This may lead to the suppression or modification of footnote No. **S5.388**.

For footnotes, if following the format of No. **S5.388**, the required footnotes could be structured as follows:

ADD S5.XXX *(Additional bands for satellite IMT-2000):* The bands [...] are intended for use, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of these bands by other services to which these bands are allocated. The band should be made available for IMT-2000 in accordance with Resolution **212 (Rev.WRC-2000)**/a new Resolution.

As noted in Method 1 in the previous Section, alternative formulations of the footnotes are also possible.

1.1.3 Agenda item 1.6.2

"identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000"

1.1.3.1 Conclusions of ITU-R studies

ITU-R has studied the WRC-2000 agenda item 1.6.2 and determined that facilitation of multimode terminal operation and worldwide roaming of IMT-2000 is possible without a specific physical global radio control channel. Accordingly, no recommendation is made for the specific allocation, or identification, of frequencies within the RR at this time.

Further information on the global radio control channel may be found in Document 8-1/226 (Attachment 4, Annex 2, Appendix 1).

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1.2 Agenda item 1.7

"review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting operational, distress and safety communications, taking into account Resolution **346 (WRC-97)**"

*Resolution **346 (WRC-97)** "Protection of distress and safety communications on the frequencies 12 290 kHz and 16 420 kHz from harmful interference caused by these frequencies if also used for non-safety calling"*

1.2.1 Summary of technical and operational studies

HF assignments to Aeronautical (R) users are based on an ITU Allotment Plan set out in Appendix **S27** (see also Article **S41**). Ships and coast stations operate on internationally assigned distress and safety channels, as defined in Article **S52** and Appendices **S13**, **S15** and **S17** of the RR. There are two principle issues which may be addressed under this agenda item.

1.2.1.1 Problem A

The first issue is that the HF band, commonly used on international and domestic routes for communications by aircraft and vessels operating throughout the world, suffers from interference from illegal itinerant sources or use which is in some way in contravention to the RR. Mobile HF

SSB transceivers are often indiscriminately operated by unlicensed users, causing interference to legitimate aeronautical and maritime communications. The interfering signal can be on channel or off tuned. Interference is experienced on all channels from 3 to 16 MHz and occurs daily at different times varying in intensity and duration. Monitoring of these transmissions indicates that the sources are both land- and sea-based. Interference is also experienced from licensed maritime or aeronautical users, but who are operating outside the terms of the RR and are therefore causing interference to legitimate aeronautical and maritime communications. For both types of interfering communications there are cases where it is possible to identify the source of the interference, and cases where it is not possible to identify the source.

Interference to such HF communications is normally reported under Article **S15**. ITU reporting and notification of incidents under Article **S15** has not proved to be effective in the case of this type of interference, which has continued to increase.

1.2.1.2 Problem B

The second issue is that addressed by Resolution **346 (WRC-97)**, that on several maritime HF frequency bands the radiotelephony distress and safety frequencies are also used as international routine calling frequencies. The routine calling causes interference to distress and safety communications.

1.2.2 Analysis of the results of studies

1.2.2.1 Problem A

Administrations in the Asia-Pacific region have been alerted to the problem and are taking action through the Asia Pacific Telecommunity to set up a coordinated monitoring network including direction finding to effectively locate and take action against interfering HF operations. However, in view of the vast areas of sea and land and the multiplicity of islands in the region, elimination of unauthorized operation of HF radios is improbable, since the extensive resources needed for enforcement would not be available.

Action is also being taken by some administrations to curb unlicensed activity by the use of television and radio broadcasts to warn offenders.

Regular reports of severe interference have been submitted to the ITU under Article **S15**. More recently with the increasing involvement of ICAO, interference reports have also been directed to the ICAO regional office in Bangkok.

Further studies are needed to examine possible solutions to this type of interference, in particular that characterized by its emission from unlicensed transmitters which are difficult to locate and control. Technical innovations which would mitigate interference appear to offer the most practical and effective solutions to this type of interference.

In this regard there are several likely techniques that could be adopted. Possibilities include frequency hopping, near vertical incidence sky wave (NVIS), barred frequencies (V-Chip), adaptive arrays, etc.

Recently a technique has been successfully evaluated for mitigating interference on HF communications channels which adopts a programmable HF adaptive receiving system (PHFARS) which selectively cancels interfering signals. PHFARS is being examined as a possible solution to combat interference on civil aviation HF channels.

The ITU-R is studying this issue, including the consideration of interference mitigation techniques and the assessment of their effectiveness in these cases of interference.

Clearly the unpredictable and uncontrollable nature of this type of interference means that any solution to eliminate it should:

- not be costly and complex to implement and should ideally not require modification to aircraft and ship installations;
- not facilitate unauthorized use of the HF band;
- address the need to mitigate interference received by the aircraft/ship stations and by flight service and coast radio stations, and;
- not introduce any risk or threat to aeronautical (R) and maritime communications.

1.2.2.2 Problem B

Resolution **346 (WRC-97)** mentioned in this agenda item is concerned with the protection of HF distress and safety frequencies, in particular the frequencies 12 290 kHz and 16 420 kHz. WRC-97 addressed the problem of interference to distress traffic on these frequencies due to their permitted use as calling frequencies. WRC-97 adopted Resolution **346 (WRC-97)** which called for action from administrations to minimize the use of these frequencies for non-safety calling purposes by coast and ship stations. Since the adoption of Resolution **346 (WRC-97)** no reports have been received indicating that the situation has improved.

The problem seems to be related to the calling ship not being aware of ongoing distress traffic on the ship calling frequency since the ship is tuned to a different receive frequency for coast station calls and replies. The problem is complicated by the transmitting station not adhering to existing regulatory standards which require a station to listen on its transmitting frequency prior to transmitting. This problem occurs in the 4, 6, 12 and 16 MHz bands and not in the 8, 18, 22 and 25 MHz bands.

1.2.3 Methods to satisfy the agenda item and their advantages and disadvantages

ITU-R considers the following methods to be complementary. They may all be implemented by the conference and are not mutually exclusive.

1.2.3.1 Problem A

1.2.3.1.1 Method 1: Time periods for reports on interference

The WRC may consider that Article **S15** is modified to stipulate the time period in which reports of interference are submitted to the administration having jurisdiction over the interfering station or administrations believed to be responsible for the harmful interference. Article **S15** may also state that these administrations should respond in a timely manner.

The Conference may consider modification or adoption of Resolutions (particularly Resolution **207 (Mob-87)**) in order to address issues arising from discussion of this agenda item. These modifications may particularly emphasize that these cases of interference are often caused by unauthorized sources, that there is a need to find solutions to the problem through study, and that ITU and administrations may carry out awareness campaigns.

Advantages

- The quicker a case of interference is reported, the quicker that action may be taken against that interference, and the shorter the duration of the interference should be.

- The inclusion of a particular time period within which cases should be reported would improve the timeliness of reports.
- Modification of Resolution **207 (Mob-87)** would draw the attention of administrations to the fact that this interference is often due to unauthorized sources and to study possible solutions in assisting the mitigation of this interference.

Disadvantages

- This method would not address cases of interference where it is not possible to identify the source.
- It may be difficult to include a time-limit for reporting cases of this type of interference to HF communications, without impacting unfavourably on other obligations of administrations towards wider issues of the ITU and to make such a provision effective.

1.2.3.1.2 Method 2: Modification of Section VI of Article S15

The WRC may consider modification of Section VI of Article **S15**, particularly **S15.28**, to ensure that suitable provision is made for both the aeronautical (R) and maritime services.

Advantage

- Inclusion of suitable provisions in the RR would lead to the protection of frequencies used for the safety and regularity of flight against interference.

Disadvantage

- Modification of Section VI of Article **S15** alone would not solve the problem of HF interference to aeronautical mobile (R) and maritime mobile services from itinerant sources.

1.2.3.1.3 Method 3: Mitigation techniques

The WRC may consider the adoption or continue the study of interference mitigation techniques.

This could be reflected in a modification to Resolution 207 (Mob-87) or through the adoption of a new WRC Resolution.

Advantages

- Mitigation techniques offer the advantage of being effective against both known and unknown cases of interference.
- Adoption of flexible enabling provisions concerning the use of mitigation techniques would allow the development and implementation of such techniques without the need for any further action by a future conference.

Disadvantages

- ITU-R studies on appropriate mitigation techniques have not been concluded.
- In particular, further study of the technical and operational consequences of introduction of mitigation techniques in aircraft operations is required before these techniques could possibly be considered for implementation in the aeronautical HF bands.
- Implementation of mitigation techniques would require a change of equipment, which would place the cost of problem solution on those suffering the interference.

- Adoption of mitigation techniques by victim receivers would not solve the source of the interference.

1.2.3.2 Problem B

Only the first two of the three following proposals is intended to satisfy the agenda item. The third method is presented as a subsequent and supporting action which the conference may consider.

1.2.3.2.1 Method 1: Exclusive HF distress and safety frequencies

The WRC may consider modification of Article **S52** and Appendices **S13** and **S17** in such a way that the HF distress and safety frequencies become exclusive (i.e. that no routine calling on these frequencies is allowed) but that routine voice calling frequencies are also made available.

Advantage

- Vessels which use voice calling for routine calling purposes may continue to do so.

Disadvantage

- Modification of existing equipment may be necessary to allow operation on the new voice calling frequencies selected.

1.2.3.2.2 Method 2: Modification of provisions to enhance compliance

Some administrations felt the WRC may wish to consider minimum modifications required in the Radio Regulations (e.g. Article **S52**) and its Appendices, without the creation of exclusive HF distress and safety frequencies, in order to improve the situation on the HF radiotelephony distress and safety frequencies. However, calling would continue to be permitted on the distress and safety frequencies.

Compliance with existing Radio Regulations, **S52.224,** which requires that stations listen before transmitting, would alleviate this problem.

Advantage

- Further regulations are not required, rather enforcement of the existing regulation is required. Vessels which use distress and safety frequency for routine calling purposes may continue to do so.

Disadvantages

- Due to the construction of ship HF equipment, prior listening on the distress frequency complicates the calling procedure. Experience shows that ship station operators will not often do this.
- Enforcement of the requirement would be difficult, and it would require hardware changes to solve the problem through technical means.

1.2.3.2.3 Method 3: Encouraging the use of Digital Selective Calling

The WRC may further consider methods for encouraging the use of digital selective calling (DSC) instead of calling by radiotelephony.

Advantage

- The use of DSC by all vessels would be promoted, thereby promoting the implementation of the GMDSS.

Disadvantage

- This may cause problems for vessels not fitted with DSC.

1.2.4 Regulatory and procedural considerations

If any of the above Methods are adopted, the appropriate consequential amendments to the RR would need to be considered.

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1.3 Agenda item 1.18

"to consider the use of new digital technology for the maritime mobile service in the band 156-174 MHz and consequential revision of Appendix **S18**, taking into account Resolution **342 (WRC-97)**"

*Resolution **342 (WRC-97)** "Review of new technology to provide improved efficiency in the use of the band 156-174 MHz by stations in the maritime-mobile service"*

1.3.1 Summary of technical and operational studies

Studies in response to Recommendation **318 (Mob-87)** and Question ITU-R 96-1/8 have been ongoing in ITU-R for a number of years. It has long been recognized that the most likely solution to the problems identified in the present use of Appendix **S18** would be found in the adoption of technologies based on those already implemented in the land mobile service. It is also recognized that the adoption of any new technologies in Appendix **S18** would require a significant period to phase in, and should not disrupt the provision of distress and safety services in the VHF band; see Recommendations ITU-R M.1084 and M.1312.

Changes to the technology used in Appendix **S18** should provide relief of congestion experienced in some parts of the world, and the flexibility to meet the rapidly growing requirement for new services.

The use of the present system operating on the frequencies of Appendix **S18** is changing. In some parts of the world, public correspondence traffic has fallen to uneconomic levels, being replaced in coastal regions by the use of mobile phones. A number of regions find public correspondence channels to be maintaining high levels of traffic due to the implementation of successful local public correspondence systems. At the same time as certain traffic is falling, many administrations are finding that other traffic, particularly port operations, is increasing in congestion.

At a time of great change in global and data communications, maritime operators are keen to take advantage of the opportunities new technologies provide. Many are using systems designed for use in other services for various business and non-safety related purposes. New navigational tools are also taking advantage of digital communications. Some of these communications systems not designed for use in the maritime service are licensed through free circulation, or licence exemption arrangements. However, many such systems are operated without adequate licensing arrangements and not being part of the maritime station, are not covered by the maritime licence.

Some of these newer applications may continue to be best served by these new systems, especially those global systems which have suitable global licensing arrangements. However, many new applications could be provided by the maritime mobile service, providing common international applications, and offering the benefit of improved general communications integrated into the same system as distress and safety communications. Services which could be provided by new technology in the VHF maritime mobile service include data transmission for all purposes such as safety of navigation, business operations, medical situations, and improved public correspondence including Internet and e-mail.

1.3.2 Analysis of the results of studies

WRC-97 made a number of changes to Appendix **S18** to provide administrations with the flexibility to address immediate problems of local congestion. In particular, a footnote was added to Appendix **S18** to allow the use of 12.5 kHz channel interleaving on a non-interference basis to other administrations' and international shipping's use of 25 kHz channels. The conference also identified a number of public correspondence channels as being available for use for port operations and ship movement. This provides administrations which have a decrease in the use of public correspondence services with the opportunity to use under-utilized channels for the services where congestion is still experienced.

Resolution **342 (WRC-97)** was adopted by the Conference and details the studies necessary to progress within ITU-R the development of new technologies for use in the channels of Appendix **S18**. However, ITU-R has not completed these studies as detailed in Question ITU-R 96/8 and Resolution **342 (WRC-97)**. It is clear from the status of studies in the ITU-R that any revision of the present Appendix **S18** to introduce new technologies should be considered only for non-operational purposes at this·Conference.

1.3.3 Methods to satisfy the agenda item and their advantages and disadvantages

The modification of Appendix **S18** allowed for by this agenda item has been identified by ITU-R as intending to fulfil two roles: providing the possibility to implement new applications; and the relief of congestion experienced in certain parts of the world. Whilst the status of the ITU-R studies indicate that it may be difficult for the conference to carry out the revision of Appendix **S18** in order to introduce new digital technologies, it may be possible for the conference to take action to address the issue of congestion.

1.3.3.1 Modifications to Appendix S18

The Conference could consider modifications to Appendix **S18** which would provide administrations with further flexibility to use some of the channels of Appendix **S18** in simplex mode if required. Furthermore, the conference could consider permitting, subject to non-interference and no protection, the use of some of these channels or sub-bands created by the conversion of duplex channel to simplex channels for the initial testing and possible future introduction of new technologies, subject to non-operational use. This would necessarily be subject to special arrangement between interested or affected administrations.

Advantages

- Allowing the use of duplex channels in Appendix **S18** in simplex mode would increase the number of available channels.
- The cost of the change to the user, not taking into account new technology would be minimal, requiring at most a change to equipment software.
- Administrations would be able to quickly address certain local problems of congestion.

- The necessary change would be straightforward for the conference to make, basing the change on actions taken at the last conference.
- May permit facilitation of the development and testing of new technology.
- Use of channels for the development and testing of new technologies may, in turn, encourage maritime radio equipment manufacturers to advance or accelerate such development and testing.

Disadvantages

- This would only provide a limited and short-term improvement to congestion problems.
- Administrations implementing all the available channels in simplex mode would have no more duplex channels available.
- The need for coordination between administrations would increase.
- There may be a problem of equipment meeting international standards and operating worldwide.
- Use of channels for the development and testing of new technology may appear to prejudge the outcome of requested studies by the ITU-R.
- Use of channels for testing may increase the channel loading of the remaining operational channels for the concerned administrations.

1.3.4 Regulatory and procedural considerations

If the above Method is adopted the appropriate consequential amendments to the RR would need to be considered.

CHAPTER 2

Mobile-satellite and radionavigation-satellite services

(WRC-2000 agenda item 1.10)

CONTENTS

Mobile-satellite and radionavigation-satellite services

Introduction - Spectrum requirements

Part A - MSS spectrum requirements in the 1 to 3 GHz range (agenda items 1.9, 1.10)

The need for additional spectrum for the MSS in the 1 to 3 GHz range has been stated in the CPM Reports to the last two WRCs. The CPM to WRC-95 indicated that a total allocation of between 2 x 75 MHz and 2 x 150 MHz would be required by 2005 (Chapter 2, part A.2, § 3). Two years later, the CPM to WRC-97 indicated that 2 x 250 MHz would be necessary by 2010 (Chapter 4, § 4.2.6).

Two recent submissions to ITU-R, one a compendium of studies, based on conservative assumptions of MSS traffic growth and realistic MSS spectrum efficiency, have forecast a minimum MSS spectrum demand of between 2 x 125 MHz and 2 x 145 MHz by 2010, depending on the geographic region. (See also § 2.1, which in the context of Resolution **218 (WRC-97)** addresses AMS(R)S spectrum requirements that are a subset of the overall MSS spectrum requirements.) These studies are consistent with the spectrum demand estimates presented in Report ITU-R [IMT.SPEC], which are detailed in § 1.1 (part B.2) in the context of the satellite component of IMT-2000. It is important to note that although it is foreseen that some or all of the spectrum requirements for the satellite component of IMT-2000 may be accommodated in the existing MSS allocations, as discussed in § 1.1.2, additional MSS allocations are needed to meet the projected total MSS spectrum requirements, since the satellite component of IMT-2000 is only a subset of the MSS. Indeed, identification of the existing MSS allocations for the satellite component of IMT-2000 places additional emphasis on the need for additional allocations to support both IMT-2000 and non-IMT-2000 MSS requirements.

Since all studies indicate that there is a requirement for additional MSS spectrum in 1-3 GHz to meet the demand of MSS in time, including the satellite component of IMT-2000, all existing worldwide MSS allocations should be retained for MSS use.

Currently the Radio Regulations allocate about 2 x 115 MHz to the MSS in 1-3 GHz, with some variations among the ITU Regions. It should however be noted that most of these bands are used by other services in most countries, significantly reducing the actual availability of those bands for the MSS, and in many countries they are not available for MSS at all. This applies in particular to the bands 1 980-2 010/2 170-2 200 MHz (and 2 010-2 025/2 160-2 170 MHz in Region 2), 2 500-2 520/2 670-2 690 MHz and 2 520-2 535/2 655-2 670 MHz (MSS use of this band is subject to agreement obtained under No. **S9.21** and for operation within national boundaries), which are heavily used mainly by terrestrial fixed services in many countries. In order to satisfy the MSS spectrum requirements it is essential to facilitate the MSS access to spectrum already allocated to the MSS, taking into account other services with a co-primary allocation.

The bands 1 525-1 559/1 626.5-1 660.5 MHz and 1 610-1 626.5/2 483.5-2 500 MHz are rapidly approaching saturation due to an increasing number of operational and planned MSS systems with growing spectrum requirements. This has become apparent in the annual multilateral coordination meetings in all Regions with respect to the first pair of bands. As other MSS bands in 1-3 GHz become available, these bands will also rapidly reach saturation when the satellite networks are brought into operation.

The need for additional MSS spectrum was highlighted in Resolution **213 (Rev.WRC-95)**. Considering the results of studies reported in § 2.2.1, if a suitable MSS downlink allocation cannot be found through the studies completed under Resolution **220 (WRC-97)**, every effort should be made to find a suitable MSS downlink allocation, taking into account the results of already available ITU-R relevant sharing studies.

Solutions need to be sought urgently to accommodate the MSS spectrum demand in the 1-3 GHz range (i.e. the technically preferred range), while taking due account of the needs of other services. Such solutions may include making available the existing MSS allocations in a timely manner and making limited additional MSS allocations that are not constrained by shared services. If there are still requirements that remain unsatisfied after WRC-2000, it may be necessary to consider the issue of MSS spectrum requirements in the 1-3 GHz range at future WRCs.

Part B - MSS spectrum requirements below 1 GHz (agenda item 1.11)

A total of 1.525 MHz (space-to-Earth) and 1.9 MHz (Earth-to-space) are presently allocated on a worldwide primary basis to the MSS below 1 GHz and 300 kHz (Earth-to-space) is allocated for land MSS on a worldwide primary basis. An additional 151.5 MHz may be used subject to agreement obtained under provision No. **S9.21**. It is difficult to implement MSS systems in this 151.5 MHz of spectrum subject to No. **S9.21** because of the need to obtain agreements with many countries. In addition, 2 MHz (Earth-to-space) in Region 2 is allocated to the MSS below 1 GHz. Some individual countries have additional allocations (Earth-to-space) for the MSS below 1 GHz, appearing in footnotes. These allocations are for both the MSS service links and feeder links.

The Radiocommunication Bureau has identified 25 non-GSO MSS networks as of 26 November 1999, at frequencies below 1 GHz, at some state of coordination under No. **S9.11A**/Resolution **46 (Rev.WRC-97)**, and nine non-GSO MSS networks at the advance publication stage only. However, it appears that many of the proposed networks cannot be implemented in the existing allocations because there is not enough spectrum readily available without applying **S9.21** to allow the development of all of these systems.

It had previously been identified in the CPM Report for WRC-95 and is also stated in *considering b)* of Resolution **214 (Rev.WRC-97)** that 7 to 10 MHz of additional spectrum is required for MSS below 1 GHz. An extensive study carried out by an administration in 1996 identified a need for spectrum beyond the current allocations to provide for certain applications until the year 2002. This study identified a spectrum requirement for service links of about 17 MHz on a shared basis, and an additional 4 MHz of shared spectrum for feeder links. In arriving at the conclusions regarding spectrum requirements and market demand, the study took into account the ability of present and future competing terrestrial and satellite technologies to provide these applications. This study estimated that when the data rates and frequency of use among the various users are taken into account on a worldwide basis an average of 3.2 million non-GSO MSS users would be provided service in each 1 MHz of bandwidth for uplinks, and 6.1 million users per MHz for downlinks.

Since the 1996 market study referred to above, there have been more recent reports carried out in 1997-1998. These reports describe the estimated market for non-GSO MSS services and support the estimates made in the original 1996 market study.

In general, the uplink and downlink allocations should be approximately balanced for CDMA systems. A wider uplink allocation, however, facilitates co-frequency sharing with other services; the wideband MSS system can operate with a lower power density by spreading over wider bandwidths. Narrow-band FDMA systems with dynamic channel selection will occupy any given sub-channel less often and will require a greater bandwidth to achieve a given message rate. Thus, the uplink and downlink allocations do not necessarily have to be equal.

The frequency range 470-862 MHz is not considered in this Chapter because studies relating to consideration of allocations in this range to non-GSO MSS are carried out by ITU-R according to Resolution **728 (WRC-97)** which is not a part of WRC-2000 agenda.

Part C - RNSS spectrum requirements (agenda item 1.15)

RNSS spectrum is being used to the fullest capacity in support of a large and expanding base of users worldwide. There are over eight million Radionavigation-Satellite Service (RNSS) receivers in use today for a wide range of applications, including safety-of-life, critical navigation on land, at sea, and in the air. As discussed in § 2.2, the current RNSS allocations, of 1 559-1 610 MHz and 1 215-1 260 MHz, are of great importance to the Global Navigation Satellite System (GNSS) which today consists of the United States Global Positioning System (GPS), the Russian Federation Global Navigation Satellite System (GLONASS), space and ground-based augmentation systems, and pseudo-satellites (pseudolites). New generations of GPS and GLONASS satellites are being designed. Plans are currently under consideration that could alter the Y-code and Coarse/Acquisition (C/A) code assignments for future GPS in the bands 1 559-1 610 MHz and 1 215-1 260 MHz.

In addition to the current RNSS systems operating in the 1 559-1 610 MHz and 1 215-1 260 MHz bands three systems have been advanced published by ITU-R, LSATNAV and MSATNAV proposed by the CNES French Space Agency and E-NSS-1 proposed by the European Space Agency. The European Union has also announced preliminary plans for the implementation of a European RNSS system, Galileo, which will also operate in the 1 559-1 610 MHz and 1 215-1 260 MHz bands. It is clear that the current RNSS allocations are extensively used, and will continue to undergo an extremely rapid expansion that will drive further evolution. As a result, all existing worldwide RNSS allocations should be retained for RNSS use.

There is a requirement for additional RNSS spectrum in the bands between 1 and 6 GHz to support worldwide satellite navigation developments in both the space-to-Earth and Earth-to-space directions of transmission. For example, the United States has announced that it intends to provide an additional GPS signal in the space-to-Earth direction for civil users. The European Union is also exploring the desirability of using new RNSS bands for Galileo. This matter will be discussed under agenda item 1.15.1 of WRC-2000 and is treated fully in § 2.4.1 of this Chapter. These additional allocations will enable GNSS operations with greatly improved performance characteristics (accuracy, availability and continuity). GNSS operations in widely spaced multiple frequency bands is necessary to support improved ionosphere corrections and phase tracking capabilities, which are essential for robust and precise navigation. An RNSS system using higher code rates to give better navigation accuracy and reduce multipath errors is required to satisfy the navigation requirements of tomorrow. An additional 20 to 24 MHz of spectrum is needed for such a wideband signal. The spectrum that is allocated to RNSS is occupied by existing (GPS and GLONASS) and planned systems (LSATNAV, MSATNAV, E-NSS-1) to such an extent that the required bandwidth for additional RNSS signals is not available. The bands under consideration for a new RNSS allocation include: parts of 1 151-1 215 MHz, 1 260-1 300 MHz and parts of 5 010-5 150 MHz in the space-to-Earth direction and 1 300-1 350 MHz and 5 000-5 030 MHz in the Earth-to-space direction.

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2.1 Agenda item 1.10

"to consider results of ITU-R studies in accordance with Resolution **218 (WRC-97)** and take appropriate action on this subject"

*Resolution **218 (WRC-97)** "Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service"*

2.1.1 Summary of technical and operational studies, including a list of relevant ITU-R Recommendations and provisions of the RR

Relevant provisions: No. **S5.353A** and No. **S5.357A**

Relevant ITU-R Recommendations: M.1089, M.1180, M.1229, M.1233 and M.1234.

2.1.2 Analysis of the results of studies

In the context of Resolution **218 (WRC-97)**, "prioritization" means assignment by the network of the first available channel to the traffic within the AMS(R)S priority 1-6 in Article **S44** or distress, urgency and safety communications of the GMDSS in accordance with No. **S5.353A.** "Pre-emption", means termination of some non-safety communications by the network to establish the distress, urgency or safety communications

Within a network, under the definitions given above, prioritization and real-time pre-emption are deemed to be feasible and have been implemented in the AMS(R)S. However, an existing system has found that for its system, the complexity and cost of implementing intra-system prioritization and pre-emption between different types of MES standard designations is substantially greater than within one standard designation. Further studies are required to define the technical and operational requirements that will satisfy the needs of the AMS(R)S/GMDSS. Further studies are also required with respect to the implementation of a system that could use spectrum flexibly between different MSS networks.

Possible impact on future spectrum requirements could result from the addition of redundant satellite system capability for the provision of AMS(R)S as well as the initiation of new types of data service.

2.1.3 Methods to satisfy the agenda item and their advantages and disadvantages

2.1.3.1 Accommodation of distress, urgency and safety traffic in the GMDSS and AMS(R)S communications with priority 1-6 of Article S44

The following methods can be considered as means of providing access to spectrum for distress, urgency and safety communications of the GMDSS and AMS(R)S as referred to in Resolution **218 (WRC-97)**. Whenever the terms "distress, urgency and safety communications" are used in reference to the bands 1 530-1 544 MHz/1 626.5-1 645.5 MHz and 1 545-1 555 MHz/ 1 646.5-1 656.5 MHz they refer to communications in accordance with Nos. **S5.353A** and **S5.357A**.

2.1.3.1.1 Intra-system, inter-service prioritization and pre-emption

The need for resorting to intra-system pre-emption of an MSS call will arise when all the spectrum, which that system has coordinated within the spectrum in which Nos. **S5.353A** and **S5.357A** apply, is at that instant being fully used and additional distress, urgency or safety traffic needs to be accommodated. In such a situation, one way to accommodate the additional traffic could be to build-in prioritization and pre-emption for distress, urgency or safety traffic over other MSS traffic as necessary, in any part of the relevant MSS bands quoted in the footnotes to which access has been coordinated for that system.

The following technical provisions would be required to implement intra-system prioritization and pre-emption and are applicable in the bands covered by the footnotes providing priority for GMDSS and AMS(R)S:

i) MSS space, feeder link and control elements are to be capable, by design, of supporting the transmission of messages compliant with ICAO SARPs and/or GMDSS;

ii) user terminals in the satellite networks providing AMS(R)S and/or GMDSS need to be placed under a control system which is capable of supporting AMS(R)S and/or GMDSS priority and real-time pre-emption;

iii) user terminals in the satellite network providing AMS(R)S services need to be designed and operated in conformance with Recommendation ITU-R M.1234;

iv) MSS space, feeder link and control elements need to be designed such that the AMS(R)S or GMDSS services could be integrated into the system operation. Specific design requirements must be clearly identified to ensure acceptable integration of the AMS(R)S and/or GMDSS.

In addition, this scenario would require that the operation of any MES that accesses the relevant bands in an MSS system, providing AMS(R)S and GMDSS, be subject to certain requirements. These include:

i) the terminals need to be frequency agile;

ii) the terminals need to be automatically tuneable to any forward and return channel pair;

iii) transmit and receive function need to be under constant control;

iv) control protocols need to be implemented to permit pre-emption in a timely manner (to be identified by further study);

v) the terminals must be assigned a communications channel before transmission is initiated.

Under this scenario the requirements of distress, urgency or/and safety traffic of AMS(R)S and GMDSS could be met by that system until the entire spectrum coordinated by that system in the relevant bands is full of such calls.

2.1.3.1.2 Inter-system prioritization and pre-emption

Under an alternative scenario there may be multiple MSS service providers, some of which provide for AMS(R)S and GMDSS. In this situation there could be yet another way of accommodating additional distress, urgency or safety traffic. This possibility will arise when system A's coordinated spectrum within the spectrum in which Nos. **S5.357A** and **S5.353A** apply is full of such traffic while system B's coordinated spectrum within the same bands is not fully used by the applicable traffic. System A's distress, urgency or safety traffic would then be accommodated by the spectrum transferred by system B to system A on a temporary basis to alleviate the congestion. System B would initially transfer spectrum not currently in use and use pre-emption of ongoing calls as a last resort. There are MSS systems in operation today that are capable of transferring spectrum not actively used by their system and pre-empting ongoing calls. What remainss in question are the overall feasibility of this option and the definition of the mechanisms for transferring such spectrum temporarily to another system.

2.1.3.1.3 Capacity planning

Under this approach the system operators, which provide AMS(R)S/GMDSS, with the guidance and support of their administrations, coordinate from time to time with other operators using the spectrum to which Nos. **S5.353A** and **S5.357A** apply, access to the amount of spectrum needed to accommodate the requirements of AMS(R)S/GMDSS. This option would accommodate the distress, urgency or safety traffic of AMS(R)S/GMDSS and can be categorized as capacity planning. This process should be able to ensure that the required amount of spectrum would always be available for such usage until such time as distress, urgency and safety requirements reach the spectrum allocated under Nos. **S5.353A** and **S5.357A** for the GMDSS and AMS(R)S respectively. This procedure is in fact used today through the multilateral frequency coordination process.

2.1.3.1.4 Discussion of options

The choice of the option for implementation will depend upon the spectrum requirements and the relative advantages and disadvantages of each of the options outlined above, which requires further evaluation. The current state of growth of AMS(R)S suggests that the capacity planning option given in § 2.1.3.1.3 may satisfy the AMS(R)S/GMDSS requirements in the short to medium time-frame.

Although the option in § 2.1.3.1.1 is deemed to be feasible, due to the need for implementation of the features listed in § 2.1.3.1.1, this option is expected to entail additional cost and operational complexities in network control systems and network operations, in comparison to systems without full pre-emption capabilities. Further studies on options in § 2.1.3.1.1 are needed. It should also be noted that study of option § 2.1.3.1.2 is needed.

In the longer term, and as the future scenario becomes clearer, § 2.1.3.1.1 and/or § 2.1.3.1.2 may be considered. This longer-term consideration should focus more generally on future systems in order to minimize the impact on current users.

Studies on establishing the feasibility of and defining a mechanism for facilitating inter-system prioritization and pre-emption should be expedited. The studies need to be conducted within ITU-R with the participation of ICAO, IMO, interested administrations and MSS operators.

2.1.3.2 Spectrum requirements for the provision of GMDSS and AMS(R)S communications

Two studies have been performed that used significantly different assumptions to calculate the future spectrum requirements of AMS(R)S. A study prepared by ICAO and IATA, based on the ICAO CNS/ATM system, which is presently being implemented, established that the future spectrum requirements of AMS(R)S will be 10.8 MHz by 2010. Additional spectrum, which may be required beyond 2010 is under study. A second study prepared by one administration indicated that the future spectrum needs of AMS(R)S could be accommodated in 1 MHz of spectrum by 2025. Significant disagreement exists on the approaches and methodologies to be used in such studies.

Introduction of AMS(R)S traffic in MSS systems which are not operating in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz may affect the spectrum requirements for AMS(R)S traffic in these bands. Introduction of MSS systems in the 1 525-1 559 MHz and 1 626.5-1 660.5 MHz bands that do not intend to provide AMS(R)S may also affect spectrum availability.

The spectrum requirements of distress, urgency and safety communications of the GMDSS and AMS(R)S can be met in the future by giving priority to the accommodation of the spectrum requirements for these types of communications within the spectrum in bands where Nos. **S5.357A** and **S5.353A** apply. Setting aside dedicated spectrum segments for distress, urgency and safety communications would have the disadvantage that the amount of exclusive spectrum would have to correspond to the amount needed to cope with the worst possible case spectrum usage, which could result, from time to time, due to the combination of such conditions as, for example, airport closures, severe storms and maritime and aeronautical emergencies. As this amount would be many times greater than the average use, this would lead to inefficient use of the spectrum, since the allocated spectrum will only be used on rare occasions.

2.1.4 Regulatory and procedural considerations

Administrations are required to accommodate AMS(R)S and GMDSS communications in bands where Nos. **S5.357A** and **S5.353A** apply. The Conference may wish to request, as a matter of urgency, further technical and regulatory studies by ITU-R by means of a suitable resolution. Regulatory provisions may need to be modified or added to by WRC-2000 to ensure that future spectrum requirements are met for the AMS(R)S in the bands where No. **S5.357A** applies and the GMDSS in bands where No. **S5.353A** applies.

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2.2 Agenda item 1.9

"take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions **213*(Rev. WRC-95)*** and **220 (WRC-97)**"

*Resolution **213(Rev. WRC-95)** "Sharing studies concerning possible use of the band 1 675-1 710 MHz by the mobile-satellite service"*

*Resolution **220 (WRC-97)** "Studies to consider the feasibility of using a portion of the band 1 559-1 610 MHz by the mobile-satellite service (space-to-Earth)"*

2.2.1 Band 1 559-1 567 MHz

2.2.1.1 Summary of technical and operational studies, including a list of relevant ITU-R Recommendations

The frequency range under consideration, 1 559-1 567 MHz, is allocated on a co-primary basis to RNSS (space-to-Earth) and ARNS. Additionally, the band is allocated to the FS in some countries. Work has been carried out by various administrations leading to the following Recommendations: ITU-R M.1088, M.1317, M.1318, M.1343, and ITU-R M.[RNSS.CHAR].

Studies have been carried out by ITU-R in response to Resolution **220 (WRC-97)**. Among the studies conducted is an assessment of the impact of pseudo-satellites (pseudolites) (for details see § 2.2.1.2.3) operating in the aeronautical radionavigation service (ARNS) in the band 1 559-1 567 MHz on the feasibility of sharing between MSS and ARNS/RNSS. Other studies have examined whether the proposed power flux-density of -112 dB(W/m^2·MHz) would provide protection to existing and planned RNSS systems.

2.2.1.2 Analysis of the results of studies

2.2.1.2.1 Current uses of the RNSS in the 1 559-1 610 MHz band by GNSS receivers

There are millions of RNSS receivers in use today for a wide range of applications, including safety-of-life, critical navigation on land, at sea, and in the air (see Table 2-1). Today, many of these receivers operate with the Global Positioning Satellite (GPS) system, an element of the Global Navigation Satellite System (GNSS) whose first-generation operates in the 1 563.42-1 587.42 MHz portion of the 1 559-1 610 MHz ARNS/RNSS band.

TABLE 2-1

Examples of uses of RNSS

AGRICULTURE and FORESTRY Forest area and timber estimates. Identifying species habitats. Fire perimeters. Water resources. Locating property boundaries. Ploughing, planting and fertilizing without operators.	**MARITIME and WATERWAYS** Navigation on the high seas. Search and rescue. All weather harbour approach navigation. Vessel traffic services. Dredging of harbours and waterways. Positioning of buoys and marine navigation aids. Navigation for recreational vessels. Location of commercial fishing traps and gear. Offshore drilling research. Monitoring deflections in dams as a result of hydrostatic and thermal stress changes. Ice breaking and monitoring icebergs and flows. Observing tides and currents. Harbour facility management. Location of containers in marine terminals.
AVIATION Oceanic and en route navigation. Non-precision and precision all-weather approaches. Direct routing of aircraft for fuel savings. Improved aircraft separation standards for more efficient air traffic management. Airport surface traffic management. Monitor wing deflections in flight. Wind shear detection. Precise airfield and landing aid locations. Seamless (global) air space management. Less expensive avionics equipment. Monitoring aircraft locations in flight. Precision departures. Missed approach applications Enhanced ground proximity warning system. Automatic dependent surveillance.	**PUBLIC TRANSPORTATION** Bus fleet on-the-road management. Passenger and operator security monitoring. **RAILROAD** Railroad fleet monitoring. Train control and collision avoidance. Facility inventory control and management.
ELECTRIC POWER Synchronization of power levels. Event location. **EMERGENCY RESPONSE** Ambulance, police, and fire department dispatch. Road service locating disabled vehicles.	**RECREATION** Hiking and mountain climbing. Measuring at sports events. Setting lines on sports fields.
ENVIRONMENTAL PROTECTION Hazardous waste site investigation. Ground mapping of ecosystems. Oil spill tracking and cleanup. Precise location of stored hazardous materials.	**SURVEYING** Electronic bench marker providing absolute reference of latitude, longitude and altitude. High precision surveys in minutes by anyone. Real-time dam deformation monitoring. Hydrographic surveying. Efficient and accurate photo surveys. Measuring areas without triangulation. Oil and mineral prospecting. National spatial data infrastructure.
HIGHWAY and CONSTRUCTION Intelligent vehicle-highway system operation. Highway facility inventory and maintenance. Accident location studies. Highway construction. Navigation for motor vehicle drivers. Truck fleet on-the-road management. Monitoring status of bridges.	**TELECOMMUNICATIONS** Precise timing for interlacing messages/network synchronization. **WEATHER, SCIENTIFIC and SPACE** Use as weather balloon position radiosonde. Measurement of sea level from satellites.
LAW ENFORCEMENT and LEGAL SERVICES Tracking and recovering stolen vehicles. Tracking narcotics and contraband movements. Maintaining security of high government officials and dignitaries while travelling. Border surveillance. Measuring and recording property boundaries. Tort claim evidence in aviation and maritime accidents.	Navigating and controlling space shuttles. Placing satellites into orbit. Monitoring earthquakes and tectonic plates. Measuring ground subsidence (sinking). Measuring atmospheric humidity from ground. Precise global mapping of ionosphere.

GLONASS and GPS are established elements of the International Civil Aviation Organization (ICAO) GNSS, operating in the band 1 559-1 610 MHz. These systems are accepted by the ICAO Council for use in international civil aviation. ICAO is currently developing Standards and Recommended Practices (SARPs) for international application in civil aviation. Some of the receiver characteristics used in these SARPs differ from those in Recommendations ITU-R M.1088 and M.1317 (see draft new Recommendation ITU-R M.[RNSS.CHAR]). The GNSS will be used during all phases of flight, including precision approaches and landing, and under all weather conditions. The latter places extensive requirements on the performance characteristics of the system. The aeronautical use of RNSS is recognized in the RR as a safety-of-life application.

The lower portion of the band 1 559-1 610 MHz, where GPS operates, is of great importance to GNSS. GPS provides position and time information to users by means of one-way transmissions using RNSS (space-to-Earth) allocations. GPS is information technology that uses systems of hardware and software, as well as information (time and ephemeris) transmitted from satellites to provide derived information to the user. Conventional GPS receivers in commercial use receive and decode the 1.023 Mbit/s code. Many receivers, used for precise navigation, timing and positioning, in surveying, agriculture, hydrology and other applications, also receive and process, but do not decode, the 10.23 Mbit/s codes on the 1 575.42 MHz and 1 227.6 MHz carriers. These latter receivers, which include safety-of-life applications, may be more sensitive than conventional receivers to interference from sources such as commercial MSS satellite transmitters.

GPS and GLONASS are the sole bases for the formation of International Atomic Time (TAI) and Coordinated Universal Time (UTC) by the International Bureau of Weights and Measures (BIPM). These systems are also the primary means by which clocks are synchronized within telecommunications networks for Time Division Multiple Access (TDMA) transmissions. Time and frequency functions are or will be available on other RNSS systems.

2.2.1.2.2 Considerations for the future use of the RNSS allocation at 1 559-1 610 MHz

As Resolution **220 (WRC-97)** recognizes, RNSS and ARNS systems are evolutionary, and other types of GNSS are under development for operation in the band 1 559-1 610 MHz. There are both aeronautical and non-aeronautical safety-of-life services in the 1 559-1 610 MHz band, and it is well-established (see No. **S4.10**) that there is an essential need to protect systems operating in the ARNS and RNSS. GPS and GLONASS space-based augmentation systems and associated ground-monitoring receivers plan to utilize signals with high associated chipping rates.

New generations of GPS and GLONASS satellites are being designed. Plans are currently under consideration that could alter the Y-code and C/A code assignments for future GPS in the bands 1 559-1 610 MHz and 1 215-1 260 MHz, and to add one or more signals using frequencies offset from those existing signals, to enhance civil applications while maintaining backward compatibility. In addition, other administrations have notified the ITU of proposed new RNSS systems (e.g., E-NSS-1, LSATNAV, and MSATNAV) that would operate in the 1 559-1 610 MHz band. It is anticipated that there will be additional break-through in the use of satellite-based GNSS signals that cannot be properly modelled today.

2.2.1.2.3 Use of the ARNS allocation by pseudolites

Use of the band 1 559-1 567 MHz by pseudo-satellites (pseudolites) in the ARNS/RNSS band at 1 559-1 610 MHz is presently undergoing field trials. Commercial deployment is under way in several countries in the band 1 559-1 610 MHz, and more widespread deployment is planned. Worldwide deployment of pseudolites for aviation is under consideration, with the band 1 559-1 610 MHz as a prime candidate. Pseudolites are ground-based radio transmitters that transmit signals that are similar to and fully compatible with those that come from RNSS satellites, and with some using high chipping rates and frequencies offset from 1 575.42 MHz, in the band 1 559-1 567 MHz. As an augmentation to the performance of RNSS systems, pseudolites provide additional ranging signals and are intended for use in safety-critical applications where a minimum level of positioning performance must be guaranteed.

Through the use of pseudolites to increase the availability of positioning information, the occurrence of service outages has been reduced. Pseudolites are especially valuable when the application involves a safety critical service requiring high availability and reliability, or when users are near obstructions. Field trials, using split spectrum GPS C/A code modulation, conducted at an open pit mine, confirmed this commercial utility. Pseudolites will be particularly useful for helicopters, which often operate in rural and urban environments where terrain or man-made obstructions impact the visibility of satellites from which positioning information is sought. The trials also showed that pseudolites have utility for safety-critical applications in such non-aviation settings as precision construction and mining. The use of pseudolites is expected to proliferate around airports, and to extend to harbours, navigable waterways, and other urban, rural, and topographically challenging environments.

It is anticipated that these pseudolites will further evolve beyond those that exist today. The use of split spectrum pseudolites is currently under investigation.

2.2.1.2.4 Possible uses by the MSS of the band 1 559-1 567 MHz

It is noted that GNSS operations in the 1 559-1 610 MHz band are subject to very stringent requirements with respect, *inter alia*, to integrity and continuity of the services in order to ensure flight safety. All elements of GNSS operations in these bands - including the national RNSS satellite systems, space-based augmentation systems, and emerging ground-based augmentation systems that employ ARNS pseudolites - are designed to be interoperable. In addition each includes a system of monitors to ensure the integrity of aviation navigation and redundant sources of ranging signals to ensure the continuity of flight operations.

The discussions of potential MSS (space-to-Earth) sharing of the 1 559-1 567 MHz band contain no demonstration of how such an MSS system would accomplish fault detection and reporting or data archiving, and the impact of MSS (space-to-Earth) signals on continuity failures has not been assessed. No finding of sharing feasibility between the MSS (space-to-Earth) and ARNS/RNSS can be made without a complete and acceptable demonstration of how such signals would be monitored, how aircraft would be notified of ensuing anomalies, and the manner in which MSS signal parameters would be archived. For example, any unexpected increase in the aggregate power flux-density will be of concern. Such an unexpected increase may be due to a fault in the power control for a single satellite or it could be due to simultaneous transmission from an unexpected multiplicity of satellites. As another example, spectral concentration of MSS power may be of concern, because GNSS performance can be much more sensitive to narrow-band interference than wideband. In addition, no finding of feasibility of sharing can be made until the impact of MSS on the failure rates required for the continuity of flight operations is both understood and negated.

2.2.1.2.5 Analysis of data and results of sharing studies

The core signal structures of MSS and RNSS/ARNS are fundamentally different: MSS uses a two-way signal while ARNS/RNSS transmits a weak, receive-only signal. Having systems from a radiocommunication service operate on a co-primary basis in the 1 559-1 610 MHz band would limit ARNS/RNSS operators' flexibility by reducing the spectrum available for use in the band, and could therefore hamper the development of a GNSS that meets evolving international needs and provides adequate protection for international civil use worldwide.

Resolution **220 (WRC-97)** recognizes the essential need to protect ARNS/RNSS systems operating in the 1 559-1 610 MHz band. The unique technical characteristics of GNSS, and its safety-of-life applications, makes it extremely difficult to predict the operational consequences of such signal sharing.

It should be stressed, however, that sharing studies, while having considered a representative cross-section of RNSS receivers, have not considered the full range of receivers for GNSS applications (see Table 2-1).

a) Impact of pseudolites on potential MSS (space-to-Earth) operations in the band 1 559-1 567 MHz

Ground-based pseudolites are compatible with RNSS space-based transmissions in the same frequency band only because the ground-based transmission has been crafted to take advantage of the specifics of the space-based signal structure-driven user equipment. As noted above, the use of pseudolites is expected to proliferate, although the exact frequencies of operation may vary from country to country.

Studies in the ITU-R have shown that pseudolite deployment would significantly interfere with MSS (space-to-Earth) in the band 1 559-1 567 MHz when there is insufficient geographic separation. As a result, the ITU-R has concluded that with the expected widespread deployment of pseudolites, it is unlikely that there will be opportunities for sharing between MSS (space-to-Earth) and pseudolites in this band.

b) Impact of interference to ARNS/RNSS from potential MSS (space-to-Earth) operations in the band 1 559-1 567 MHz

The ITU-R has examined the claims of some administrations (reported in Resolution **220 (WRC-97)** at *considering d)*, to the effect that an aggregate power flux-density limit at the Earth's surface of -112 dB(W/(m^2·MHz)) in the entire band 1 559-1 567 MHz for all angles of arrival from the MSS space station would protect the ARNS and RNSS services. Studies evaluating the impact on several existing and planned RNSS systems of such MSS (space-to-Earth) systems in the 1 559-1 567 MHz band have since been completed.

One such study, reporting results on the significance of the interference to be caused to existing GPS, shows that sharing is not feasible due to a slight exceedance of the required interference criteria. Another study shows that the interference impact on existing GPS is negligible based on the fact that the previously mentioned study relies on an frequency dependent rejection factor averaged over the 1 559-1 567 MHz band that is at least 10 dB lower than the theoretical value. The ITU-R was unable to explain this discrepancy between the experimental and theoretical results.

All studies agree, however, that, at the very least, such MSS systems would preclude the introduction of new RNSS applications in the band 1 559-1 567 MHz and might preclude the evolution of GPS by preventing the use of the lower part of the existing GPS frequency assignment.

It is therefore concluded that sharing between ARNS/RNSS and MSS (space-to-Earth) is not feasible in any portion of the 1 559-1 567 MHz band.

2.2.1.3 Methods to satisfy the agenda item and their advantages and disadvantages

Studies conducted in the ITU-R indicate the incompatibility of the MSS (space-to-Earth) and ARNS/RNSS in any portion of the 1 559-1 567 MHz band. Not only do MSS signals have the potential to cause significant interference to ARNS/RNSS, but GNSS pseudolites and proposed new RNSS systems also have the potential to cause significant interference to the MSS (space-to-Earth).

The RNSS is extensively used, and is continuing to undergo a tremendous expansion that drives further evolution. As a result of these factors, which have to be considered in conjunction with the many critical timing, positioning, and navigation uses of RNSS (including, but not limited to, aeronautical and maritime safety-of-life navigation), sharing of the 1 559-1 610 MHz band - including any portion of the segment at 1 559-1 567 MHz - with any co-frequency communication service is not recommended.

Although studies were not carried out on every different type of RNSS receiver used in all the numerous applications of RNSS, it was nevertheless possible to conclude that sharing between ARNS/RNSS and MSS (space-to-Earth) is not feasible in any portion of the 1 559-1 567 MHz band.

2.2.1.4 Regulatory and procedural considerations

No practically implementable regulatory or procedural mechanisms have been presented to the ITU-R that could satisfy established fault monitoring and reporting requirements and ensure that MSS (space-to-Earth) signals would not have an negative effect on the continuity of flight operations.

The ITU-R examined the matter of burden sharing between ARNS/RNSS and the MSS (space-to-Earth) and concluded that the burden sharing concept is not applicable in the 1 559-1 610 MHz band, particularly due to the fact that ARNS/RNSS are safety services.

2.2.2 Band 1 675-1 710 MHz

This section addresses the area of Resolution **213 (Rev.WRC-95)**, which calls for completion of technical and operational studies of the feasibility of sharing between the MSS (Earth-to-space) and the MetSat (space-to-Earth), MetAids, FS and MS services.

2.2.2.1 Summary of technical and operational studies, including a list of relevant ITU-R Recommendations

The ITU-R has completed studies regarding the feasibility of sharing in the 1 675-1 710 MHz band between the MSS and MetSat and produced a draft revision of Recommendation ITU-R SA.1158-1. The studies considered the different uses of this band by the MetSat service in three sub-bands and came to the conclusions below. Regarding the MetAids service, Recommendation ITU-R SA.1262 analyses the feasibility of sharing between MSS and MetAids services in the band 1 675-1 700 MHz.

2.2.2.2 Analysis of the results of studies

2.2.2.2.1 Study results regarding sharing between MSS and MetAids

Regarding the MetAids service, sharing studies completed to date indicate that co-channel sharing between currently proposed MSS systems and MetAids operated in the band 1 675-1 700 MHz is not feasible due to unacceptable levels of interference to MetAids systems and non-GSO MSS systems. While the GSO MSS systems may be able to accept interference levels from MetAids, the protection to MetAids from mobile earth stations is required according to No. **S5.377**. It should also be noted that cross-border coordination would be required between mobile earth stations and MetAids when such different uses are made of parts of this spectrum in neighbouring countries. Studies also indicate that time sharing is not feasible due to the nature of both services. Studies have concluded that co-frequency sharing between MetAids and MetSats in the band 1 675-1 700 MHz is not feasible. In view of the thousands of meteorological earth stations in the band 1 690-1 700 MHz, MetAids operations have to be restricted to the sub-band 1 675-1 690 MHz, where significantly less MetSat stations are deployed. Coordination is required between MetAids operators and MetSat earth stations in Region 2 and Region 3 due to unacceptable levels of interference in the range 1 683-1 690 MHz, where GVAR (GOES Variable) (Region 2) and S-VISSR (Stretched - Visible and Infrared Spin Scan Radiometry) (Region 3) operations occur.

WMO identified future requirements for narrow-band MetAids operations as 1 675-1 683 MHz, while wideband MetAids requirements for some administrations should not exceed 12 MHz consistent with national spectrum availability. Consequently, some of the administrations with wideband MetAids requirements in Regions 2 and 3 will also require spectrum in the range 1 683-1 690 MHz.

2.2.2.2.2 Study results regarding sharing between MSS and MetSat

Regarding the sharing situation between MetSat and the MSS, the following conclusions have been reached for the three different sub-bands considered.

a) 1 675-1 690 MHz band

Sharing is considered feasible if an appropriate separation distance is kept at all times between MetSat and MSS earth stations, as determined pursuant to coordination under No. **S9.11A**. Studies have shown that typical separation distances would be up to 55 km for non-GSO MSS systems and up to 70 km for GSO MSS systems. The mobile earth station locations will have to be determined with sufficient accuracy relative to the required separation distances. Coordination of mobile earth stations in this band would therefore be subject to the ability of MSS systems to respect these separation distances through location determination capabilities. The number of MetSat earth stations deployed in the three Regions is significantly different. There are relatively few main stations deployed in all three Regions. In addition, there is a large number of meteorological GVAR/S-VISSR satellite earth stations in Regions 2 and 3 in the range 1 683-1 690 MHz. Coordination with these earth stations will also be required and sharing may not be possible in those countries where a large number of these stations is deployed.

b) 1 690-1 698 MHz band

Sharing of this sub-band is not feasible due to the existence of many thousands of earth stations receiving data from geostationary meteorological satellites.

c) 1 698-1 710 MHz band

The sharing situation is very complex in this sub-band and various problems must be considered. Sharing based on exclusion zones (separation distances) is not feasible due to the large number of MetSat earth stations and their generally unknown locations. Nearly a thousand MetSat earth stations already are deployed in this band. It is expected that this number will increase significantly because a number of new MetSat systems are planned for this band. Sharing based on time separation will be subject to severe operational and design constraints on the MSS as well as strong interference from MetSat satellites. It can be generally concluded that the band cannot be used by the MSS itself but must be considered at most as an extension band to another allocated band as the available bandwidth drops to zero at irregular time intervals. A study based on a model with 14 meteorological satellites revealed that availability of bandwidth would be of short duration and frequently inadequate to provide access during the entirety of a normal telephone call. Consequently, only variable bandwidth, short duration data transmission would be possible in such a situation. Increasing the number of meteorological satellites would result in decreased availability of bandwidth and time due to the required phasing of the meteorological satellites in order to minimize internal interference. Any use of this band would require continuing real-time coordination involving between ten and twenty active MetSat satellites operated by different administrations or international organizations already within the next decade. Furthermore, the difficulties of implementing timesharing would be enormous due to the need to maintain precise current information on the position and current frequency usage of MetSats in the band. MSS systems will suffer additional constraints when MetSats transmit wideband signals toward their corresponding CDA stations. Detailed studies on this subject have not been done, but the already limited availability of spectrum will be further reduced. Taking all these into account, it is considered very difficult that MSS operation of a viable system within this band could comply with No. **S5.377**. For the above reasons, sharing of this sub-band should not be considered.

The band 1 700-1 710 MHz is also allocated to the FS on a co-primary basis and is used extensively by some administrations. Some of these administrations use this band for broadcasting relays. No sharing studies have been carried out yet.

2.2.2.3 Methods to satisfy the agenda item and their advantages and disadvantages

Segmentation of the band 1 675-1 690 MHz consistent with No. **S5.377** on a national or regional basis, may be a method of providing MSS spectrum in the sub-band 1 683-1 690 MHz where no MetAids operations take place. In addition, appropriate separation distances will be required between MetSat and MSS earth stations in the sub-band 1 683-1 690 MHz, as determined pursuant to coordination under No. **S9.11A**. Coordination of mobile earth stations with relatively few MetSat main earth stations in all Regions will be required. In a number of administrations, coordination will additionally be required with meteorological GVAR/S-VISSR satellite earth stations in Regions 2 and 3 in the range 1 683-1 690 MHz. Sharing may not be feasible in those countries where a large number of these stations are deployed. Sharing must also be based on the proposed amendment to No. **S5.377** in § 2.2.2.4 and take into account the different use of this band in the three ITU Regions by the MetSat service.

2.2.2.4 Regulatory and procedural considerations

Protection of the MetSat service in the band 1 683-1 690 MHz could be ensured by a proper footnote supplementing the provisions of No. **S5.377** for which the following text should be considered:

"Mobile-satellite systems using the 1 683-1 690 MHz band shall not cause harmful interference to earth stations of the meteorological-satellite service. To avoid causing harmful interference, mobile earth stations shall not operate, except in a non-interfering signalling channel, within the exclusion zones around the meteorological earth stations defined in Recommendation ITU-R SA.1158-1(Rev.). The mobile-satellite system shall have position determination capabilities to ensure compliance with this provision."

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2.3 Agenda item 1.11

"to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-GSO/MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions **214 (Rev.WRC-97)** and **219 (WRC-97)**"

2.3.1 Constraints on existing allocations for the non-GSO MSS below 1 GHz (Resolution 214 (Rev.WRC-97))

2.3.1.1 Summary of technical and operational studies relevant to constraints on existing allocations and relevant to sharing between existing non-GSO MSS systems and existing terrestrial services

A number of studies have been carried out since MSS allocations for non-GSO satellite systems were first agreed at WARC-92. These have led to ITU-R Recommendations that indicate the sharing techniques, which are being used by those systems to share with each other and other co-primary services.

2.3.1.2 Analysis of the results of studies

Table 1 from Recommendation ITU-R M.1389 summarizes the techniques and Recommendations applied to existing MSS allocations. Many of these techniques are being employed in practice successfully.

2.3.1.3 Method to satisfy the agenda item

The constraints on existing allocations are reflected in the footnotes to the allocations, and in Appendix **S5** and No. **S9.11A**. These have evolved to their present form since WARC-92. Administrations have accepted the sharing criteria between services of equal status.

These constraints have served to provide a basis for implementing non-GSO MSS systems in these bands and at the same time provide protection to other space and terrestrial services. Therefore in respect of the constraints on the MSS in existing allocations below 1 GHz, no further modifications are needed.

2.3.1.4 Regulatory and procedural considerations

No modifications are required to the tables of criteria applicable to MSS allocations for use by non-GSO systems below 1 GHz, as found in No. **S9.11A**, or to the footnotes containing constraints that apply to the pertinent allocations.

2.3.2 Studies on non-GSO MSS links (Earth-to-space) sharing with terrestrial services in the band 450-470 MHz (Resolution 214 (Rev.WRC-97))

2.3.2.1 Summary of technical and operational studies

The ITU-R conducted sharing studies relevant to possible additional Earth-to-space allocations to the non-GSO MSS during the ITU-R study period 1996-1997 and the current study period 1998-1999. A variety of scenarios were examined with differing technical characteristics for systems in the mobile and fixed services and for mobile-satellite systems.

Study 1

In specific studies conducted at 460 MHz, interference between a non-GSO MSS network and land mobile systems was analysed. The MSS network used was a 48 satellite system with the characteristics of the system designated LEO-L in draft revision of Recommendation ITU-R

M.1184[8/47]. The land mobile system was modelled with the following characteristics: an analogue, frequency modulation system (or digitally modulated, binary-FSK system); a vertically polarized antenna having 0 dBi gain towards the satellite; 10 m^2 antenna height product (consistent with Recommendation ITU-R M.1039-1(Rev.)[8/53]); minimum received signal power assumed to be -140 dBW; and channel bandwidths of 6.25, 12.5 and 25.0 kHz. Several worst-case assumptions were made: 1) non-GSO MSS mobile earth stations (MESs) transmitting at 100% of network capacity, 24 hours per day, 2) terrestrial stations and non-GSO MESs geographically clustered in the same areas, and 3) dynamic channel avoidance not employed. For the conditions modelled in these studies, it was calculated that the probability of interference to a land mobile receiver resulted in less than 0.1% decrease in channel availability, that is, a reduction in channel availability smaller than a 99% availability being reduced to 98.9%. Over the range of parameters studied, the mean time between interference events for a land mobile user with 0.01 Erlangs of traffic was calculated to range from 10 hours to 21 months, which is much less than 0.1% decrease in channel availability. Since in general the non-GSO MSS network would be able to identify and avoid active mobile channels, the actual interference from non-GSO MSS MESs into the modelled land mobile station would be much less than that calculated under the worst-case assumptions used in the analysis.

In these same studies at 460 MHz, the availability of temporarily clear land mobile channels that could be used for MES uplinks was determined. These studies showed that a sufficient number of clear channels per satellite (six for the MSS network used) could be found with a density of use by the land mobile systems ranging from 77 000 to 190 000 mobile stations within the satellite beam (12 million km^2) in 1 MHz of shared bandwidth. In 5 MHz of shared bandwidth, six available clear channels could be found with 570 000 to 1.5 million terrestrial mobile stations operating within the satellite beam.

Study 2

Other specific studies evaluated non-voice, non-GSO MSS networks frequency sharing with the fixed and mobile services operating in a portion of the band 450-470 MHz. The MSS networks modelled had characteristics of the 81 satellite "LEO-T" network described in draft revision of Recommendation ITU-R M.1184[8/47]. The mobile system was modelled with the following characteristics: analogue FM or digital modulation; 5 dBi antenna gain toward the horizon; 200 m antenna height resulting in an antenna height product of 600 m^2; C/(I+N) of 17 dB and channel bandwidths of 16 and 25 kHz. These analyses indicate that sharing in portions of the 450-470 MHz band is feasible subject to certain operational constraints on the non-voice, non-GSO MSS networks; such constraints include MES transmission duration and transmission duty cycle limitations. It is concluded that shared access to a minimum of 4 MHz of spectrum by five non-voice, non-GSO MSS can meet the modelled land mobile service (LMS) protection requirements. This conclusion is based on the conditions that: any single MSS MES transmission must be less than 450 ms in duration, and: an individual MES cannot retransmit on the same frequency within a 60 s period.

In addition, these studies assumed the following traffic loading rates:

Mobile:	0.01 Erlang
Base Station:	0.733 Erlang
Fixed Station:	0.6 Erlang

It has been determined that by imposing the above technical constraints on the MSS, the operational needs of the modelled non-voice, non-GSO MSS operating in portions of the 450-470 MHz band are satisfied while at the same time meeting the FS and LMS performance objectives. The use of Dynamic Channel Assignment Techniques such as described in Recommendation ITU-R

M.1039-1(Rev.)[8/53] may also be used by low power, low duty cycle non-voice, non-GSO MSS systems to further reduce the probability of interference and promote compatibility with terrestrial services.

Study 3

An analysis was performed at 455 MHz to evaluate frequency sharing between FDMA narrow-band uplinks in the non-GSO mobile-satellite service and a specific terrestrial system operating in a mobile service band. The non-GSO MSS network modelled had 48 satellites with Earth-to-space links from mobile earth stations with antenna heights of 3 m. The satellite network was assumed to use a dynamic channel assignment technique to avoid channels that were actively being used by terrestrial systems, and it was assumed that this channel assignment technique was 99.8% effective in detecting active remote pickup unit (RPU) channels for the specific terrestrial systems modelled.

The specific terrestrial system was an RPU linked to a sound broadcasting station, in an urban noise environment (assumed to be -138 dBW). The remote unit antenna height was 15 m and the base station receiving antenna height was 60 m. The simulation results showed that the probability of interference was 0.00015% (due to one interfering non-GSO MSS system). This is equivalent to a single short, one-half second, interference event every four days, assuming that the RPU is operating continuously for that period. If the RPU only operated for 2.5 hours per day, then the average interval between short, one-half second, interference events would be a month. The results show that for the particular sharing scenario analysed the RPU channel availability was degraded by much less than a 99% availability being reduced to 98.9%.

Study 4

Studies of sharing between an MS system and two example digital terrestrial systems in the band 450-470 MHz have been carried out, investigating the probability of interference from the MSS MES to the mobile units and the base stations of the terrestrial systems. The analyses at 455 and 460 MHz modelled a non-GSO MSS network with 48 satellites and narrow-band Earth-to-space links from mobile earth stations with antenna heights of 3 m. This is the MSS system designated as LEO-L in draft revision of Recommendation ITU-R M.1184[8/47]. MES data rates of 9.6, 4.8, and 2.4 kbits/s were used. Base station to mobile and mobile to base station links using transmitter and receiver characteristics from two digital trunked land mobile systems were modelled:
1) characteristics that were provided by ITU-R for a system that may be installed in many Region 1 and other countries, and 2) characteristics that were provided by ITU-R for a system similar to those used in a Region 2 country. The links of the first used digital modulation, 25 kHz channel spacing, 1.5 m mobile antenna height with 45 dBm transmitter power, and 50 m base station antenna height with 40 dBm transmitter power. The second system used digital modulation, 6.25 kHz channel spacing, 2 m mobile antenna height with a maximum of 38.5 dBm transmitter power, and 200 m base station antenna height with 48 dBm transmitter power. The threshold of interference in both cases was a carrier-to-interference ratio less than 19 dB. The statistical simulation model in draft revision to Recommendation ITU-R M.1039-1(Rev.)[8/53] was used to determine the probability of interference to digital trunked receivers at mobile and base locations. Four different geographical regions were used in the studies, Europe, North America, South America, and Central America & Caribbean. For the range of parameters studied, the maximum probability of interference into a single terrestrial link was 0.0030% for the first system and 0.0027% for the second system. The

higher value is equivalent to a single, half-second interference event occurring once every four hours at a continuously operating LMS receiver. The results may be viewed as 99% channel availability being reduced to 98.9970% for the highest probability of interference in the cases studied. The parameters provided for these studies do not take into account the network design and other considerations of digital trunked systems, and therefore do not account for network aspects of sharing in the band.

Other studies

There are many kinds of terrestrial systems operating in the band 450-470 MHz which have varied technical and operational requirements (such as density distributions, necessary C/(N+I) ratios and antenna heights). Therefore, at this time, it might be difficult to provide single value protection or sharing criteria applicable to all such systems. It may be necessary to do case-by-case studies of specific combinations of systems and bands and a number of such studies have been performed. The following are the results of interference studies of several systems within one administration calculated by using the methodology contained in Recommendation ITU-R M.1039-1(Rev.)[8/53].

Some fixed radio frequency links designed for government use, including public safety are, in case of emergency, occupied as much as 80% of the time. The transmitting power towards a non-GSO satellite could be as low as 0.028 Watts for brief periods of time, which may not be sufficient for instantaneous detection by a Dynamic Channel Assignment Technique system. Low power devices, such as wireless microphones and leaky coaxial cable communication systems, may also be of insufficient power for detection by Dynamic Channel Assignment Technique.

Studies were performed on two kinds of land mobile wireless systems used by broadcasting utilities. One of these systems is used in one administration for monitoring of incoming signals 24 hours per day at base stations located at an altitude of up to 1 000 m. Additional interference due to MES transmissions in the presence of a waiting mode receiver may increase the number of times that the squelch is activated and decrease the lifetime of the squelch relay to some extent. Some MES transmissions may be too short to activate the squelch circuit.

Further, because it is expected that the signals received at the satellite will experience scintillation in the frequency band 450-470 MHz (Recommendation ITU-R P.531), MSS systems may need to be designed to account for this.

2.3.2.2 Analysis of results of studies

Studies conducted by the ITU-R show the low probabilities of interference resulting from co-channel sharing between narrow-band, FDMA MSS uplinks and terrestrial services for different specific cases. For frequencies near 460 MHz, both analogue and digital terrestrial systems were analysed. In cases with certain LMS receivers with antenna heights of 1.5 m, 3 m, 50 m, 60 m and 200 m, the probabilities of MSS mobile earth stations interfering into terrestrial receivers were shown to be less than 0.1%, which would meet an availability criteria of no greater than 0.1% decrease in availability when appropriate technical and operational constraints, such as dynamic channel assignment techniques were used. Analyses showed that for co-channel sharing between terrestrial services with assumed characteristics and the MSS below 1 GHz, the probability of interference decreased with increasing shared bandwidth. Also the use of short duration, intermittent signals by the MSS uplinks contributed to the low probabilities of interference.

Sharing studies investigating interference effects to and from future digital terrestrial systems, as well as in a mixed digital/analog and other specific environments remain to be completed.

2.3.2.3 Methods to satisfy the agenda item

Because of the heavy use of frequencies below 1 GHz by presently allocated services and the possibilities of co-channel sharing with the existing services, the ITU-R has not identified additional frequency bands for exclusive use by non-GSO MSS Earth-to-space links.

However, the results of specific ITU-R technical studies indicate that additional allocations to the non-GSO MSS below 1 GHz (Earth-to-space) may be achieved in some cases by the following methods:

- co-frequency allocations to the non-GSO MSS and the terrestrial services near 460 MHz may provide sufficient channels for MSS uplinks and low interference probabilities to the existing services noting that network aspects of digital trunked systems in the band have not been taken into account, thus further study is required in the area of sharing between digital trunked systems and MSS. Further studies are also needed for the mobile and fixed systems described in section 2.3.2.1 - Other studies;
- appropriate technical and operational constraints on the non-GSO MSS networks (as used in the studies) would be required to keep the probabilities of interference to the existing services to acceptable levels.

2.3.2.4 Regulatory and procedural considerations

Additional allocations to the non-GSO MSS below 1 GHz for Earth-to-space links in bands shared with MS and FS allocations need to ensure that the existing services are provided with acceptable levels of protection against possible interference. Recommendation ITU-R M.1039(Rev.)[8/53] addresses the use of dynamic channel activity assignment techniques by MSS systems to avoid the use of channels that are in active use by terrestrial systems. Recommendation ITU-R M.1039(Rev.)[8/53] also notes that restrictions on the MSS length of transmissions and on the re-use of frequencies in the same location can facilitate sharing with certain terrestrial services used for voice communications. Since non-GSO MSS sharing with the existing allocations depends on MSS systems using these characteristics, appropriate restrictions would need to be applied to any new allocations to the non-GSO MSS.

Current allocations to the non-GSO MSS near 460 MHz (454-456 MHz and 459-460 MHz) are restricted to Region 2 and to several administrations in each of the other two ITU Regions. These regional or country allocations limit the use of MSS networks to these areas. For the non-GSO MSS networks, worldwide allocations to the MSS would allow the use of the satellite network resources by all parts of the Earth.

2.3.3 Resolution 219 (WRC-97) "Studies relating to consideration of the allocation to the non-geostationary mobile-satellite service in the meteorological aids band 405-406 MHz and the impact on primary services allocated in the adjacent bands"

2.3.3.1 Summary of technical and operational studies including a list of relevant ITU-R Recommendations

Sharing studies carried out by ITU-R indicate that co-channel sharing between non-GSO MSS systems using narrow-band modulation techniques and MetAids service in the band 401-406 MHz is not feasible.

ITU-R has also completed studies regarding the use of the MetAids band and developed a draft revision to Recommendation ITU-R SA.1258-1 and Recommendation ITU-R SA.1165-1. The studies conducted by several administrations and by WMO considered the worldwide spectrum requirements in this band for radiosonde systems in the MetAids service and for data collection systems in the EESS and the MetSat service.

ITU-R has carried out some studies regarding the protection of Cospas-Sarsat services in the band 406-406.1 MHz and radio astronomy services in the band 406.1-410 MHz. Recommendation ITU-R M.[8/84] contains protection criteria for SARSAT search and rescue processors (SARP) in the band 406-406.1 MHz.

2.3.3.2 Analysis of the results of studies

2.3.3.2.1 Current and future use by EES/MetSat

At WRC-97 the band 401-403 MHz was upgraded as a primary allocation to the EES/MetSat service. This band is used for the operations of Data Collection Systems (DCS) on GSO and non-GSO MetSat/EES satellites. DCS Data Collection Platforms (DCP) make periodic measurements of a wide range of environmental data and uplink them to the MetSat/EES satellite. Alert DCPs are also installed to report emergencies and data from hazard/disaster recognition. Sharing between DCPs and MetAids is currently being accomplished via careful coordination within the operating agencies of meteorological services.

Recommendation ITU-R SA.1258-1-contains sharing criteria between MetSat, EES and MetAids services in the band 401-403 MHz. Co-channel sharing of MetAids with non-GSO MetSat/EES (currently operating in 401-402 MHz) is not feasible; co-channel sharing of MetAids with GSO MetSat is difficult or not feasible in some areas. A WMO survey shows that DCP stations are expected to significantly increase in number for the foreseeable future and this will result in a segmentation of the band 401-406 MHz between EES/MetSat and MetAids services. It is anticipated that the MetAids service may effectively have only the 403-406 MHz band available in the future.

2.3.3.2.2 Current and future requirements for MetAids

Radiosonde observations are vital for operational meteorology (weather analysis, warnings and forecasts), coordinated in the framework of WMO, and for several other applications (research, environmental, defence).

There are increasing requirements for MetAids operation for meteorological, research, environmental and defence applications. MetAids services need all of the band of 403-406 MHz, and part of the band 401-403 MHz under adequate sharing coordination with EES/MetSat, where feasible.

At WARC-92, the portion of the spectrum band 400.15-401 MHz was allocated to the MSS, and National Meteorological Services plan to move narrow-band MetAids operation out of the band to enable MSS operation.

The technical characteristics and performance criteria for radiosonde systems in the MetAids service are given in Recommendation ITU-R SA.1165-1. In the long term, improved technology and operational techniques may result in more efficient use of these bands and more affordable radiosondes, which may enable future review of requirements for the band 401-406 MHz. These improvements would facilitate the increasing usage of MetAids service in those countries with increasing requirements that can bear the significant increase in costs of new radiosondes. The use of advanced spectrum-efficient meteorological aids systems has already been implemented in a few countries in order to meet requirements for high density MetAids networks within the existing allocations, but at very high costs.

For most of the countries, and in particular for developing and less-developed countries, the use of more spectrum efficient meteorological aids systems would increase the operational costs of meteorological aids networks beyond the available financial resources, and would damage current meteorological operations and hamper the future development of radiosonde measurements.

Data collected by MetAids in any country benefits all member nations of the WMO by providing essential data for weather analysis, warnings, forecasts and climate change studies.

Taking into account current technology, transition of the MetAids service out of the band 405-406 MHz is considered as not feasible in order to accommodate the increasing requirements for EES/MetSat in the band 401-403 MHz, and the increasing requirements of MetAids in the band 401-406 MHz, taking into account sharing constraints between MetAids and EES/MetSat. This conclusion also takes into account the economic viability of MetAids improvements in spectrum efficiency.

2.3.3.2.3 Impact on primary services in adjacent bands

a) Impact on Sarsat SARP in the band 406-406.1 MHz

The results of analyses indicate that the required protection level for Sarsat Search and Rescue Processor (SARP) operations in the band 406.0-406.1 MHz is -198.6 dB(W/(m^2·Hz)) against out-of-band broadband emissions, and pfd -185.8 dB(W/m^2) against spurious narrow-band emissions. The analyses also indicated that the Doppler shift should be considered in determining the effect upon Cospas-Sarsat instruments by proposed MSS using the 405-406 MHz band (the worst-case Doppler shift is 20 kHz).

The results further indicated that possible future use of the band 405-406 MHz by non-GSO MSS will require a guardband at the upper band edge that may extend from 61 to 142 kHz in order to limit interference to the Sarsat SARP.

b) Impact on Cospas SARP in the band 406-406.1 MHz

The results of analyses indicate that the required protection level for Cospas Search and Rescue Processor (SARP) operations in the band 406.0-406.1 MHz is -200.8 dB(W/(m^2·Hz)) against out-of-band broadband emissions, and pfd is -176.6 dB(W/m^2) against spurious narrow-band emissions. The analyses also indicated that the Doppler shift should be considered in determining the effect upon Cospas-Sarsat instruments by proposed MSS using the 405-406 MHz band (the worst-case Doppler shift is 20 kHz).

The analysis results further indicated that possible future use of the band 405-406 MHz by non-GSO MSS would require a guardband at the upper band edge that may extend from 32 kHz, as a minimum, in order to protect from a burn out of the low noise amplifier of the Cospas SARP.

c) Impact on radio astronomy service in the band 406.1-410 MHz

The band 406.1-410 MHz is allocated on a primary basis to radio astronomy, to be shared with fixed/mobile services under No. **S5.149**. This band is used for continuum mode observations leading to sky surveys and study of pulsars. The band is extensively used in many radio observatories around the world. In Canada, observations in this important radio astronomy band are made 100% of the time.

As listed in Recommendation ITU-R RA.769-1, the threshold detrimental level to RAS on the ground in the 406.1-410 MHz band is -255 dB(W/(m^2·Hz)). The maximum pfd level at the ground for MSS transmissions is -161 dB(W/(m^2·Hz)). Thus, the required MSS signal attenuation to protect RAS is 94 dB. This required attenuation is appropriate only to an emerging technology and is not characteristic of existing satellites. It is understood that the MSS system planned under the proposed allocation is employing a small number of satellites to minimize the probability of interference by satellites passing near the main beam of a radio telescope.

This attenuation might be attainable through a combination of spectral shaping techniques, centre frequency offset and transmit filtering on the proposed MSS service. A guardband near the upper band edge for the proposed MSS operations in the 405-406 MHz band will be essential. The width for the guardband is to be decided based on practical aspects of continued protection to radio astronomy during the lifetime of the satellite.

2.3.3.3 Methods to satisfy the agenda item and the advantages and disadvantages

Method A: Allocation to the MSS

Allocate the band 405-406 MHz to the non-GSO MSS, with a transition of MetAids out from the band 405-406 MHz, while ensuring the protection of Cospas-Sarsat systems and radio astronomy service.

Advantage

The new allocation would provide additional spectrum available for non-GSO MSS systems below 1 GHz.

Disadvantages

- The transition of MetAids out from the band would be required to enable MSS operation. For the foreseeable future, it would damage current MetAids operations (meteorological, environmental and defence) and hamper future MetAids service development.
- The protection of Cospas-Sarsat in the band 406-406.1 MHz and the radio astronomy service in the band 406.1-410 MHz requires protection limits and an upper guardband for MSS systems.

Method B: No change to current allocations

Maintain current allocations of 401-406 MHz.

Advantage

Maintaining current allocations would protect the MetAids service and would enable EES/MetSat and MetAids to meet increasing service requirements.

Disadvantage

Does not provide urgently needed spectrum for MSS below 1 GHz, in the candidate band 405-406 MHz.

Summary

Operation of the MSS in the band 405-406 MHz (Method A) is considered as not feasible in the foreseeable future_based on assessments and studies carried out by ITU-R. Studies on improved technology and operational techniques may result in the long term in more efficient use of these bands, and may enable future review of requirements for the band 401-406 MHz and some administrations are continuing studies in this area.

2.3.3.4 Regulatory and procedural considerations

If an allocation were to be made in a portion of the band 405-406 MHz to MSS, protection limits would need to be included into the Radio Regulations to provide adequate protection measures to Cospas-Sarsat (Recommendation ITU-R M.[8/84]) and radio astronomy (Recommendation ITU-R RA.769-1).

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2.4 Agenda item 1.15

"issues related to the radionavigation-satellite service"

2.4.1 Agenda item 1.15.1

"to consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments"

Current designs of proposed RNSS systems operate with restrictions on the signal bandwidth and limitations on the achievable performance. The evolution towards and beyond Global Navigation Satellite System-2 (GNSS-2) would be better assured by the provision of additional allocations for RNSS.

Current RNSS systems using frequencies in the bands 1 215-1 260 MHz and 1 559-1 610 MHz are significantly affected by variable delays due to electron fields in the ionosphere, with the result that accurate navigation requires the use of measurements at local stationary reference points with accurately-known locations and communication of these measurements to the (moving or stationary) object under survey. Moreover, the higher frequencies also permit higher accuracy in tracking of the RNSS satellites.

Wider signal bandwidth would allow higher code rates to give better navigation accuracy and reduce multipath errors, which would benefit all RNSS applications. An RNSS network in the frequency range 1 GHz to 6 GHz is considered to require between 20 to 24 MHz of spectrum. If other networks must be considered, a wider allocation might be necessary, unless compatible designs could be introduced which would allow co-frequency sharing.

Studies are therefore being made into the feasibility of RNSS systems using frequencies, which are high enough to reduce the effects of ionospheric delay, or significantly different from existing RNSS signals to allow for correction of ionospheric delay, but which are not so high as to suffer significant troposphere attenuation. Such systems would require a sufficient RNSS (space-to-Earth) allocation.

Proposals for RNSS systems have been made in which the satellites are required to be synchronized to terrestrial beacon reference stations. Less than 50 beacons are required, distributed worldwide. These proposals would require an RNSS (Earth-to-space) allocation. The corresponding downlinks are in the already existing RNSS (space-to-Earth) allocations 1 215-1 260 MHz and 1 559-1 610 MHz.

Another proposal considers an RNSS (space-to-Earth) signal in a portion of the 960-1 215 MHz aeronautical radionavigation service (ARNS) band. A new RNSS allocation should provide for new

Global Navigation Satellite System (GNSS) signals that can be used, together with a signal in the 1 559-1 610 MHz band, to mitigate ionospheric delay errors; provide robustness in the event of unintentional interference; and reduce the time required to resolve carrier phase ambiguities. It is anticipated that the new RNSS signals will be used for many aviation and non-aviation applications.

The band 960-1 215 MHz is being used for a variety of aeronautical radionavigation systems as further specified in § 2.4.1.1.1. The use of these systems and their enhancements is expected to continue for the next two decades without any expectation of any decrease.

2.4.1.1 Summary of technical and operational studies

2.4.1.1.1 RNSS (space-to-Earth) in part of the band 960-1 215 MHz

The 960-1 215 MHz band is allocated to the ARNS on an exclusive, worldwide basis and is used for ICAO standardized radionavigation and surveillance systems that include: the Secondary Surveillance Radar (SSR), the Airborne Collision Avoidance System (ACAS) and the Distance Measuring Equipment system (DME) and is also used for the Tactical Air Navigation system (TACAN). The 1 151-1 215 MHz portion of that band is used by ground DME and TACAN transponders.

A study has shown that a bandwidth of 24 MHz could allow the requirements for Category I/II/III aircraft precision approach to be met, and will improve GNSS services to land-based, maritime, and airborne users worldwide.

A study was performed to assess the compatibility of a signal in the proposed RNSS band with the aeronautical radionavigation receivers in the 960-1 215 MHz band. The study concluded that RNSS signals can be designed that do not cause interference to the inband aeronautical radionavigation receivers which include: SSR interrogators, SSR transponders, Mode S Interrogator, Mode S transponders, TCAS, TACAN/DME interrogators, and TACAN/DME transponders.

A study was performed to assess the compatibility of an RNSS signal in the band 1 164-1 188 MHz with radar receivers in the 1 215-1 400 MHz band characterized in draft new Recommendation ITU-R M.[8/118]. The study concluded that RNSS signals can be designed that do not cause interference to the adjacent band radar systems which include: aeronautical surveillance radar and air traffic control radar.

Studies were performed to assess the compatibility of the aeronautical radionavigation transmitters operating in the 960-1 215 MHz band and GNSS receivers using a new RNSS signal in 1 151-1 215 MHz. Initial studies conclude that:

a) Measures could be taken to ensure that emissions from equipment on board aircraft transmitting in the band 1 025-1 150 MHz and spurious emissions from other on board equipment into RNSS receivers in the band 1 164-1 215 MHz on board the same aircraft would be tolerable. Moreover, ICAO has stated that any such on board compatibility is considered an internal aviation and industry matter. It is considered unlikely that such emissions would affect RNSS receivers on the ground.

b) RNSS networks in the band 1 164-1 188 MHz can be designed so that their receivers can tolerate interference due to emissions from radar stations operating in the band 1 215-1 400 MHz. Considering that RNSS systems currently operate in the band 1 215-1 260 MHz, a similar result is expected for RNSS receivers in the band 1 151-1 215 MHz, though a guardband may be required for certain applications.

c) In certain geographical areas where there is a high density of ground-based DME transponders, harmful in-band interference would be received by wideband RNSS receivers on aircraft at high altitude. One proposed solution is frequency re-assignment of some co-frequency DME/TACAN transponders in these areas, but this is not feasible in some of these areas due to lack of available DME channels. Another proposed solution is use of a dual-bandwidth RNSS signal, avoiding interference at high altitudes by use of a narrow-band signal component while obtaining the precision required at lower altitudes by use of a wideband signal component.

d) Ground-based RNSS receivers can be designed to tolerate the interference from ground-based DME transponders.

e) Sharing of the same spectrum by two or three different RNSS networks, which would minimize the necessary allocation, has been shown to be technically feasible and to result in only a slight increase in the interference received by the RNSS receivers of each network. However, this would require compatible power levels and signal types in the design and operation of the different RNSS networks. Use of independent spectrum by each RNSS network would decrease the chance of a single interference incident affecting more than one network.

It was recognized that, if an allocation to RNSS were to be made in any part of the band 960-1 215 MHz, further study effort will be required by ITU, ICAO and others to develop Recommendations to ensure compatibility between the various systems in the band.

2.4.1.1.2 RNSS (space-to-Earth) in the band 1 260-1 300 MHz

In principle, there is no major difference between the current allocations of 1 215-1 260 MHz and 1 260-1 300 MHz apart from the absence of RNSS from the latter.

The band 1 260-1 300 MHz, as the band 1 215-1 260 MHz, might provide scope for non-aeronautical, non-safety-of-life radionavigation-satellite applications, without operational constraints on terrestrial radar and spaceborne synthetic aperture radar installations.

The band 1 260-1 270 MHz is allocated to the amateur satellite service.

Wind profiler radars are planned to use the band 1 270-1 295 MHz, and these have a higher duty cycle (10%) than other radars, so that multiple-entry interference, if it occurs, may cause problems.

2.4.1.1.3 RNSS (space-to-Earth) in parts of the band 5 000-5 150 MHz

a) Protection of the radio astronomy service (RAS) allocation in the band 4 990-5 000 MHz

Studies have shown that a guardband of at least 10 MHz is required between an RNSS (space-to-Earth) allocation and the RAS band immediately below 5 000 MHz together with careful control of the RNSS out-of-band emissions.

A study has shown that filters can be designed which provide enough attenuation to easily accommodate the protection requirements of the RAS contained in Recommendation ITU-R RA.769-1 within the RAS allocated bands.

b) Protection of the MLS system in the band 5 030-5 091 MHz and 5 091-5 150 MHz

An RNSS (space-to-Earth) system operating in the 5 010-5 030 MHz band is compatible with MLS operations in the band 5 030-5 150 MHz if its power flux-density at the surface of the Earth does not exceed the level of -124.5 dB(W/m^2) in a 150 kHz band, as specified by ICAO.

Analysis has shown that sharing in the band 5 030-5 150 MHz with MLS is not feasible due to unacceptable interference from MLS to RNSS receivers up to the radio horizon.

c) Sharing with feeder links in the band 5 091-5 150 MHz

The band is allocated to the FSS (Earth-to-space) for use by MSS feeder links under the conditions of No. **S5.444A**.

Analysis has shown that sharing of the band between RNSS (space-to-Earth) and FSS (Earth-to-space) is not feasible due to unacceptable interference from feeder links to RNSS receivers up to the radio horizon.

d) Sharing with AMS(R)S in the band 5 000-5 150 MHz

The band 5 000-5 150 MHz is allocated to AMS(R)S through No. **S5.367**. This band is currently unused by AMS(R)S and no studies have been carried out on sharing between AMS(R)S and RNSS in the band 5 000-5 150 MHz.

2.4.1.1.4 RNSS (Earth-to-space) in parts of the bands 1 300-1 350 MHz or 5 000-5 030 MHz

a) Sharing with radionavigation and radiolocation in the band 1 300-1 350 MHz

RNSS beacons using the band 1 300-1 350 MHz will be located in areas permitting their operation above 15° elevation for any azimuth. In addition, an antenna decoupling of at least 50 dB will be provided at elevation angles lower than 10° through the use of choke-ring equipment. In this context, analyses have shown that a separation distance of 60 km or less, depending on the radar to be protected, is sufficient to avoid excess interference of RNSS (Earth-to-space) beacons into radars. Considering the small number of these radiobeacons (less than 50 worldwide), the choice of their location, taking this constraint into account, is not problematic. On the other side of the problem it was shown that with an adequate tuning of the AGC loop in the receiver, the interference of radionavigation and radiolocation radar in the band 1 300-1 350 MHz is compatible with the operation of the RNSS (Earth-to-space) radiobeacon transmission.

b) Protection of the RAS allocation in the band 4 990-5 000 MHz

The RAS can be well protected through the implementation of an adequate separation distance between the beacons and the RA sites.

c) Protection of MLS in 5 030-5 091 MHz and 5 091-5 150 MHz

The MLS can be well protected through the implementation of an adequate separation distance between the radiobeacons and the MLS sites. The specific characteristics of the RNSS beacons will need to be used to determine the required separation distance from airports using or planning to use MLS. Guidance could be taken from Recommendation ITU-R S.1342.

d) Sharing with AMS(R)S in the band 5 000-5 150 MHz

The band 5 000-5 150 MHz is allocated to AMS(R)S through No. **S5.367**. This band is currently unused by AMS(R)S and no studies have been carried out on sharing between AMS(R)S and RNSS in the band 5 000-5 150 MHz

2.4.1.2 Analysis of the results of studies

New worldwide allocations to RNSS (space-to-Earth) are required to support advanced RNSS systems. The 1 151 to 1 215 MHz portion of the 960-1 215 MHz ARNS band was investigated for RNSS (space-to-Earth). Studies to date indicate that new signals in this portion of the band would not interfere with current users. The feasibility of airborne reception of RNSS signal in the current RF environment depends on careful RNSS design, and is under investigation. Preliminary sharing analyses have shown that airborne RNSS receivers are compatible with the existing environment except in certain geographic areas, and at high altitude, where a dense DME/TACAN environment is encountered by the receivers. Frequency reassignment of some ground DME/TACAN transponders would be required if high altitude use of the RNSS signal is desired in those areas and if the RNSS signal is not adapted to cope with this situation.

A new allocation to RNSS (Earth-to-space) of 20 MHz is also required to support uplink beacons. It may be possible to allocate the band 5 000-5 030 MHz to RNSS (Earth-to-space), whilst protecting the RAS allocation below 5 000 MHz. The RNSS (Earth-to-space) allocation should not be shared with RNSS (space-to-Earth) so as not to constrain the downlink. If RNSS (space-to-Earth) is allocated in the band 5 010-5 030 MHz, the RNSS (Earth-to-space) allocation should be limited to 5 000-5 010 MHz.

2.4.1.3 Methods to satisfy the agenda item and their advantages and disadvantages

2.4.1.3.1 RNSS (space-to-Earth)

Method 1

Part of the band 960-1 215 MHz.

Advantages

- RNSS signals in this band, used in conjunction with RNSS signals in another separated band, can be used to mitigate ionospheric delay errors, to provide robustness in the event of unintentional interference and to reduce the time required to resolve carrier phase ambiguities.
- RNSS networks in this band can operate without causing harmful interference to ARNS networks.
- Wideband RNSS receivers at low altitudes or on the ground, and also in most areas at high altitudes, as well as narrow-band RNSS receivers at any altitude could be designed to tolerate the interference caused by ground-based ARNS transmitters.

Disadvantage

- In certain geographical areas where there is a high density of ground-based DME transponders, wideband RNSS receivers on aircraft at high altitude would receive harmful in-band interference, unless the RNSS system is designed to mitigate the interference.

Methods 1.1 and 1.2 are two sub-options of Method 1 for the band 960-1 215 MHz. The advantages and disadvantages mentioned above for the band 960-1 215 MHz are applicable to the sub-options below.

Method 1.1

1 164-1 188 MHz

Advantages

- In areas where administrations re-assign DME transponders to reduce the density of DME signals within the proposed RNSS band, the impact of re-assignment only affects a limited band.
- Adjacent-band interference into RNSS in this band from stations operating in the radiolocation service in the band 1 215-1 260 MHz is mitigated through a guardband.

- Three RNSS networks, with up to a total of 30 satellites in view from any location, could technically share the same band. This method thus minimizes the allocation bandwidth for RNSS and maximizes the spectrum retained for exclusive use of ARNS.
- Co-frequency operation of multiple RNSS networks enables the use of less complex common receiver equipment.

Disadvantages

- A single interference incident could simultaneously disrupt all RNSS systems within that band.
- Sharing of the same frequency band by different RNSS networks would impose technical and operational constraints on the design of each RNSS signal and would place a burden of close cooperation between all the RNSS network operators, which may have schedule, cost and design impact on both initial system implementations and subsequent modifications.
- In this band, the deployment of additional DME/TACAN transponders, as well as the development of future ARNS systems, would be hampered in certain areas.
- In the region (Europe) with the greatest interference from DME, the 1 164-1 188 MHz portion of the 1 151-1 215 MHz band has a higher density of DME compared to other portions of that band.

Method 1.2

1 151-1 215 MHz

Advantages

- Two non-overlapping 24 MHz wide RNSS networks could be implemented in the considered band, and benefit from having neither mutual constraint on their signal design, nor any requirement for permanent close common operation. This flexibility may help to design RNSS that can tolerate interference from ARNS. Much more flexibility is also given to later modification of the characteristics of the signals for an upgrade of the service.
- As a single interference incident is less likely to cause simultaneous interruption of several non-overlapping RNSS systems, these RNSS systems can provide mutual backup in the same frequency range.

Disadvantages

- In regions where administrations decide to assign DME frequencies away from the signal of any RNSS system that has not been designed to tolerate them, there is less flexibility to assign a DME to a frequency in a band that would not affect the occupied bandwidths of other RNSS systems.
- A guardband is reduced between RNSS networks operating up to the high end of the 1 151-1 215 MHz band and radar stations operating in the 1 215-1 260 MHz band, hence increasing the need for mitigation techniques for safety-of-life RNSS applications making use of that high end of the band.
- Operation of frequency separated multiple RNSS systems makes common receiver equipment more complex.

Method 2

1 260-1 300 MHz

This frequency range is currently allocated to the same primary services as 1 240-1 260 MHz except the radionavigation-satellite service (space-to-Earth). The use of the band 1 260-1 270 MHz by the amateur-satellite service operating under RR **S5.282** is also noted.

Advantage

The sharing environment is expected to be similar as in the band 1 240-1 260 MHz in which radionavigation-satellite systems are in operation under certain limitations.

Disadvantage

The use of the band by high powered radars and the related possible harmful interference to RNSS receivers leads to the conclusion that this band is not suggested for RNSS safety-of-life applications.

Method 3

Part of the band 5 010-5 150 MHz

This frequency range 5 000-5 150 MHz is currently allocated to the aeronautical radionavigation service (ARNS) and is reserved (No. **S5.444**) for the microwave landing system (MLS) on a primary basis. The 5 010-5 030 MHz portion is not included in the aviation frequency plans for MLS and is only lightly used by other ARNS systems. The 5 030-5 150 MHz portion of the band is included in the aviation frequency plan for international standard MLS systems.

The band 5 091-5 150 MHz is also allocated on a co-primary basis to the fixed-satellite service (Earth-to-space) in accordance with provision **S5.444A** and limited to feeder links for non-geostationary mobile-satellite. Resolution 114(**WRC-95**) mentions that this subject should be reviewed at WRC-01.

Studies showed that sharing between RNSS (space-to-Earth) and MLS or FSS feeder links is not feasible.

Advantages

- Ionospheric delay would be reduced by a factor of ten, allowing higher accuracy of navigation without auxiliary means. Natural and man-made interference would be reduced at the higher frequencies, in addition to which the smaller size of receiver antenna would make practicable the realization of active phased-array antennas capable of rejecting interfering signals, for safety-critical users.
- These directive antennas will also suppress multipath signals that are detrimental to the ranging process.
- Furthermore, the availability of a wider bandwidth able to accommodate a higher-rate code would both increase accuracy and improve the suppression on unmodulated or narrow-band interference.

Disadvantages

- The wavelength decreases at the higher frequency of 5 000 MHz, so this requires the transmission of some 10 dB more power than at 1 600 MHz, if receiving antenna gains are assumed to be the same.

- RNSS (space-to-Earth) unwanted emissions require careful control in order to protect the RAS band below 5 000 MHz, however, filters already exist which can accommodate these requirements.
- RNSS (space-to-Earth) unwanted emissions must meet the aggregate pfd level at the Earth's surface of -124.5 dB(W/m^2) in a 150 kHz band, as specified by ICAO in order to protect MLS operations in the 5 030-5 150 MHz band.

The following four options (3.1 to 3.4) are mutually exclusive. The advantages and disadvantages mentioned above for the band 5 010-5 150 MHz are applicable to the four options below.

Method 3.1

5 010-5 030 MHz

Advantage

The band 5 010-5 030 MHz is lightly used and is not planned for use by the international standard MLS systems.

Disadvantages

- 20 MHz may not be wide enough to accommodate the RNSS requirement. Therefore appropriate technical, but more complex solutions for RNSS (space-to-Earth) systems may be required.
- The separation between RNSS (space-to-Earth) and the radio astronomy service would be a minimum of 10 MHz to protect the radio astronomy service inside its allocation. This may cause difficulties due to the radio astronomy receiver sensitivity outside the band allocated to the radio astronomy service.

Method 3.2

5 010-5 034 MHz

Advantages

- The band 5 010-5 030 MHz is lightly used and is not planned for use by the international standard MLS system.
- RNSS (space-to-Earth) would be provided with sufficient spectrum.

Disadvantages

- The implementation of MLS in the band 5 030-5 034 MHz might preclude the availability of this band for RNSS (space-to-Earth).
- The RNSS (space-to-Earth) transmission would be inside the bandwidth of the front end filter of existing MLS receivers.
- If the band 5 030-5 034 MHz is used for RNSS (space-to-Earth), this could influence the MLS spectrum requirements in the band 5 091-5 150 MHz, which is investigated under Resolution 114(**WRC-95**).
- The loss of assignable MLS channels would have a negative operational impact on other aeronautical radionavigation systems due to channel pairing with DME.

- The separation between RNSS (space-to-Earth) and the radio astronomy service would be the minimum of 10 MHz to protect the radio astronomy service inside its allocation. This may cause difficulties due to the radio astronomy receiver sensitivity outside the band allocated to the radio astronomy service.

Method 3.3

5 066-5 090 MHz (this method implies that MLS is shifted from the band 5 030-5 091 MHz to the band between 5 000 and 5 066 MHz)

Advantages

- RNSS (space-to-Earth) would be provided with sufficient spectrum.
- The radio astronomy allocation immediately below 5 GHz is protected by a separation of 66 MHz from the proposed RNSS (space-to-Earth) allocation.
- By extending the tuning range of the international standard MLS system down to 5 000 MHz, if this is feasible, the total number of available channels remains unchanged.

Disadvantages

- The tuning range for the international standard MLS system needs to be extended down to 5 000 MHz. The feasibility of this frequency shift and the change of pairing with DME has not been studied in ITU-R.
- The necessary frequency and geographical separation between MLS and stations operating in the radio astronomy service needs careful consideration.
- The already installed MLS equipments will need to be replaced (similar to the situation if the band 5 091-5 150 MHz is used for MLS extension but without the associated operational benefits to aviation).

Method 3.4

5 091-5 115 MHz (this method implies that FSS feeder links need to vacate the band)

Advantages

- RNSS (space-to-Earth) would be provided with sufficient spectrum without constraining the use of MLS in the band 5 030-5 091 MHz.
- The RAS immediately below 5 000 MHz would be protected by a separation of 91 MHz from the proposed RNSS (space-to-Earth) allocation.

Disadvantages

- The use of the band 5 091-5 115 MHz by RNSS (space-to-Earth) would be constrained by existing and future use of the non-GSO MSS feeder links or MLS depending on the outcome of Resolution 114(**WRC-95**).
- As sharing between RNSS (space-to-Earth) and FSS (Earth-to-space) is not feasible (see 2.4.1.1.3 c), MSS feeder links would require the allocation of other immediately adjacent frequency bands to satisfy spectrum requirements.

- An existing non-GSO-GMPCS system using the band 5 091-5 250 MHz for two years would be forced to stop transmission in service link beams if RNSS (space-to-Earth) started to operate. The provision of services would be impeded due to the impossibility of modifying the feeder-link frequency plan on board the satellites.
- If the non-GSO-MSS feeder links need to vacate the band 5 091-5 115 MHz this would constrain the use by non-GSO-MSS feeder links in the band 5 115-5 250 MHz (under the assumption that concentration in this band is possible).
- The use of the band 5 091-5 115 MHz by RNSS (space-to-Earth) could result in unacceptable interference to spacecraft feeder-link receivers operating in the band 5 115-5 250 MHz.

2.4.1.3.2 RNSS (Earth-to-space)

Method 1

1 300-1 350 MHz

Advantages

- Taking into account the decoupling of at least 50 dB for low elevation angles on the radiobeacon antenna, studies have shown that a separation distance of no more than 60 km is required to protect ground-based radars. Because of the small number of beacons, sharing of this band with ARNS would not pose undue constraints to RNSS (Earth-to-space).
- Furthermore the low frequency makes it easy to use a single hemispherical coverage antenna at each radiobeacon earth station.

Disadvantage

The necessity of taking into account the above-mentioned separation distance.

Method 2

5 000-5 030 MHz

Advantage

This band is lightly used and is not planned for use by the international standard MLS. It is then very valuable for a system whose aim is to promote safety for RNSS users. The nearby RAS band below 5 000 MHz can also be well protected through the implementation of a separation distance between the beacons and the RAS sites.

Disadvantages

- The higher frequency will require a higher transmission power from the terrestrial beacons.
- In order to protect the MLS, separation requirements from airports using or planning to use MLS will be needed as mentioned above.

2.4.1.4 Regulatory and procedural considerations

If Method 1 and/or Method 2 and/or Method 3, including the options presented under each method, above are adopted the following regulatory changes need to be considered.

RNSS (space-to-Earth)

Allocate to RNSS (space-to-Earth), either 1 164-1 188 MHz, or a portion of 1 151-1 215 MHz, that could allow the operation of multiple RNSS systems, while providing protection to the aeronautical radionavigation service. Priority should be given to ARNS over RNSS, in order to satisfy current and future requirements of the aeronautical radionavigation service. It is recommended that ITU-R develops one or more Recommendations on the technical requirements of RNSS to ensure the compatibility between RNSS and ARNS.

Allocate to RNSS (space-to-Earth) 1 260-1 300 MHz on the same basis as the band below 1 260 MHz while taking into account the operation of spaceborne synthetic aperture radars in the upper band within 1 215-1 300 MHz of the amateur-satellite service in the band 1 260-1 270 MHz and wind profilers in the 1 270-1 295 MHz band.

Allocate a portion of 5 010-5 150 MHz to RNSS (space-to-Earth) while providing protection and replacement spectrum for aeronautical safety services and accommodation of feeder links operating in the FSS. Priority should be given to the aeronautical radionavigation service and the FSS. Measures should be taken to ensure the operation of existing systems up to the end of their lifetimes.

RNSS (Earth-to-space)

Allocate the band 1 300-1 350 MHz, and add a provision to the effect that the use of this band by RNSS earth stations should not cause harmful interference to and not constrain the development of this band by radars.

Allocate a portion of the band 5 000-5 030 MHz, depending on the downlink allocation because the up- and downlink should not be shared.

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2.4.2 Agenda item 1.15.2

"to consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the 1 215-1 260 MHz and 1 559-1 610 MHz frequency bands"

2.4.2.1 Summary of technical and operational studies

RNSS systems such as GPS and GLONASS are primarily being used in the space-to-Earth direction to provide service to terrestrial users. These systems are, however, also increasingly being used in the space-space direction by spaceborne users for such applications as spacecraft three-dimensional positioning and velocity determination; three-axis attitude control; precise time synchronization; precision orbit determination; and atmospheric science.

The use of RNSS signals is presently protected only through a space-to-Earth allocation in the 1 215-1 260 MHz and 1 559-1 610 MHz bands. Considering current and future operational usage of spaceborne RNSS receivers for scientific and commercial applications, it is important to add the space-to-space direction to the existing RNSS allocations.

Interference studies have been conducted to assess the sensitivity of spaceborne RNSS receivers to interference from RLS, EESS (active), SRS (active), FS, MS and ARNS in the 1 215-1 260 MHz band; from the ARNS and FS in the 1 559-1 610 MHz band; and also their sensitivity to intra-service interference between RNSS systems in these two bands. To assist in the interference studies draft new Recommendation ITU-R M.[8/85] provides technical characteristics of current and prospective RNSS spaceborne receivers. As noted in the draft new Recommendation ITU-R M.[8/85], the characteristics of spaceborne RNSS receivers are different due to differing performance requirements and operational environments.

Potential interference from services in adjacent bands was also examined.

2.4.2.2 Analysis of the results of the studies

The addition of a space-to-space direction to the 1 215-1 260 MHz and 1 559-1 610 MHz RNSS bands will not cause any additional interference to other services since it involves no change to the space-to-Earth transmissions.

Over the past seven years, more than 90 GPS receivers have been flown in space by 20 different countries from around the world for a variety of applications and experiments. There have been no identified cases of interference to spaceborne RNSS receivers from the existing space and terrestrial services in the 1 215-1 260 MHz and 1 559-1 610 MHz bands.

Studies provided demonstrate that RNSS spaceborne receivers can operate satisfactorily in the presence of interference caused by systems in other services as well as other RNSS systems.

It has been concluded that:

a) Given the characteristics of the FS, MS, and RLS systems in the two RNSS bands, they will not cause unacceptable interference to the spaceborne RNSS systems. Interference only becomes noticeable when multiple terrestrial emitters simultaneously illuminate the spaceborne receiver. However, because of the narrow beams of these emitters, the probability of simultaneous illumination is very small and even if it did occur, the duration of the interference event would be very short. Also, in the case of interference from radiolocation emitters, RNSS receivers have high immunity to pulsed interference. In addition, most spaceborne receivers will be pointed away from the Earth looking upwards to the navigation satellites which will further mitigate terrestrial interference.

b) Interference from typical spaceborne synthetic aperture radars of the EESS and SRS in the 1 215-1 260 MHz band is not harmful to RNSS spaceborne receivers. Peak signal power levels were calculated in a worst-case geometry (spaceborne receiver in main beam of SAR) and determined to be well below the levels that would cause preamplifier burnout. Furthermore, the pulse duty cycles of typical SARs are low enough (<10%) that even if the receiver is driven into saturation, the receiver can still successfully operate and the impact on performance is negligible.

c) Intra-service interference into receivers of one RNSS system from emitters of other RNSS systems is tolerable. The worst-case examples of emission from the LSATNAV and MSATNAV systems interfering with GPS receivers were analysed. Interference from the proposed low altitude LSATNAV system only becomes significant when the GPS spaceborne receiver is in the main beam of an LSATNAV satellite and in close proximity (less than 25 km) to it. For the medium-Earth orbit MSATNAV satellites the corresponding range is 350 km. Due to the relative motion of satellite the interference will be rare and will not usually last more than a few minutes unless the satellites are in very similar orbits. Because satellites move in predictable orbits, such outages can be accepted. Similarly, interference from the proposed GSO altitude E-NSS-1 system is negligible.

d) RNSS spaceborne receivers of the currently operating and notified RNSS systems will be able to operate satisfactorily in the presence of adjacent band emissions from GSO MSS (space-to-Earth) satellites below 1 559 MHz.

e) Based on the unwanted e.i.r.p. emission limits specified in Recommendation ITU-R M.1343, the aggregate interference from MSS mobile earth stations into spaceborne RNSS receivers in low-Earth and geostationary satellite orbits is negligible, provided the RNSS carrier frequency is below 1 607 MHz.

f) Based on the results of a worst-case analysis that considered the emissions from the MSS (space-to-Earth) system operating in the 1 613.8-1 626.5 MHz band, a distance separation of only 30 km is required to protect RNSS spaceborne receivers in the 1 559-1 610 MHz band. Considering the existing and currently expected deployment of both MSS (space-to-Earth) systems in the 1 613.8-1 626.5 MHz band and RNSS spaceborne receivers, separations of less than 30 km are not expected to occur in practice and hence RNSS spaceborne receivers will be able to operate satisfactorily in the presence of out-of-band emissions from such MSS systems.

2.4.2.3 Methods to satisfy the agenda item and their advantages and disadvantages

Option A:

Propose the addition of the space-to-space direction to the RNSS (space-to-Earth) allocation in the bands 1 215-1 260 MHz and 1 559-1 610 MHz with a provision indicating that no protection should be given to spaceborne RNSS receivers from RNSS systems already operating in these bands or for which complete advance publication information has been received by the Bureau, prior to the end of WRC-2000.

Advantage

This provides protection for spaceborne RNSS receivers operating within existing and planned RNSS systems from interference from any future RNSS system.

Disadvantage

New radionavigation systems would have to demonstrate compatibility with spaceborne RNSS receivers operating within existing and planned RNSS systems.

Option B:

Propose the addition of the space-to-space direction to the RNSS (space-to-Earth) allocation in the bands 1 215-1 260 MHz and 1 559-1 610 MHz with provisions indicating that:

No protection should be given to spaceborne RNSS receivers from RNSS systems already operating in these bands or for which complete advance publication information has been received by the Bureau, prior to the end of WRC-2000.

Spaceborne RNSS receivers operating in the 1 559-1 610 MHz band should not request protection from unwanted emissions of stations of the MSS (Earth-to-space) operating in the band 1 610-1 660.5 MHz.

Advantages

- This provides protection for spaceborne RNSS receivers operating within existing and planned RNSS systems from interference from any future RNSS system.
- Stations of the MSS (Earth-to-space) will not be subjected to additional constraints due to RNSS (space-to-space) operations.

Disadvantage

New RNSS systems would have to demonstrate compatibility with spaceborne RNSS receivers operating within existing and planned RNSS systems.

Option C:

Propose the addition of the space-to-space direction to the RNSS (space-to-Earth) allocation in the bands 1 215-1 260 MHz and 1 559-1 610 MHz with provisions indicating that:

No protection should be given to spaceborne RNSS receivers from RNSS systems already operating in these bands or for which complete advance publication information has been received by the Bureau, prior to the end of WRC-2000.

Spaceborne RNSS receivers operating in the 1 559-1 610 MHz band should not request protection from unwanted emissions of stations of the MSS (Earth-to-space) operating in the 1 610-1 660.5 MHz band.

Spaceborne RNSS receivers should be deployed and operated such as to avoid or accept possible interference at levels equivalent to those caused by MSS (space-to-Earth) systems in the bands 1 525-1 559 MHz and which are already operating or for which a request for coordination has been received by the BR, prior to the end of WRC-2000.

NOTE - Further studies would be needed to define the level of unwanted emissions from MSS (space-to-Earth) systems - referred to above - into spaceborne RNSS receivers.

Advantages

- This provides protection for spaceborne radionavigation receivers operating within existing and planned RNSS systems from interference from any future RNSS system.
- Stations of the MSS (Earth-to-space) will not be subjected to additional constraints due to RNSS (space-to-space) operations.
- Stations of the MSS (space-to-Earth) - referred to above - will not be subjected to additional constraints due to RNSS (space-to-space) operations.

Disadvantage

New RNSS would have to demonstrate compatibility with spaceborne RNSS receivers operating within existing and planned RNSS systems.

2.4.2.4 Regulatory and procedural considerations

If any of the above Options are adopted the appropriate consequential amendments to Article **S5** would need to be considered for the bands 1 559-1 610 MHz and 1 215-1 260 MHz.

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2.4.3 Agenda item 1.15.3

"to consider the status of allocations to services other than the radionavigation-satellite (Nos. **S5.355** and **S5.359**) in the 1 559-1 610 MHz band"

Nos. **S5.355** and **S5.359** are applicable. No. **S5.355** allocates the bands 1 540-1 645.5 MHz and 1 646.5-1 660 MHz also to the fixed service on a secondary basis in twenty-five countries. No. **S5.359** allocates the bands 1 550-1 645.5 MHz and 1 646.5-1 660 MHz also to the fixed service on a primary basis in forty-four countries.

2.4.3.1 Summary of technical and operational studies, including a list of relevant ITU-R Recommendations

Relevant Recommendations ITU-R: M.1088, M.1317, M.1318, F.759 and M.[RNSS.CHAR]

Four analyses have been carried out by the ITU-R which considered the potential interference from FS transmitters into the GPS, GLONASS and E-NSS-1. One analysis used the characteristics of FS systems found in Recommendation ITU-R F.759. The other analyses used characteristics of typical FS systems known to be operating in the 1 559-1 610 MHz band.

2.4.3.2 Analysis of the results of studies

The analyses showed that harmful co-frequency interference would be suffered by all RNSS receivers in the main beam of the FS transmitter antenna up to around 50 km for land-based receivers and up to around 400 km or more for aeronautical receivers. On the basis of these studies, it is concluded that RNSS receivers would be unable to support co-frequency interference from FS transmissions within radio line-of-sight. Moreover one analysis showed that typical FS transmitters in the band 1 559-1 592 MHz would cause interference to GPS/Space-Based Augmentation Systems (SBAS) airborne receivers out to the radio horizon. Another analysis showed that a removal of some typical FS transmitters from the band 1 592-1 610 MHz would sufficiently protect GLONASS receivers at a distance greater than 1 km.

It is noted that FS stations registered in the ITU MIFR with higher power and greater bandwidths were not considered in the current studies.

The potential for interference from aeronautical radionavigation (ARNS) pseudolites on RNSS has also been analysed by the ITU-R. The result of this analysis is contained in § 2.2.1.2.5 a).

2.4.3.3 Methods to satisfy the agenda item and their advantages and disadvantages

The RNSS is extensively used today and is undergoing rapid expansion of all its uses including aeronautical and marine safety-of-life navigation. As a result, use by the FS of the band 1 559-1 610 MHz is not recommended.

2.4.3.4 Regulatory and procedural considerations

In order to protect present and future RNSS applications, sharing of the band 1 559-1 610 MHz between RNSS and FS is not recommended.

CHAPTER 3

Non-GSO FSS issues

(WRC-2000 agenda item 1.13 (1.13.1, 1.13.2))

CONTENTS

Non-GSO FSS issues

Agenda item 1.13

"on the basis of the results of the studies in accordance with Resolutions **130 (WRC-97)**, **131 (WRC-97)** and **538 (WRC-97)**"

3.1.1 Agenda item 1.13.1

"to review and, if appropriate, revise the power limits appearing in Articles **S21** and **S22** in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services"

3.1.1 Sharing among non-GSO FSS systems

3.1.1.1 Results of studies relating to sharing between non-GSO FSS systems

Several studies contributed to ITU-R addressed the determination of the number of non-GSO FSS systems that can share co-frequency in the 14/11 and 30/20 GHz bands included in Resolution **130 (WRC-97)**. These studies have shown the following:

– that there are several mitigation techniques that should be considered for use to achieve satisfactory sharing between co-frequency, codirectional non-GSO FSS satellite networks in Resolution **130 (WRC-97)** frequency bands as shown in draft new Recommendation ITU-R S.[Doc. 4/65];

– that non-GSO FSS systems that operate with homogeneity in power flux-density levels at the Earth's surface are able to coexist with much smaller inter-system interference levels in the downlink direction for a given avoidance angle than systems with disparate power flux-densities. Thus, these systems should be able to coexist with a smaller avoidance angle to satisfy downlink requirements;

– that an important factor to be taken into account in the determination of the number of non-GSO FSS systems that can share with each other is potentially acceptable levels of interference along with the corresponding avoidance angles necessary to achieve the required interference objectives (draft revision to Recommendation ITU-R S.1323 [Doc. 4/69] gives guidance for determining interference criteria for non-GSO FSS systems);

– that sharing appears to be difficult for non-GSO FSS systems if they are required to operate with large avoidance angles (around 10° to 15°) in order to share with other non-GSO FSS systems due to the reduction in capacity and the potential increase in outages or coverage degradation;

– that some non-GSO FSS systems may be able to use smaller avoidance angles (about 3° to 7°) to share with other non-GSO FSS systems, thus resulting in an increase in the number of systems that can share a given frequency band.

a) Sharing between homogeneous constellations

The possibility of sharing between non-GSO FSS networks employing homogeneous orbital planes, (i.e., where the altitude and inclination angles of the orbital planes of two or more constellations are almost identical) was studied, and three methods identified to allow such sharing:

– plane interleaving or constellation shift, where a non-GSO constellation has its satellite orbital planes placed in between those of the other constellations;

- satellite interleaving within planes; and
- a combination of the above.

Studies have suggested that, in principle, a rather larger number of homogeneous non-GSO FSS systems may be able to share frequencies with each other than with inhomogeneous constellations, since, if all such systems employed the same orbit height and inclination, and either their respective orbit planes were interleaved or the true anomalies of their respective satellites were interleaved within the same orbit planes, no "in-line" transitions would occur between them. However, considerable cooperation between the various operators would be needed throughout the lifetime of the systems, and simulations have confirmed that even very minor differences between the heights or inclinations of the systems would create the need for some satellite diversity. It is concluded that filings by different operators for non-GSO FSS systems with this degree of similarity are extremely unlikely to occur.

b) Sharing between inhomogeneous constellations

The issue of sharing in the bands 10-15 GHz and 20/30 GHz between non-GSO FSS systems using dissimilar constellation parameters (inhomogeneous systems) was also studied in detail. Simulations have shown that sharing between two inhomogeneous non-GSO FSS systems is feasible if one or both of the systems employs mitigation techniques, including satellite diversity to avoid main beam-to-main beam coupling of interference to and from the other system during "in-line" transitions.

These studies showed that when avoidance angles are required to be impracticably large, other mitigation techniques might be required to allow multiple inhomogeneous non-GSO FSS systems to share the same frequency band. It was also demonstrated that as the number of systems sharing the same frequency band increases, the complexity of satellite avoidance implementation increases. Studies showed that the shortest-term interference into a non-GSO FSS system from multiple non-GSO FSS systems is dominated by a single system and so is not additive in either time and power.

Coordination under No. **S9.12** effectively places the obligation for implementing mitigation techniques, such as diversity on the later of the two systems to be filed with the BR. A subsequently filed third non-GSO FSS system would be faced with implementing mitigation techniques with respect to the earlier two systems, and a fourth with respect to the first three, and so on. Each earth station in a system operating with satellite diversity must be able to "see" an alternative satellite in its constellation whenever an "in-line" transition involving it approaches, and that alternative satellite must have a beam and transponder capacity "free" at the appropriate time, otherwise the link will suffer an outage. Unless such outages can be tolerated by the service being provided, it follows that systems operating diversity require either more satellites, or higher capacity satellites, or both, than systems either not operating diversity or operating diversity with respect to fewer prior systems. In certain situations, depending on the particular characteristics of the systems concerned, the simulations have shown that the requirement for space-sector hardware increased rapidly as a consequence of this factor for non-GSO FSS systems having to exercise diversity with respect to more than two or three other systems.

c) Sharing between high-altitude non-GSO (quasi-GSO) and non-GSO systems

No conclusions were reached regarding sharing between high-altitude non-GSOs (i.e. quasi-GSOs) and lower-altitude non-GSOs, such as LEOs and MEOs. It has been noted that the large difference in orbital characteristics may impose constraints, which need to be assessed through future study by the ITU-R.

d) Maximum effective number of non-GSO FSS system able to share the same frequency band

It was therefore concluded, on the basis of studies performed, that only a small number of constellations using homogeneous orbits and homogeneous transmission parameters could share the same frequency band, but that this sharing could likely be accomplished without the use of interference mitigation techniques, except possibly for earth stations at a certain latitude. It was also concluded that sharing between non-GSO systems employing different orbital characteristics would necessitate some form of interference mitigation to reduce the interference levels and that in this case, the difficulty in mitigating interference increases as the number of systems sharing the band increases.

Studies were also performed to determine the manner in which interference from multiple non-GSO FSS systems aggregates into a GSO FSS earth station. These studies resulted in a method to convert any equivalent power flux-density, $EPFD_{down}$ versus %-of-time curve required to protect GSO downlinks from the aggregate interference from multiple non-GSO FSS systems to the corresponding $EPFD_{down}$ versus %-of-time curve for interference from a single non-GSO FSS system.

These studies also showed that the aggregate interference into a GSO network from "N" non-GSO FSS systems sharing a frequency band will likely be different from the interference into a GSO network caused by one non-GSO FSS system multiplied by a factor of "N" (in either power level or time percentage) since the impact of each non-GSO FSS system will not be identical.

It was agreed that an equivalent number "$N_{effective}$" of systems should be considered for the purposes of studying the impact of aggregate interference from multiple non-GSO FSS systems, under the assumption that each system operates at the single entry EPFD limits.

For the reasons explained above, the use of inhomogeneous parameters was assumed.

The implementation of interference mitigation techniques between the different non-GSO FSS systems in order to provide adequate protection to all other non-GSO systems was considered simultaneously with those mitigation techniques required to meet the single-entry EPFD levels in order to assess the cumulative interference effect from multiple non-GSO FSS systems.

Several studies were reviewed dealing with the determination of the number of simultaneous entries to be considered for determining EPFD levels used in bands covered by Resolution **130 (WRC-97)**, and with sharing among non-GSO FSS systems.

3.1.1.2 Summary

Taking account of the studies leading to assessments of the maximum number of non-GSO FSS systems which are likely to be able to share frequencies, a value of 3.5 for $N_{effective}$ was agreed to be used in the ITU-R studies to determine the final values of single-entry $EPFD_{down}$ versus percentage of time to be applied in bands currently covered under Resolution **130 (WRC-97)**. This value was to be used solely for the purpose of deriving single-entry EPFD masks from aggregate EPFD masks and is not a representation of the actual number of non-GSO FSS systems that can share a given frequency band.

3.1.1.3 Regulatory and procedural considerations

3.1.1.3.1 Coordination between non-GSO FSS systems

It would be beneficial, in order to facilitate sharing between non-GSO FSS systems in the frequency bands covered by Resolutions **130 (WRC-97)** and **538 (WRC-97)**, that the ITU-R should develop a methodology to be used in applying the relevant coordination procedure (No. **S9.12**). Revision of Recommendation ITU-R S.1323 contains several methodologies to derive the permissible level of interference into a wanted non-GSO FSS system, whether the interference is caused by a GSO or by a non-GSO system (See also § 3.1.2.2.2). This permissible level however, relates to the aggregate interference caused by all non-GSO FSS and GSO FSS systems. It is therefore necessary to apportion this aggregate interference into single entry permissible levels to be met by non-GSO FSS systems, taking into account the mechanisms by which all the interference sources cumulate. The ITU-R is continuing its studies to develop such a method.

The Radiocommunication Bureau should not be asked to use the method described in the above paragraph to determine the need for coordination. However, such a method would be very desirable to carry out coordination under No. **S9.12** in a satisfactory way. With the addition of such a method, the coordination process under No. **S9.12** would be facilitated since it would be based on a generally agreed and sufficiently specific method and would therefore facilitate agreement and the timely notification and bringing into service of the non-GSO system for which coordination is sought.

3.1.1.3.2 Example resolution concerning the aggregate EPFD limit from multiple non-GSO systems being exceeded

There is a need to provide a regulatory mechanism that would ensure protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where equivalent power flux-density (EPFD) limits have been adopted. One possible mechanism for meeting this objective is a WRC-2000 Resolution that would take the form of the example draft Resolution (Example Resolution WWW) that is included in Annex 2.

3.1.2 Sharing between non-GSO FSS and GSO FSS systems in the bands 10.7-11.7 GHz, 11.7-12.2 GHz (Region 2), 12.2-12.5 GHz (Region 3), 12.5-12.7 GHz (Regions 1 and 3), 12.7-12.75 GHz, 12.75-13.25 GHz, 13.75-14.5 GHz, 17.8-18.6 GHz, 19.7-20.2 GHz, 27.5-28.6 GHz and 29.5-30.0 GHz

3.1.2.1 Protection of the GSO FSS systems

Resolution **130 (WRC-97)** introduced provisional $EPFD_{down}$ and aggregate power flux-density, APFD (which is re-defined as $EPFD_{up}$) limits for non-GSO FSS systems in certain bands intended to protect GSO FSS systems operating co-frequency and requested ITU-R to conduct the appropriate technical, operational and regulatory studies to review the regulatory conditions relating to the coexistence of non-GSO and GSO systems in the FSS.

In order to adequately protect GSO FSS networks, an aggregate interference level from all non-GSO FSS systems, which individually meet the Table **S22-1** limits, needs to be defined. This issue is discussed in § 3.1.1.3.2 and Resolution WWW.

ITU-R has agreed that several mitigation techniques are available to reduce potential interference from non-GSO systems into GSO FSS systems. These techniques may be considered by non-GSO systems in order to operate within the EPFD masks.

3.1.2.1.1 Characteristics of the GSO FSS

Circular Letters CR/92 and CR/116 invited administrations to supply data on existing and planned GSO FSS links in certain frequency bands. The parameters for over 600 14/11 GHz and approximately 200 30/20 GHz carriers were collected in a database. Descriptions of GSO FSS systems are contained in Recommendation ITU-R S.1328. In addition to traditional 14/11 GHz and 30/20 GHz fixed margin FSS systems, i.e. systems that use power to compensate for rain fade, the database and Recommendation ITU-R S.1328 includes a 30/20 GHz GSO FSS system employing adaptive coding to compensate for rain fade.

For fixed margin systems, the more sensitive links include those operating with larger earth station antennas, low link noise temperature, in low rain regions (which could include some links in rain zones A to E), and/or at high altitudes with little or no excess margin. Excess margin is margin above what a link needs to meet its short-term performance objective due to rain.

It was agreed that it is not possible to determine the proportion of sensitive links in the environments based on the information contained in the CR92/CR116 database. However, it is reasonable to suppose that a large number of the links operated or planned to be operated would be less sensitive to short-term interference than the links in the database.

In the revision to Recommendation ITU-R S.1323 [Doc. 4/69], it was agreed that the system designer and operator should have control over the overall performance of a network and have the capability to provide the required quality of service. An additional link margin above that necessary to compensate for fading, e.g. to compensate for equipment ageing, should not be used for the protection from interference by other networks.

The 30/20 GHz GSO FSS system employing adaptive coding provides link robustness to rain fades on a per link basis. The excess margin concept does not apply to adaptive coding systems. Adaptive coding systems set aside a per cent of each beam's channel capacity in reserve as "spare capacity" (similar to rain margin in fixed margin systems) that is used to transmit additional bits/s for links requiring "heavy coding" to compensate for rain. This capacity is sized to cope with the expected rain statistics for a specified availability on a per beam basis which allows constant user data throughput on a link-by-link basis, depending on the link conditions at each user terminal.

For the characteristics of the GSO earth station reference antenna pattern for calculating $EPFD_{down}$ limits, and for conducting interference assessments to GSO networks from non-GSO FSS systems, ITU-R agreed to adopt reference patterns specified in Recommendation ITU-R S.[Doc. 4/57]. These reference antenna patterns are defined in two dimensions only, but it was decided that they would be considered as applicable throughout all rotational planes. Reference patterns were defined to cover both co- and cross-polar signals. These reference patterns differ from those currently referenced in the definitions of $EPFD_{down}$ in Article **S22**, which are based upon worst-case peak envelope patterns. The new agreed reference patterns take into account a more accurate, though conservative, description of the shape of the pattern so that it can be used more realistically in interference calculations involving non-GSO FSS systems, and lead to lower levels of $EPFD_{down}$ than those calculated using the patterns currently referenced in Article **S22**.

Circular Letter CR/115 requested Administrations to provide information on the number, locations and principal characteristics of their current and planned earth station antennas having a receive gain greater than 60 dBi, in order to assess the scope and specifics of a coordination procedure. Several administrations and sector members responded to CR/115, providing data at varying levels of detail on approximately 400 large antennas. Most of the large GSO earth station antennas identified in response to CR/115 are in the 14/11 GHz band. There were few large antennas identified in response to CR/115 in the 30/20 GHz band. Some carriers operating in the band 12.2-12.75 GHz use 18 m antennas with a gain of 65 dBi and other carriers operating in the 17.8-21.2 GHz use 20 m antennas with a gain of 70 dBi.

It was concluded that an additional regulatory procedure would be necessary to protect very large GSO FSS antennas from downlink interference from non-GSO networks. The detailed requirements for this proposed new procedure are given in § 3.1.2.4.

3.1.2.1.2 Protection criteria

a) Description of $EPFD_{up}$, $EPFD_{down}$, $EPFD_{is}$

For the protection of GSO uplinks WRC-97 set provisional limits on non-GSO FSS interference in the form of single validation power limits to be met for 100% of the time. It is recommended that this principle should be retained, but that the limits should be redefined to take into account the discrimination of the receive antenna pattern of the GSO satellite, and termed $EPFD_{up}$ limits.

Recognizing that in certain bands covered by Resolution **130 (WRC-97)** there are allocations to FSS space-to-Earth links and also to either BSS or FSS Earth-to-space links, it is recommended that additional power limits be applied to emissions from non-GSO FSS constellations in those bands in order to protect the receivers of satellites operating in the GSO. These additional limits may be termed $EPFD_{is}$ limits.

For the protection of GSO downlinks it is recommended that the individual limits provisionally adopted by WRC-97 to be met for various percentages of time should be replaced by curves prescribing the power levels not to be exceeded for percentages of time from 0% to 100%, and termed $EPFD_{down}$ masks.

In order to simplify the RR and facilitate the understanding of the provision of Article **S22**, it is recommended that the same generic mathematical definition should be used for the $EPFD_{down}$, the $EPFD_{up}$ and the $EPFD_{is}$. The reference GSO FSS space station antenna patterns in the calculation of $EPFD_{up}$ and $EPFD_{is}$ values should be the single-feed patterns defined in Recommendation ITU-R S.672; for this purpose, in the 11/14 GHz bands a peak gain of 32.4 dBi, a beamwidth of 4° and a first side lobe level of -20 dB should be assumed; in the 20/30 GHz bands a peak gain of 40.7 dBi, a beamwidth of 1.55° and a first side lobe level of -10 dB should be assumed. Annex 1 contains regulatory text that is considered to reflect the agreed changes.

The purpose of the limits contained in Section II of Article **S22** is to give an upper bound to the interference that GSO networks may receive from non-GSO FSS networks in some frequency bands. By analogy with the relevant existing ITU-R S-series Recommendations, a 40 kHz reference bandwidth for the 10-15 GHz bands and reference bandwidths of 40 kHz and 1 MHz for the 17-30 GHz bands should be used when expressing the power limits to be included in Section II of Article **S22**.

b) Time allowances for non-GSO FSS interference

With the exception of links using adaptive coding, the principal criterion used as the basis for the derivation of the validation power limits is that the aggregate interference from all non-GSO FSS systems sharing frequencies with a GSO link should not be responsible for more than 10% of the proportion of time for which the link C/(N+I) ratio is permitted to fall below the shortest-term performance threshold defined for the considered link. This criterion is defined in Recommendation ITU-R S.1323 [Doc. 4/69].

c) Criteria for defining loss of synchronization

An additional criterion identified in Recommendation ITU-R S.1323 [Doc. 4/69] refers to the protection of GSO FSS links from loss of synchronization (sync-loss). Specifically, *recommends* 3.2 stipulates that interference from non-GSO FSS systems shall not lead to sync-loss in the GSO FSS network more than once per "x" days ("x" has not been defined in Recommendation ITU-R S.1323). Sync-loss is related to the level of interference, earth station hardware performance, satellite link margin and rainy events, and sun outages in some cases. Based on measurements for sync-loss thresholds for systems with data rates less than 34 Mbits/s, the ITU-R agreed that the following sync-loss thresholds need to be considered when determining EPFD levels that should not be exceeded:

Modulation and coding	C/(N+I) (dB)
QPSK rate 7/8	6.0
QPSK rate 3/4	5.3
QPSK rate 1/2	3.5
8-PSK	8.1
16-QAM	11.0

In all other cases, and in particular when performance objectives are specified with values lower than those assumed above, the ITU-R agreed to assume a 1 dB degradation from the lowest performance objective to the synchronization loss level.

GSO FSS operators design their links so that sync-loss is a rare event. Rain attenuation is the main cause of unpredictable sync-loss events, and thus earth stations in dry climates can be less prone to sync-loss due to precipitation than most earth stations. However, carriers received by earth stations in dry climates may operate with small threshold margins and hence be more prone than others to sync-loss caused by non-GSO interference. For a typical link a mean-time-between-sync-losses due to non-GSO interference of less than about eight weeks would not be acceptable to most GSO FSS operators. The time required to verify compliance with a target of this order makes it impracticable for mean-time-between-sync-losses to be imposed as a regulatory requirement; however the sync-loss interval may be used in the determination of "operational" limits and in the development of a methodology for checking whether they are met. In making use of a sync-loss interval the effect of orbit perturbations and imperfect station keeping should be taken into account.

The degree of protection against sync-loss due to non-GSO interference peaks is related to rain rate. For the same sync-loss threshold C/(N+I) the $EPFD_{down}$ corresponding to the interfering signal (I) can be much lower in the driest areas than in the wettest areas for the same link availability.

d) Criteria for systems using adaptive coding

Recommendation ITU-R S.1323 [Doc. 4/69] also addresses the protection criteria for GSO FSS systems employing adaptive coding. Adaptive coding systems are planned in the 30/20 GHz band but not in the 14/11 GHz band. This criterion defines the impact from all non-GSO FSS systems on a per beam basis versus a per link basis for fixed link margin systems. It allows the aggregate interference from non-GSO systems to be responsible for a 10% decrease in the amount of spare capacity available to adaptive coding links that require heavy coding.

At the 14/11 GHz band frequencies, it was agreed that no additional protection measures should be considered for the protection of GSO systems employing adaptive coding, over and above the protection measures required for other GSO systems.

e) Protection of GSO links having very large earth station antennas

Some links with very large earth station antennas may not be adequately protected by the $EPFD_{down}$ limits proposed in Annex 1. The following points were agreed regarding GSO FSS networks having earth stations with very large antennas:

- Transmissions to earth stations with very large antennas need to be protected, and thus it may be desirable that they be treated separately. A coordination procedure would be one possible mechanism to ensure this protection.
- Downlink transmissions to very large GSO earth station antennas are most sensitive to interference. This sensitivity is more related to the availability degradation than to the potential for synchronization loss (i.e. the 100% $EPFD_{down}$ value).
- For very large GSO earth station antennas, the following factors would facilitate achieving mutually satisfactory coordination:
  - Non-GSO interference $EPFD_{down}$ levels at or near the maximum are likely to occur over only a small proportion of the Earth's surface.
  - The locations of interference $EPFD_{down}$ levels at or near the maximum are likely to differ from one non-GSO system to another.
- Coordination would be triggered for GSO FSS networks having very large earth station antennas meeting all of the following conditions:
  - Earth station antenna maximum isotropic gain (APS4/C.10 *c)* 2)) of 64 dBi or higher for the band 10.7-12.75 GHz and 68 dBi or higher for the bands 17.8-18.6 GHz and 19.7-20.2 GHz, which corresponds to approximately 18 metres.
  - G/T_l of 44 dB/K or higher, where G is earth station antenna maximum isotropic gain and T_l (APS4/C.10 *c)* 5)) is the lowest total system receiving noise temperature which includes the earth station noise temperature, retransmitted uplink noise, cross-polarization noise, inter-modulation noise, and any other internal link noise sources. The link noise temperature as defined herein excludes external noise sources.
  - Space station emission bandwidth (APS4/C.7 *a)*) of 250 MHz or higher for the band 10.7-12.75 GHz and 800 MHz or higher for the bands 17.8-18.6 GHz and 19.7-20.2 GHz.
- In addition to the conditions indicated in the preceding point, the coordination trigger should contain the condition of the $EPFD_{down}$ level radiated by the non-GSO FSS system into the earth station employing the very large antenna considered when this earth station is pointed to the wanted GSO satellite. Two $EPFD_{down}$ values in each band would be needed and exceeding either $EPFD_{down}$ would trigger coordination. Coordination would be triggered if the $EPFD_{down}$ exceeds:
  - either –174.5 dB(W/(m^2.40 kHz)) for any percentage of time or [x] dB(W/(m^2.40 kHz)) for [y]% of the time in the frequency band 10.7-12.75 GHz;
  - either –151 dB(W/(m^2.MHz)) for any percentage of time or [x'] dB(W/(m^2.MHz)) for [y']% of the time in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz.

  These $EPFD_{down}$ threshold criteria would be sufficiently conservative to trigger coordination. A reference to these $EPFD_{down}$ thresholds is needed in Appendix **S5**.

- Based on the responses to CR/115, setting the threshold size of very large GSO earth station antennas at 64 dBi in the band 10.7-12.75 GHz and 68 dBi for the bands 17.8-18.6 GHz and 19.7-20.2 GHz clearly indicates that there would be few cases requiring coordination.
- Additional regulatory and procedural conditions (e.g. due diligence provisions) may be needed to reduce the number of cases requiring coordination.
- The conditions required to initiate coordination would be that the notifying administration provide the specific earth station location (APS4/C.10 *b)*) and satellite location (APS4/C.10 *a)*) and that the BR check that all conditions required to initiate coordination are met.

Implementation of this coordination procedure may include additions or modifications to Articles **S9** and **S22** and Appendixes **S4** and **S5**. Annex 3 contains example regulatory and procedural text for coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antennas. Since there is no mandatory requirement to provide specific earth station information associated with GSO FSS networks, specific provisions would be needed to grandfather existing or planned earth stations having very large antennas. Additional guidance would need to be added to the *Instructions for Filling Out the Form of Notice APS4/II and APS4/III Relating to Space Radiocommunication Stations* distributed via CR/65.

3.1.2.1.3 Methodologies used to assess the adequacy of the limits to protect GSO FSS

a) Methodologies and treatment of the CR/116 links

The ITU-R agreed that in deriving candidate EPFD limits, different methodologies can be used (e.g. Recommendation ITU-R S.1323 [Doc. 4/63]), and then using procedure D included in Annex 2 of Recommendation ITU-R S.1323 [Doc. 4/63] to verify compliance with the requirement that the interference from all non-GSO systems should not account for more than 10% of the short-term time allowance and refine the candidate masks. These methodologies do not apply to 20/30 GHz GSO FSS systems employing adaptive coding.

In order to apply the 10% criterion to carriers in the CR/116 database, it was agreed that the following treatment should be given to links where the time percentage of unavailability without non-GSO interference (T_f) is not equal to 90% of the time percentage T_t corresponding to the unavailability target (fading plus interference): the total allowable unavailability time percentage (with non-GSO interference) should be ($T_f + T_t/10$). Note that when T_f is less than 90% of unavailability target, the link has excess margin; when T_f is more than 90% of unavailability target, the link has insufficient margin.

b) Methodologies to derive the single-entry EPFD$_{down}$ mask from the aggregate EPFD$_{down}$ mask

The 10% of unavailability time allowance criterion leads to the derivation of aggregate EPFD limits. A method was needed to derive a single-entry mask from each aggregate mask.

It was agreed that the following method be employed to convert any EPFD$_{down}$ versus %-of-time curve required to protect GSO downlinks, having earth station antennas of approximately 10 m and larger in the 10.7-12.75 GHz band and 5 m and larger in the 17.8-18.6 GHz and 19.7-20.2 GHz bands, from the aggregate interference from $N_{effective}$ (equal to 3.5: see § 3.1.1.1 c)) non-GSO FSS systems, to the corresponding curve for interference from a single non-GSO FSS system:

The aggregate mask is drawn using a linear abscissa scale for the EPFD in decibel units increasing to the right, and a logarithmic scale for percentage of time increasing upwards. A second line is then drawn, 10 log($N_{effective}$) dB to the left of the first line, thus representing power division. A third line is then drawn, dividing the first line by a factor of $N_{effective}$, thus representing time division. The single-entry mask is then formed by taking the second line from 100%-of-time to the point where it crosses the third line, the third line between that point and the point where the third line reaches 0.01%-of-time, and the first (i.e. aggregate) line for percentages of time below 0.001%. The single-entry mask is completed by drawing a straight line between the 0.01%-of-time EPFD and the 0.001%-of-time EPFD.

For smaller earth station antennas the third line is taken for all percentages of time less than the point where it crosses the second line.

In those cases where the time-shifted and the power-shifted curves do not intersect, the following procedure is applied:

1) a point P greater than or equal to the 1% of time on the aggregate curve is selected;
2) the corresponding point P on the time-shifted and the corresponding point P on the power-shifted are connected;
3) the single entry curve consists of the power-shifted portion for time between 100% and P%, the segment created in 2) for the time between P% and (P/ $N_{effective}$)% and the time-shifted segment for times less than (P/ $N_{effective}$)%;
4) using the derived single entry mask, the reverse procedure is applied to derive a new aggregate mask. The new aggregate mask is then verified to ensure that it is not greater than the original aggregate mask. If this condition is not met, a new point P is chosen and steps 2) and 3) are repeated.

c) Development of continuous EPFD curves

Once the final limits have been determined by WRC-2000, a new Recommendation if practicable will be developed by ITU-R to provide continuous curves of equivalent power flux-densities versus percentage time for a range of antenna diameters of the GSO FSS earth station to be protected, in order for designers of satellite networks to know that the protection will be adequate in the case of antennas of sizes other than those at which the Radiocommunication Bureau will check compliance.

3.1.2.1.4 Results of studies relating to the review/revision of the provisional power limits appearing in Section II of Article S22

a) $EPFD_{up}$ and $EPFD_{is}$

ITU-R agreed on single-entry $EPFD_{up}$ and $EPFD_{is}$ limits in the 14/11 GHz and 30/20 GHz bands with associated reference antenna beamwidth and radiation pattern: see Annex 1.

It was also concluded that there would be a need to include $EPFD_{up}$ limits in Article **S22** to protect GSO BSS feeder links in the band 18.1-18.4 GHz, if WRC-2000 decides that this band may be used by non-GSO FSS Earth-to-space other than BSS feeder links. The level considered appropriate for these limits to protect GSO BSS feeder links is that proposed in Annex 1 for the $EPFD_{up}$ limits in the adjacent band (17.8-18.1 GHz) and for $EPFD_{is}$ limits in the 18.1-18.4 GHz band. Other sharing considerations in this band are given in § 3.2.

b) $EPFD_{down}$

ITU-R agreed on single-entry $EPFD_{down}$ limits specified in tabular form. The limit consists of the curve on a plot which is linear in decibels for the EPFD levels and logarithmic for the time percentages and defined linear segments joining the data points.

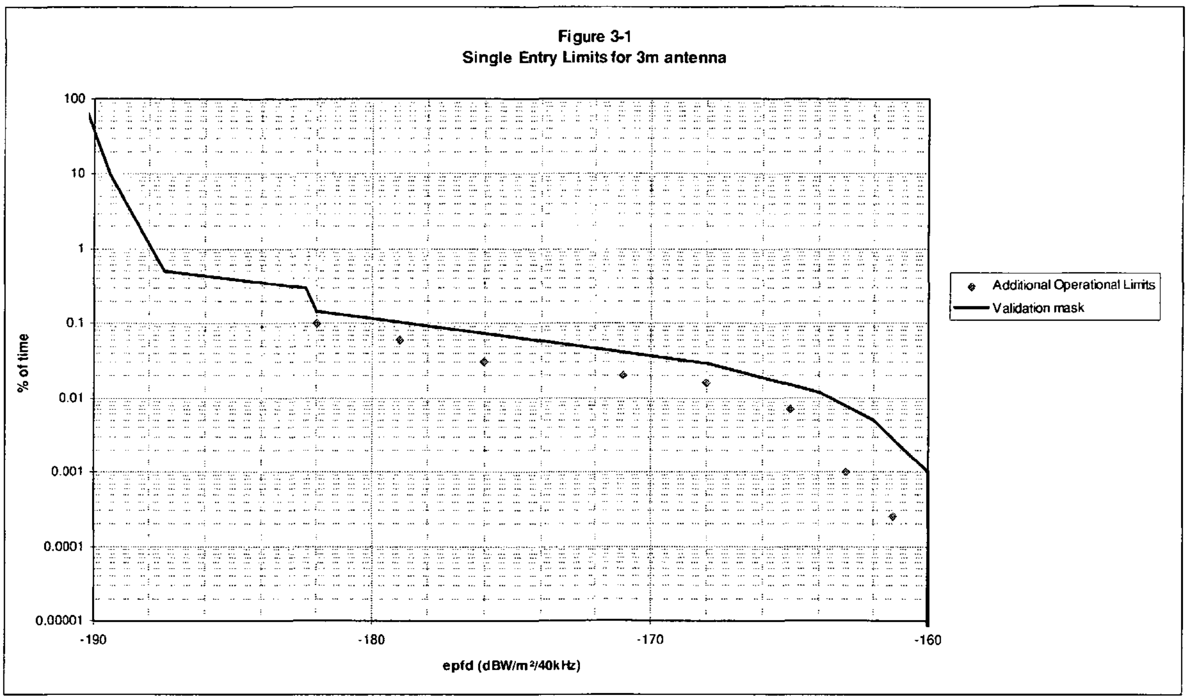
c) **$EPFD_{down}$ for 10.7-12.75 GHz band**

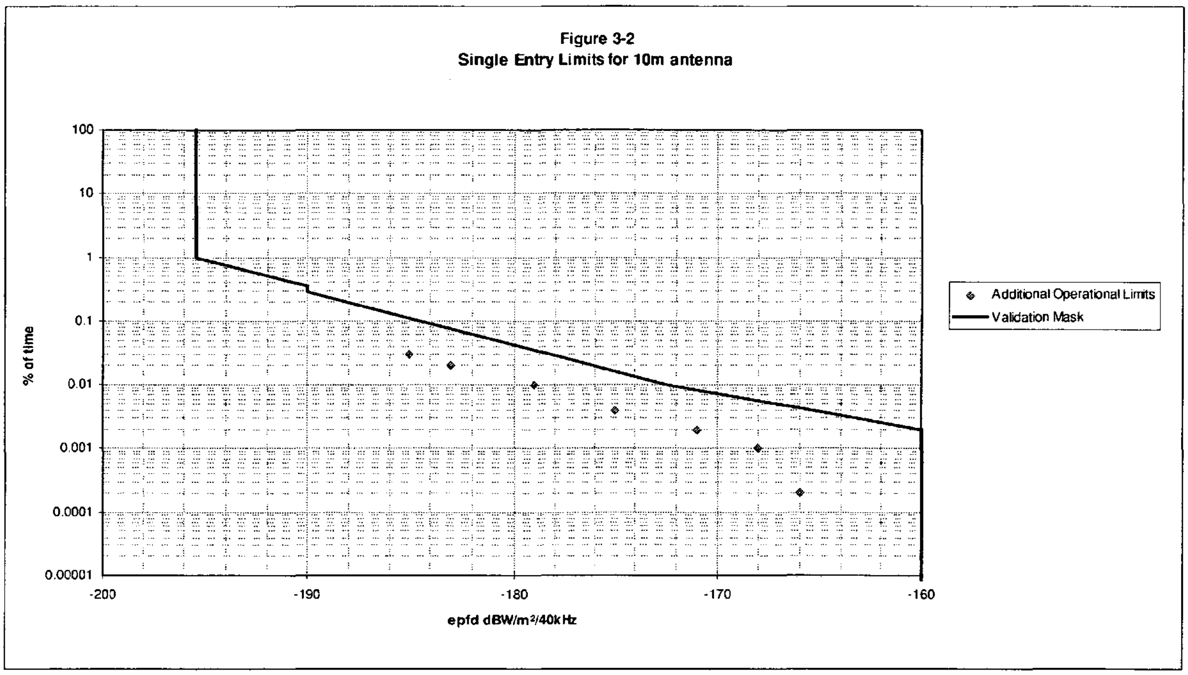
Although the 10% criterion of Recommendation ITU-R S.1323 was not met in all cases for the validation limits given in Annexes 1 and 2, an agreement by CPM-99 on $EPFD_{down}$ limits in the band 10.7-12.75 GHz was reached. This agreement was based on the following compromise, involving i) "validation" $EPFD_{down}$ masks for reference GSO earth station antenna diameters of 60 cm, 1.2 m, 3 m and 10 m; ii) "operational" $EPFD_{down}$ limits for all antenna diameters between 3 m and 18 m; iii) "additional operational" $EPFD_{down}$ limits for antenna diameters of 3 m and 10 m; and iv) EPFD validation limits for antenna diameters exceeding 60 cm located at high latitudes.

Compliance with the validation masks will be checked by BR under **S11.31**, using software conforming to the specification described in § 3.1.5.1. The administrations represented at CPM-99 agreed to support the adoption and approval of an ITU-R Recommendation which contains that specification. The CPM agreed on single-entry validation masks that, in conjunction with operational EPFD limits, adequately protect GSO FSS systems using 60 cm, 1.2 m, 3 m and 10 m antenna diameters. These masks are given in Table **S22-1** of Annex 1.

Additionally, during operation the non-GSO system shall be subject to the provisions of § 3.1.2.4.7 in order to ensure protection of GSO earth stations using antennas of diameter ≥3 m against loss of demodulator synchronization. The operational limits defined in § 3.1.2.4.7 are given in Table **S22-4** of Annex 1 for certain antenna diameters. For antenna diameters between the tabulated values, the limits are given by linear interpolation using a linear scale for $EPFD_{down}$ in decibels and a logarithmic scale for antenna diameter in metres.

Also, the administration proposing the non-GSO system shall commit that, when in service, the interference from that system into any operational antenna of diameter of 3 m will meet the additional operational limits given in Table **S22-4A1** of Annex 1, and that the interference into any operational antenna of diameter of 10 m will meet the additional operational limits given in Table **S22-4A2** of Annex 1. To assist administrations in making such commitments, ITU-R proposes that WRC-2000 should adopt a Resolution requesting ITU-R to develop, as a matter of urgency, a new or revised Recommendation containing a methodology to determine the cumulative time distribution of the actual $EPFD_{down}$ levels radiated by a non-GSO FSS system into a GSO FSS earth station antenna. The methodology should include means of evaluating the interference into intermediate antenna diameters. For illustration purposes, Figure 3-1 shows the "validation" $EPFD_{down}$ mask and the "operational" $EPFD_{down}$ limits for antenna diameters of 3 m. Similarly, Figure 3-2 provides a graphical representation for the 10 m antenna.





d) EPFD$_{down}$ for 17.8-18.6 GHz

ITU-R agreed on single-entry EPFD$_{down}$ validation limits in conjunction with operational limits that adequately protect GSO FSS systems operating in the 17.8-18.6 GHz band using 1 m, 2 m, and 5 m antenna diameters. These limits are given in Annex 1.

e) **EPFD$_{down}$ for 19.7-20.2 GHz**

ITU-R agreed on single-entry EPFD$_{down}$ validation limits in conjunction with operational limits that adequately protect GSO FSS systems operating in the 19.7-20.2 GHz band using 70 cm, 90 cm, 2.5 m and 5 m antenna diameters. These limits are given in Annex 1.

3.1.2.2 Protection of non-GSO FSS systems

3.1.2.2.1 Characteristics of the non-GSO FSS

In Circular Letter CR/102 (30 July 1999), administrations were invited to supply data on their planned non-GSO FSS links under a format enabling the assessment of the impact of interference to and from non-GSO systems. The technical characteristics of a number of proposed non-GSO FSS systems have been received and compiled in Recommendation ITU-R S.1328. These parameters have been used and will be available in the sharing studies among GSO and non-GSO systems.

3.1.2.2.2 Protection criteria

The protection criteria included in the draft revision of Recommendation ITU-R S.1323 [Doc. 4/69] apply to the protection of both GSO and non-GSO systems from interference caused by either GSO or non-GSO FSS systems. The same criteria as indicated in § 3.1.2.1.2 for the protection of GSO FSS systems from interference caused by non-GSO FSS systems have therefore been considered in the reverse direction, i.e. for the protection of non-GSO FSS systems.

In-line interference leading to synchronization loss in a non-GSO FSS system can only occur under very specific geometric situations related to the characteristics of both the wanted non-GSO FSS system and interfering GSO networks.

3.1.2.2.3 Methodologies used to assess the adequacy of the limits to protect non-GSO FSS

For geostationary networks, the link to be protected is defined between a given GSO earth station and a given GSO space station. Both of them being fixed, the slant range, elevation and rain attenuation distribution model are static. For the protection of non-GSO systems, the situation is different since the link to be protected is between one given non-GSO earth station and the selected satellite in the non-GSO constellation. This means that the physical link path is constantly moving. The elevation, the slant range and the rain attenuation distribution are not constant anymore. The path attenuation parameters vary with time.

In order to take this dynamic nature into account, a methodology has been developed and is included in § 5 of Annex 1 and Annex 3 of Recommendation ITU-R S.1323 [Doc. 4/69], and has been used to assess the impact of GSO FSS or GSO BSS interference on both regenerative and transparent non-GSO FSS satellite systems, with respect to the two protection criteria in Recommendation ITU-R S.1323 [Doc. 4/69], as reported in § 3.1.2.2.2 above.

The application of this methodology requires some assumptions on the scenarios likely to characterize the aggregate interference environment created by all GSO FSS or GSO BSS networks, in particular on the average orbital spacing between GSO FSS or GSO BSS networks serving the same area or areas adjacent to that served by the wanted non-GSO FSS system. Assumptions are also required on the geographic distribution of the earth stations in these networks. Realistic assumptions also need to be taken concerning the maximum pfd level radiated by the GSO FSS or GSO BSS space stations. On the basis of a representative scenario, it was found that the non-GSO systems would be sufficiently protected at the level of the criteria mentioned in § 3.1.2.2.2 if the off-axis e.i.r.p. density levels proposed in § 3.1.2.2.4 were to be adopted as limits to be included in

Article **S22**. However it does not necessarily follow that less stringent off-axis e.i.r.p. density levels would not adequately protect the non-GSO FSS systems.

3.1.2.2.4 Results of studies relating to the off-axis e.i.r.p. density limits

Section VI of Article **S22** contains off-axis e.i.r.p. density limits, which have been suspended, for GSO and non-GSO FSS earth stations operating in the frequency bands 12.75-13.25 GHz and 13.75-14.50 GHz. Review of these limits has resulted in the following considerations if they were to be included in the Radio Regulations:

- the values in Section VI could be increased by 3 dB while still providing protection to the non-GSO FSS systems from earth stations operated with GSO FSS satellites;
- such limits should impose a minimum of constraints on existing and future GSO networks, knowing that GSO earth stations would then have to meet a regulatory requirement, which is not the case at present;
- in particular, special attention should be given to existing earth stations or earth stations planned to be operated in the near future together with TT&C transmissions;
- it was agreed that the inclusion in the RR of FSS earth station off-axis e.i.r.p. density limits in all the plane orientations with regard to the GSO, should not lead to a situation where the GSO operators would have to provide information on the typical performance of their earth stations in more than two orthogonal planes.

Recommendation ITU-R S.524 [Doc. 4/66] provides maximum permissible levels of off-axis e.i.r.p. density from GSO FSS earth stations in the frequency bands 12.75-13.25 GHz and 13.75-14.50 GHz with these levels applying within ±3° of the GSO arc. Some existing or future GSO FSS earth stations may exhibit off-axis e.i.r.p. density levels higher than those specified in Recommendation ITU-R S.524 [Doc. 4/66] in directions beyond ±3° of the geostationary arc due to off-set feeds and spillover effects. In recognition of this characteristic it was agreed that the off-axis e.i.r.p. density levels for GSO earth stations at angles greater than 3° from the GSO should reflect a 3 dB relaxation relative to the levels which are currently recommended in Recommendation ITU-R S.524 [Doc. 4/66] within 3° of the GSO arc.

Regarding the off-axis e.i.r.p. density limits for GSO FSS earth stations operating in the frequency bands 12.75-13.25 GHz and 13.75-14.50 GHz included in No. **S22.26** and currently suspended, these levels have been reviewed for GSO FSS earth stations and agreed for communication links as follows. It has to be noted that these levels are 3 dB higher than those defined in Recommendation ITU-R S.524 [Doc. 4/66].

Off-axis angle	Maximum e.i.r.p. density	
$3° \leq \varphi \leq 7°$	$42-25 \log\varphi$	dB(W/40 kHz)
$7° < \varphi \leq 9.2°$	21	dB(W/40 kHz)
$9.2° < \varphi \leq 48°$	$45-25 \log\varphi$	dB(W/40 kHz)
$48° < \varphi \leq 180°$	3	dB(W/40 kHz)

For FM-TV emissions with energy dispersal, the limits above may be exceeded by up to 3 dB provided that the off-axis total e.i.r.p. of the transmitted FM-TV carrier does not exceed the following values:

Off-axis angle	Maximum e.i.r.p.	
$3° \leq \varphi \leq 7°$	56-25 logφ	dBW
$7° < \varphi \leq 9.2°$	35	dBW
$9.2° < \varphi \leq 48°$	59-25 logφ	dBW
$48° < \varphi \leq 180°$	17	dBW

For FM-TV carriers, which operate without energy dispersal, should be modulated at all times with programme material or appropriate test patterns. In this case, the total off-axis e.i.r.p. of the emitted FM-TV carrier shall not exceed the following values:

Off-axis angle	Maximum e.i.r.p.	
$3° \leq \varphi \leq 7°$	56-25 logφ	dBW
$7° < \varphi \leq 9.2°$	35	dBW
$9.2° < \varphi \leq 48°$	59-25 logφ	dBW
$48° < \varphi \leq 180°$	17	dBW

If limits were to be included in Section VI of Article **S22**, the following would apply to the Telecommand and Ranging carriers:

- Telecommand and ranging carriers transmitted to geostationary satellites would be allowed to exceed the limits by up to 16 dB when used in the normal mode of operation of the satellite (i.e. earth station transmitting telecommand and ranging carriers to a directive receiving antenna on the space station).
- In other modes of operation of the GSO satellite, telecommand and ranging carriers would be exempted from the limits.

With regard to provisions for grandfathering of existing earth stations, these should be developed such that the levels defined above are not applied to earth station antennas which have been brought into operation at any time and have been operating with a satellite network in the fixed-satellite service for which complete coordination or notification information has been received before 2 June 2000. Additionally, provisions should also ensure that any subsequent operation of earth stations put into operation before the specified date, to other satellite networks in the FSS, does not result in greater levels of off axis e.i.r.p. than those resulting from the previous operation to the above-mentioned network.

As an alternative to the inclusion of limits in Section VI of Article **S22,** two options have been identified:

– One would be the suppression of Section VI of Article **S22.** However, administrations may be encouraged to use applicable ITU-R Recommendations. Thus no FSS earth station off-axis e.i.r.p. density limits would be included in the Radio Regulations. This would have the advantage of imposing no additional technical or regulatory constraints on GSO FSS earth stations. On the other hand, this would not provide protection for GSO and non-GSO networks, in particular since Recommendation ITU-R S.524 is applicable only within 3° of the GSO arc in the 14 GHz band. It would not provide clear guidelines to non-GSO system designers, thus not ease sharing of spectrum between users.

– The second would consist in incorporating by reference in Section VI of Article **S22** the maximum permissible e.i.r.p. values contained in Recommendation ITU-R S.524, as appropriately modified.

3.1.2.2.5 Off-axis e.i.r.p. density limits applicable to GSO FSS earth stations operating in the frequency band 27.5-30.0 GHz

ITU-R studies to date have been carried out only for the band 29.5-30.0 GHz and in the context of GSO/GSO sharing. The results are reflected in the revision of Recommendation ITU-R S.524 [Doc. 4/66] in *recommends* 4 and the associated notes. No off-axis e.i.r.p. masks have yet been developed for the case of GSO FSS earth stations operating in the frequency range 27.5-29.5 GHz for which work is ongoing.

In *considering further h),* Resolution **130 (WRC-97)** states that non-GSO FSS systems have been proposed in some of these bands which could meet these limits and would not require specific protection from existing and future GSO FSS systems, provided that minimum constraints are applied to GSO FSS systems, such as off-axis earth station e.i.r.p. limits.

ITU-R has developed Recommendation ITU-R S.524 [Doc. 4/66] which recommends off-axis e.i.r.p. levels. This Recommendation was based on studies between GSO systems. These levels may also be used to form the basis for providing guidance to non-GSO system designers.

In order not to constrain the development of GSO systems and also to provide the necessary guidance to non-GSO system designers, the following off-axis e.i.r.p. limits may be included in the Radio Regulations, if it is considered appropriate by WRC-2000:

Off-axis angle	Maximum e.i.r.p. density	
$3° \leq \varphi \leq 7°$	28-25 logφ	dB(W/40 kHz)
$7° < \varphi \leq 9.2°$	7	dB(W/40 kHz)
$9.2° < \varphi \leq 48°$	31-25 logφ	dB(W/40 kHz)
$48° < \varphi \leq 180°$	-1	dB(W/40 kHz)

These limits apply to earth stations operating with networks in the GSO FSS in the frequency band 29.5-30.0 GHz and should apply for any angle φ in any direction outside 3° of the GSO arc.

The *Notes* 14 to 22 found in the revision of Recommendation ITU-R S.524 [Doc. 4/66] should be read in conjunction with the above.

It is noted that these values are 6 dB higher than the corresponding values in Recommendation ITU-R S.524 [Doc. 4/66], and that the impact of these higher values on non-GSO FSS systems has not been studied.

The same alternatives to inclusions of limits in Section VI of Article **S22** as identified at the end of § 3.1.2.2.4 would also apply in the 29.5-30 GHz band.

3.1.2.2.6 Off-axis e.i.r.p. density limits applicable to non-GSO FSS earth stations

The view was expressed that having some off-axis e.i.r.p. density limits applied to non-GSO earth stations would help the sharing between non-GSO networks. It was proposed that, in the bands 12.75-13.25 GHz, 13.75-14.5 GHz, 27.5-28.6 GHz and 29.5-30.0 GHz, the levels that would apply to earth stations operating with GSO would also apply to earth stations operating with non-GSO.

To date there have been no technical studies on the need for establishing off-axis e.i.r.p. limits applicable to non-GSO FSS earth stations. There was agreement that the only possible reason for establishing such limits would be to facilitate sharing between non-GSO FSS systems. The view was expressed that if such limits are applied to the earth stations of a given non-GSO network, they would possibly be helpful only in decreasing the amount of interference affecting its own satellites (internal interference) and not in facilitating sharing between non-GSO FSS systems. Further study is needed to confirm these points prior to WRC-2000. In addition, all technical studies conducted by the ITU-R apply only to GSO FSS earth stations, as clearly indicated by the scope of Recommendation ITU-R S.524 [Doc. 4/66], which summarizes the work performed to date by the ITU-R on this topic.

Sharing in the non-GSO environment depends on a wide variety of factors (e.g. orbits and number of satellites in each constellation, hand-over strategies, in-line avoidance techniques, and traffic patterns). Therefore, there is a need to study the whole interference environment before concluding whether any potential benefit of establishing limits would justify constraining, possibly unnecessarily, non-GSO FSS systems. Moreover, in some cases having off-axis limits would in fact make sharing between non-GSO FSS systems more difficult, because it would prevent the introduction of link balancing, which has been recognized as an efficient mitigation technique to promote sharing (see draft new Recommendation ITU-R S.[Doc. 4/65]).

Therefore, no consensus could be reached on whether off-axis e.i.r.p. should be established for earth stations transmitting to non-GSO satellites. Further studies are required on this issue.

3.1.2.3 Feasibility of the limits and constraints on the development of the systems and services involved

3.1.2.3.1 $EPFD_{up}$ and $EPFD_{is}$ Limits

No significant problems are foreseen, either for non-GSO FSS systems to meet the proposed $EPFD_{up}$ and $EPFD_{is}$ limits, or for GSO FSS systems to be adequately protected by them.

3.1.2.3.2 $EPFD_{down}$ Limit Masks

a) Introduction

The results of studies reported in § 3.1.2 of this Report enabled the CPM to reach the following conclusions as to the appropriate power limits to be placed on non-GSO FSS systems, in order to provide the desired protection to GSO FSS and GSO BSS networks without causing undue constraints to any of the systems and services sharing these frequency bands.

b) Consequences for GSO Systems

The introduction of power limits into Article **S22**, to share frequencies with non-GSO FSS systems, represents the acceptance of a burden on the part of the GSO FSS networks: i.e. the establishment now of acceptable interference levels from non-GSO FSS systems into all present and future GSO FSS networks, and the quantification of the protection provided for GSO FSS under No. **S22.2** in the relevant bands.

In order to ensure protection of GSO systems, a number of worst-case circumstances have been assumed in drawing up the specification for the BR compliance verification software. The $EPFD_{down}$ mask used to calculate the impact of non-GSO downlink emissions on each link in the CR92/CR116 database is based on a combination of conservative assumptions which for individual links has a low probability of occurring.

Taking into account the fact that the above assumptions have had to be made, attention is drawn to the following factors:

- The ITU-R analyses were conducted with the aim of protecting as many of the CR92/CR116 links as possible.
- The $EPFD_{down}$ limits must be met for every location on the Earth's surface and for any pointing direction towards the GSO. However, under normal circumstances, some non-GSO FSS constellations will generate their maximum $EPFD_{down}$ level in only a modest proportion of the Earth's surface. Computer simulations have shown that due to orbit perturbations, these non-GSO FSS constellations may generate their maximum $EPFD_{down}$ levels over a larger proportion of the Earth's surface, but this will result in fewer interference events in any given location. For each earth station location the maximum interference peaks will be relatively infrequent. Also, $EPFD_{down}$ levels below the maximum may be a problem for some GSO links. Quantification of these factors depends heavily on the characteristics of the non-GSO FSS system.
- ITU-R antenna reference patterns, including the pattern in draft new Recommendation ITU-R S.[Doc. 4/57], are employed for GSO earth stations, in both the ITU-R analyses and the BR software specification. These reference patterns necessarily err on the side of caution, and in practice the roll-off of the GSO earth station antenna main beam is likely to be rather faster than modelled. Also, in the models of non-GSO satellite antennas used in the analyses, the side-lobe gain assumed is likely to be somewhat higher than reality. These factors lead to conservative estimates of the durations and levels of interference peaks.
- The methodologies used to derive EPFD masks lead to conservative results because the only sources of short-term degradation taken into account are rain fading and non-GSO interference. It is noted that the rain fade models used are long-term averages, and that the rain attenuation varies substantially from year to year.
- The EPFD limits have to be met by the non-GSO system on a worldwide/GSO arc basis. The resulting EPFD mask is an envelope of all possible worst-case situations and each EPFD distribution produced by the examination software must be within the EPFD limit mask. The EPFD distribution of any single non-GSO system will therefore not follow exactly the EPFD limit mask.
- With the use of orbital avoidance, the highest $EPFD_{down}$ levels are expected to be caused by the non-GSO satellite antenna side lobes. Non-GSO systems typically use phased array antennas. Side-lobe levels for these antennas vary over the anticipated life of the non-GSO satellite due to element failures and phase and amplitude errors. These errors tend to increase satellite side lobes and change their pointing directions. It is expected that the parameters used to generate the pfd/e.i.r.p. mask correspond to the performance of the non-GSO satellite over its anticipated lifetime.
- The simulation methodology developed by ITU-R, for verification of compliance with Article **S22** of the EPFD levels produced by a non-GSO FSS system, involves the generation of a power flux-density mask (pfd mask) which corresponds to the envelope of the power radiated by each non-GSO space station, independently of the resource allocation scheme used by the non-GSO system, and independently of the traffic carried by the non-GSO system. In particular land masses and oceans are assumed to be served with maximum traffic capability at each time step of the simulation. This pfd mask is then used by the software to calculate the EPFD radiated into a given GSO earth station, by assuming, at each time step, that all the satellites contributing to interference operate at this maximum pfd level. Although this approach may be appropriate, although still conservative, to calculate the worst-case EPFD

level that may be generated at the worst-case location of the Earth, it results in an overestimation of the statistical distribution of the EPFD levels at a given point of the Earth. This also highlights that the overall impact of the interference at the GSO system level will also be overestimated as all the earth stations of a given GSO system will actually experience different EPFD statistics, the upper bound of which is the EPFD mask specified in Article **S22**.

- The methodologies used to derive the pfd masks that are input into the BR compliance examination software use what is by definition a "worst-case" scheduling algorithm for beam pointing. A study has shown that under certain circumstances the curve of EPFD statistics run over a large number of Earth points with a more realistic scheduling algorithm such as pointing in the direction of the cells that result in the highest elevation angle beams, is within 0.3 dB of the worst-case statistics obtained with the worst-case algorithm.

For those individual links which are not fully protected by the $EPFD_{down}$ validation masks, the operational limits and the additional operational limits, various ways of compensating for any shortfall in protection were considered and it was concluded that the most convenient one would usually be an increase in the satellite e.i.r.p. allocated to the GSO link, where feasible. Most of the links in the CR92/CR116 database which the $EPFD_{down}$ limits do not protect according to the 10% criterion or synchronization loss avoidance criterion are characterized by large earth station antennas and small margins.

Employing hard limits without a coordination procedure is a common practice for the FSS in the Radio Regulations in those instances where the cost of the constraints accepted by the services involved are outweighed by the benefit of coexistence without the need for coordination. Studies demonstrate that the provisional $EPFD_{down}$ limits and associated percentages of time for the large dish sizes considered by WRC-97 may not adequately protect their individual GSO FSS links terminating in very large earth station antennas as defined in § 3.1.2.4.4. $EPFD_{down}$ limits and associated percentages of time that would provide sufficient protection to GSO networks having very large earth station antennas would be substantially more stringent than limits that would protect the largest dishes considered at WRC-97. Coordination would provide an alternative sharing arrangement without placing undue constraints on the design of non-GSO systems, although it is noted that it would prove an additional burden on such systems. However, for coordination to be a satisfactory solution for the non-GSO system operators there should be very few cases requiring coordination, and the protection requirements should be clearly defined. Therefore, the thresholds for triggering coordination must be set such that in reality coordination is triggered in very few cases. The ITU-R proposed that coordination should be triggered for GSO FSS networks having very large earth station antennas and meeting a combination of thresholds as described in § 3.1.2.4.4.

c) Consequences for non-GSO Systems

The decision to operate a non-GSO FSS system in bands where $EPFD_{down}$ limits apply is based on balancing the benefits and costs of the associated economic, technical and other considerations of such operation.

The consequences for non-GSO systems of implementing $EPFD_{down}$ limits in a given band must be considered in two parts. First is the impact on the non-GSO system of having to implement satellite diversity to protect GSO systems in general. This burden has been documented in ITU-R (see CPM-97 Report). Second is the relative impact of compliance with $EPFD_{down}$ limits vs. coordination with individual GSO systems. $EPFD_{down}$ limits do provide the benefit to present and future non-GSO systems of avoiding individual negotiations with every GSO system. However, this benefit is granted at the cost of increased constraints imposed on non-GSO FSS systems (to protect GSO FSS networks) that depend on the protectiveness of the power limits adopted. $EPFD_{down}$ limits that are too tight would result in protecting the entire GSO arc to a greater degree than would be necessary if individual coordinations were completed with each GSO system.

The following sections describe the sensitivity of these burdens to variations in the level of the power limits:

– **Lower non-GSO satellite antenna side lobes**

  The use of non-GSO satellite antennas with the best available radiation patterns will lead to the most efficient use of the radio-frequency spectrum. Antenna design can become complex and there are costs associated with developing antennas with low side lobes. Antennas with fixed boresight pointing can normally achieve lower side-lobe levels than electronically-steered antenna beams that require large scan angles.

  Most non-GSO satellites use multiple beams. The aggregate antenna side-lobe level is dependent both on the single beam side-lobe performance and the number of co-frequency active beams. Assuming a given antenna design, aggregate side-lobe improvement will require a reduction in the number of active beams and, consequently, the capacity of the non-GSO system. For example; a 1 dB tightening of the maximum EPFD limit, where non-GSO satellite side lobe into GSO earth station main beam is the highest EPFD case, may reduce the non-GSO system capacity up to 20% if no other measures were used.

  To design the satellite antennas to produce side-lobe levels lower than the current state of technology and meet more stringent short-term EPFD limits may be possible but would lead to a significant increase in complexity, mass and cost due to the larger number of radiating elements and of controllable devices (variable phase shifters, variable power dividers, variable attenuators) per antenna, as well as the consequent increase in the size and number of radiating elements. It would also result in substantially increased program costs, technical risks, and launch costs.

– **Decrease in carrier power levels to meet short-term EPFD limits**

  Decrease in non-GSO satellite carrier power will result in a reduction in capacity (e.g. "1 dB capacity", i.e. 20% reduction in capacity for 1 dB of tightening, in the case of CDMA systems) or will cause a need to increase earth station terminal size that may limit the ability to provide service in certain areas.

– **Modification of waveform to reduce power spectral density**

  In the case of spread signals, this would result in an increase in bandwidth, which could result in decreased capacity and higher production cost. In cases where non-GSO carriers utilize the entire allocated band, reduced power spectral density would be achieved only if additional spectrum was made available.

– **Increase in exclusion angle (GSO arc avoidance)**

  Increase in exclusion angle will either decrease the non-GSO system coverage if the constellation is unchanged, or increase the number of satellites and/or increase the number of beams per satellite in the constellation to maintain coverage.

3.1.2.4 Regulatory and procedural considerations

The existing text in the RR (e.g., those Resolutions **130 (WRC-97)**, **131 (WRC-97)**, and **538 (WRC-97)** (incorporated by reference), and Articles **S5**, **S9**, **S11**, **S21**, **S22**, and Appendices **S4** and **S5**) was reviewed and some possible options were identified for modifications to these provisions.

In reviewing the current regulatory provisions in the current *resolves* contained in Resolutions **130 (WRC-97)**, **131 (WRC-97)**, and **538 (WRC-97)**, possible modifications, suppressions or transfers to Articles in the RR were identified. Examples of possible modifications to Resolutions **130 (WRC-97)** and **538 (WRC-97)** are included in Annex 5 to this Chapter. Possible changes were also identified to Articles **S5**, **S9**, and **S22** and Appendices **S4** and **S5** in order to reflect the results of ITU-R studies. Examples of possible modifications to footnotes in Article **S5** as a result of determinations to be made with regard to Resolutions **130 (WRC-97)** and **538 (WRC-97)** are included in Annex 6 to this Chapter. It is anticipated that revised Resolutions **130 (WRC-97)**, **131 (WRC-97)**, and **538 (WRC-97)**, or other resolutions, will be required i) to cover the transition period of the provisional limits between WRC-97 and WRC-2000 and ii) to implement the revised Article **S22** at the end of WRC-2000. It was also noted that the *instructs the Radiocommunication Bureau* of Resolutions **130 (WRC-97)** and **538 (WRC-97)** states that "as of the end of WRC-99, to review and, if appropriate, revise, any finding previously made on the compliance with the limits contained in Article **S22** of a non-GSO FSS system for which notification information has been received between 22 November 1997 and the end of WRC-99. This review shall be based on the values in Article **S22**, as revised, if appropriate, by WRC-99". A regulatory procedure may be required to implement "this review of the findings".

Additionally, the following were specifically identified as areas that may require possible procedural/regulatory actions:

a) inclined geostationary orbits;

b) very large receive earth station antennas;

c) off-axis e.i.r.p. density;

d) software;

e) operational limits to the $\mathrm{EPFD_{down}}$ by non-GSO systems in certain frequency bands;

f) GSO TT&C (space-to-Earth); and

g) possible misapplication of single-entry limits.

3.1.2.4.1 Article S5

Due to modifications to Resolutions **130 (WRC-97)** and **538 (WRC-97)**, consequential changes will be required to the footnotes in Article **S5** that make reference to these Resolutions. (See Annex 6.)

3.1.2.4.2 Article S22, Section II

Based on the work of ITU-R, there will be a need to revise Article **S22**, Section II. It is noted the tables in Article **S22** contain references to ITU-R Recommendations and, if it is determined that this is not acceptable (incorporation by reference), then an annex to Article **S22** containing the necessary information from the ITU-R documents will be required. Annex 1 provides examples of possible modifications to Article **S22**, Section II.

3.1.2.4.2*bis* Appendix S4, Annex 2A

Based on the work of ITU-R, there will be a need to revise Appendix **S4**, Annex 2A. Annex 9 contains the proposed changes.

3.1.2.4.3 Inclined geostationary orbits

ITU-R agreed that the $EPFD_{down}$ masks adopted for the protection of non-inclined GSO links would also protect links using satellites in slightly inclined orbits up to 2.5º inclination. Operation of GSO links up to 4.5º could be provided by operational limits as in Table **S22-4**. Where the actual orbital inclination of a GSO satellite exceeds 4.5º, some other regulatory procedure would be required.

3.1.2.4.4 Very large receive earth station antennas

§ 3.1.2.1.2 e) states that some very large earth station antennas may not be adequately protected by the $EPFD_{down}$ limits in proposed Annex 1 and a coordination procedure may be necessary. Implementation of this coordination procedure may include additions or modifications to Articles **S9** and **S22** and Appendices **S4** and **S5**. Annex 3 contains example regulatory and procedural text for coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antennas.

3.1.2.4.5 Off-axis e.i.r.p. density

§§ 3.1.2.2.4 to 3.1.2.2.5 of this Report address the results of studies relating to off-axis e.i.r.p. density limits for GSO/FSS earth stations.

Three options were identified for the consideration of off-axis e.i.r.p. issue in the Radio Regulations. Considerations associated with these options are addressed in §§ 3.1.2.2.4 and 3.1.2.2.5.

- **Option 1**

  Suppress the current Section VI of Article **S22** of the Radio Regulations. Thus no FSS earth station off-axis e.i.r.p. limits would be included in the Radio Regulations.

- **Option 2**

  Include FSS earth station off-axis e.i.r.p. limits in Section VI of Article **S22** for the following frequency bands: 12.75-13.25 GHz, 13.75-14 GHz, 14-14.5 GHz and 29.5-30.0 GHz.

- **Option 3**

  Incorporate by reference an ITU-R Recommendation, when available. This option would provide a mechanism for updating the off-axis e.i.r.p. values as appropriate.

Annex 7 of this Chapter contains examples of possible modifications to Section VI of Article **S22** that reflects three options above.

3.1.2.4.6 Software

The examination software intended for use by the BR would be used to compute EPFD statistics from a constellation of non-GSO satellites at specific GSO earth station locations. The cumulative probability distribution function (CDF) curves of EPFD for a single non-GSO system produced by the software would then be tested against the EPFD limits in the Radio Regulations for a decision as to whether the non-GSO system satisfied or failed the EPFD limits. It is envisioned that any non-GSO system that did not meet the EPFD limits and associated time percentages would receive an unfavourable finding from the Bureau. Regulatory and procedural work is needed regarding the examination process and results, including the following:

a) procedure for using the software;

b) definition of additional required input information by modification of Appendix **S4** or another method, and Bureau examination of input data for correctness and completeness before the data is used as software input. Administrations would provide BR with only the additional information that is useful to BR to regenerate the pfd/e.i.r.p. mask. Procedural work will be necessary to distinguish between "incorrect or incomplete information" and other changes in the system;

c) a transition plan, including identification of the date by which the required input information must be received from administrations having non-GSO FSS systems for which Appendix **S4** data was previously received by the Bureau and which now must submit new information. Provisions will also be needed to determine whether the new information is within the envelope of the existing Appendix **S4** information and the system would maintain the original date priority;

d) in order to determine the need for coordination under the proposed ADD **S9.7A** and ADD **S9.7B**, the Bureau would determine the $EPFD_{down}$ radiated by the non-GSO FSS system into earth stations employing very large antennas when the antenna is pointed toward the wanted GSO satellite. This examination would be one of the steps in determining the need for coordination. Although this examination is likely to be carried out by the Bureau's software, these results would have no impact on the determination of whether a non-GSO system met the EPFD limits;

e) publication requirements for input and output information;

f) outputs from the software, including basic outputs available to all administrations and detailed outputs that the Bureau could make available on request to the administration submitting the application, for their internal use and/or for use in case of a dispute;

g) procedure to allow administrations having GSO FSS networks the opportunity to comment on the findings of the Bureau under No. **S9.12** within four months after publication. This may include identification of a limited number of GSO earth station locations where it believes that the EPFD limits in Article **S22** are exceeded. The results from these test locations could also be employed when operational EPFD levels are examined;

h) procedures to allow the Bureau and administration concerned to inspect the detailed output.

3.1.2.4.7 Operational limits to the $EPFD_{down}$ by non-GSO systems in certain frequency bands

$EPFD_{down}$ masks have been developed to fulfil the protection criteria defined in Recommendation ITU-R S.1323 [Doc. 4/69]. These masks include limits, not to be exceeded for 100% of the time, which are being referred to below as the "validation limits". Recognizing that the validation limits may not fully protect some links from occasional synchronization loss, it is recommended that the following principles be applied:

i) An additional limit would be imposed on the actual $EPFD_{down}$ produced by a non-GSO FSS system. This "operational limit" is lower than the validation limit ($EPFD_{down}$ for 100% of the time). A non-GSO FSS system would be deemed to have fulfilled its obligations under No. **S22.2** as long as its $EPFD_{down}$ into operational GSO earth stations as defined in § 3.1.2.1.4 never exceeds the operational limit.

ii) The validation limits and operational limit would be included directly in Article **S22**. However the BR/ITU, under **S9.35** and **S11.31**, would verify non-GSO FSS compliance only with the $EPFD_{down}$ masks corresponding to the validation limits.

iii) Should an operating non-GSO FSS system exceed the operational EPFD limit into an operational GSO earth station, all necessary steps to ensure that interference caused to that GSO earth station is restored to levels at or below the operational EPFD limit would have to be taken by the non-GSO network as expeditiously as possible.

iv) The determination of whether a non-GSO FSS system is exceeding the operational EPFD limit would be made by individual administrations and their GSO system operators. A reliable means of measuring the actual interference corresponding to the EPFD produced by a non-GSO FSS system would assist administrations in this regard. This is expected to be developed in ITU-R as a draft new Recommendation prior to WRC-2000.

v) The contents of this section (§ 3.1.2.4.7) would not apply to very large antennas as defined in § 3.1.2.1.2 e). The principles in iii) and iv) above also apply to the additional operational limits in Tables **S22-4A1** and **S22-4A2** in Annex 1.

Therefore, based on the above considerations, the CPM proposes that a maximum "operational" EPFD limit as shown in Table **S22-4** in Annex 1 be included in the Radio Regulations to protect GSO networks against sync-loss.

Additional regulatory work to develop a procedure based on this concept may be needed.

3.1.2.4.8 Additional $EPFD_{down}$ limits to protect GSO FSS in the bands 10.7-11.7 GHz (in all Regions), 11.7-12.2 GHz (Region 2), 12.2-12.5 GHz (Region 3), and 12.5-12.75 GHz (Regions 1 and 3)

With respect to any GSO FSS antenna of 3 or 10 metres that is operational in the above bands, the additional operational $EPFD_{down}$ levels described in § 3.1.2.1.4 were agreed.

These additional limits would be included as limits on non-GSO FSS system operation within Article **S22**. As the limits are operational in nature, it is proposed to include them as additional tables to be considered under Table **S22-4** (see Annex 1). An administration proposing a non-GSO FSS system would have to commit that the proposed system will meet the limits that are described in this section (e.g. through inclusion of a requirement in Appendix **S4**). A method of assessing interference levels for intermediate antenna sizes should also be developed within ITU-R (see § 3.1.2.1.3 c)).

To assist administrations, further study is required within ITU-R to develop a methodology (either in a new Recommendation or a modification to an existing Recommendation) to determine the time distribution of the actual EPFD levels radiated by a non-GSO FSS system into a 3 to 10 metre GSO FSS antenna. It was agreed that a Resolution by WRC-2000 to undertake these studies as a matter of urgency would be appropriate.

ITU-R also agreed that it is essential to develop, as a matter of urgency, Recommendations to permit administrations to check compliance with the operational limits that are described in this section (as well as those operational limits described in § 3.1.2.4.7 above).

3.1.2.4.9 GSO TT&C (space-to-Earth)

The ITU-R agreed that depending on the final $EPFD_{down}$ values, there may be a need to develop provisions to protect GSO TT&C carriers in the space-to-Earth direction.

3.1.2.4.10 Possible misapplication of single-entry limits

The ITU-R identified the desirability of identifying regulatory solutions to the possible misapplication of single-entry limits by dividing a non-GSO system into several smaller non-GSO systems which independently meet the limits. It was agreed that that such misapplication would invalidate the entire basis of the derivation of the single-entry limits.

3.1.3 Sharing between non-GSO FSS and GSO BSS systems in the bands 11.7-12.5 GHz (Region 1), 11.7-12.2 GHz and 12.5-12.75 GHz (Region 3), 12.2-12.7 GHz (Region 2), 17.3-18.1 GHz (Regions 1 and 3) and 17.8-18.1 GHz (Region 2)

3.1.3.1 Protection of GSO BSS systems

Resolution **538 (WRC-97)** introduced provisional EPFD and APFD (which is re-defined as $EPFD_{up}$) limits for non-GSO FSS systems in certain bands intended to protect GSO BSS systems operating co-frequency, and requested ITU-R to conduct the appropriate technical, operational and regulatory studies to review the regulatory conditions relating to the coexistence of non-GSO FSS and GSO BSS systems.

ITU-R developed a draft new Recommendation ITU-R BO.[Doc. 11/138], referred to as BSS draft new Recommendation in the rest of § 3.1.3. This Recommendation addresses protection criteria, contains the BSS links to be protected, and descriptions of methodologies to be used in verifying protection of the BSS. The work was performed under the following principles:

a) that the equivalent power flux-density limits as defined in Article **S22** of the RR and applicable respectively to non-GSO FSS systems to be operated in the 12 GHz bands shared with BSS and in the 17 GHz frequency bands shared with BSS feeder links be derived and specified in such a way:
   - that they satisfy the criteria in *recommends* 1.1 and 1.2 of the above draft new Recommendation when applied to a set of representative GSO BSS and associated feeder-link system characteristics, as provided in Annex 1 to this Recommendation;
   - that the apportionment of the aggregate interference allowance specified in *recommends* 1.1 and 1.2 to derive single entry limits be based on the effective number of non-GSO FSS systems that are anticipated to share the same frequency bands;
   - that these limits are specified by continuous curves of cumulative density function for a range of representative GSO receiving antenna sizes.

3.1.3.1.1 Characteristics of the GSO BSS

In performing the studies requested by Resolution **538 (WRC-97)**, it was clearly impracticable for ITU-R to gather and analyse data on all existing and planned GSO BSS networks using the frequency bands covered by Appendices **S30** and **S30A**. In Circular Letters CR/92 (14 April 1998) and CR/116 (15 February 1999), administrations were therefore invited to supply data on a set of representative GSO BSS links. A number of administrations responded to these letters, ITU-R has assembled those responses received prior to 22 March 1999 into a database of GSO BSS parameters.

This database includes the detailed characteristics of more than 300 BSS links. Bearing in mind that it includes sensitive BSS links with respect to interference from non-GSO FSS systems, it was considered as the appropriate basis to assess the adequacy of the current limits, as well as alternative candidate limits, to ensure protection of GSO BSS links so as not to cause undue constraints on any of the systems involved, and has been used for this purpose.

The complete set of submitted links is contained in Annex 1 of draft new Recommendation ITU-R BO.[Doc. 11/138]. This database of links includes both reference parameter links, operational links and links representing future technologies. They represent links employing both digital modulation techniques and FM analogue modulation techniques. The range of earth station sizes is from 30 cm to 450 cm.

One important BSS characteristic used to calculate $EPFD_{down}$ statistics is the BSS receive antenna pattern. To provide reference patterns for this purpose, ITU-R developed a draft new Recommendation ITU-R BO.[Doc. 11/137]. This Recommendation provides a unified set of reference antenna patterns for all regions. A set of three reference patterns are provided: one for $D/\lambda > 100$, one for $25.5 < D/\lambda \leq 100$, and one for $11 \leq D/\lambda \leq 25.5$. These patterns should be used when determining $EPFD_{down}$ statistics.

3.1.3.1.2 Protection criteria

Recommendation ITU-R BO.[Doc. 11/137] outlines the protection criteria for BSS from non-GSO FSS interference. It is noted that the criteria to protect GSO BSS systems from interference caused by non-GSO FSS systems are similar to those adopted for the protection of GSO FSS systems.

3.1.3.1.3 Methodologies used to assess the adequacy of the limits to protect GSO BSS

As discussed in the previous sections, there are two criteria for the protection of GSO BSS from non-GSO FSS interference.

ITU-R developed two methodologies to determine whether the first criterion, a 10% increase of the BSS link unavailability, was met. These two methodologies are described in detail in Annexes 2 and 3 of draft new Recommendation ITU-R BO.[Doc. 11/138]. *Recommends* 3 of BSS draft new Recommendation establishes that both of these methodologies could be used in assessing the impact on the GSO BSS from non-GSO FSS systems.

ITU-R also developed a methodology for assessing whether the second criterion, loss of video picture continuity, was met. This methodology is described in detail in Annex 4 of draft new Recommendation ITU-R BO.[Doc. 11/138].

In addition, it was agreed to use the method of § 3.1.2.1.3 b) to go from aggregate $EPFD_{down}$ mask to single entry $EPFD_{down}$ mask or vice versa. Since the BSS earth station antenna sizes are less than 10 m, it was decided to restrict this methodology to the power addition zone and the time addition zone.

Consistent with the approach of § 3.1.1.1 d), a value of 3.5 for "$N_{effective}$" was adopted in order to relate the single entry masks to the aggregate masks. It is noted that "$N_{effective}$" is used for computation purposes only and is not a representation of the actual number of non-GSO FSS systems that can share a given frequency band.

3.1.3.1.4 Results of studies relating to the review/revision of the provisional power limits appearing in Section II of Article S22 for the protection of GSO BSS systems subject to Appendix S30 plans and associated feeder links

a) $EPFD_{up}$ and $EPFD_{is}$ limits

The concepts of $EPFD_{up}$ and $EPFD_{is}$ limits were agreed. The first set of limits is to protect the GSO BSS feeder links receive space stations from interference caused by non-GSO FSS transmit earth stations using an Earth-to-space allocation. The second set is to protect the GSO BSS feeder links receive space stations from interference caused by non-GSO FSS space stations using a space-to-Earth allocation.

The agreed single entry $EPFD_{up}$ limit is -160 dB(W/(m^2.40 kHz)). This $EPFD_{up}$ limit applies to the bands 17.3-18.1 GHz (Regions 1 and 3) and 17.8-18.1 GHz (Region 2). It is proposed that, the above-mentioned limit be also applicable to the frequency band 17.3-17.8 GHz (Region 2), in order to protect BSS feeder links in Region 2 from non-GSO FSS uplinks in Regions 1 and 3. With regard to the 17.3-17.8 GHz allocation to non-GSO FSS (uplink) in Region 2 see 3.2.2.

The agreed single entry $EPFD_{is}$ limit is -160 dB(W/(m^2.40 kHz)). This $EPFD_{is}$ limit applies to the bands 17.8-18.1 GHz.

b) $EPFD_{down}$

It was agreed that $EPFD_{down}$ masks specified by continuous curves of cumulative density function, as called by *recommends* 2.3 of the draft new Recommendation ITU-R BO.[Doc. 11/138], would be used rather than masks specified by discrete EPFD points as used in the provisional limits. Such continuous masks, specifying the maximum allowed level of $EPFD_{down}$ as a function of the percentage of time, would provide a more realistic fit to the interference caused by non-GSO FSS systems into GSO BSS systems.

The procedure described in § 3.1.3.1.3 above has been applied on the GSO BSS link included in the database reported in § 3.1.3.1.1 above for the 12 GHz band, in order to assess the compliance of candidate $EPFD_{down}$ limits with the protection criteria considered under § 3.1.3.1.2 above. The limits considered above for $EPFD_{up}$ and/or $EPFD_{is}$, as applicable, were also included in the calculations (aggregate value of -153 dB(W/(m^2.40 kHz)), which took into account the impact of non-GSO FSS interference on the overall GSO BSS links (feeder link + downlink).

Tables in Annexes 1 and 2 provide the $EPFD_{down}$ masks in terms of the allowable single entry and aggregate EPFD levels compatible with an effective number of 3.5 non-GSO FSS interfering systems into the various antenna sizes that may be considered for the receive earth station antenna.

These masks were agreed for all antenna diameters, i.e. 30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm and 300 cm. This agreement reflects the compromise reached between the parties by not imposing unacceptable constraints on any of them. This agreement is based on the following:

- Validation $EPFD_{down}$ masks for the above BSS earth stations antennas diameter.
- Latitude dependent validation 100% of the time $EPFD_{down}$ limits for 180 cm, 240 cm and 300 cm BSS earth stations antennas.
- Operational 100% of the time single entry $EPFD_{down}$ limits for 240 cm BSS antenna diameters in a certain northern high latitude area of Region 2.

The limit in the third bullet is required because the power of BSS transmissions that can be radiated toward certain northern high latitude area of Region 2 is limited by the existing pfd limits section 5c) of Annex 1 to Appendix **S30**. This leads to the use of larger BSS earth station antennas in this geographical area and more sensitive links. But the protection of a limited area should not impose worldwide constraints on non-GSO FSS. This limit may be implemented during a transition period if the pfd limits in section 5c) of Annex 1 to Appendix **S30** are relaxed, taking into account the lifetime of operational BSS spacecraft and those to be launched in a short term. Information on operational limit is provided in sections 3.1.2.4.7 and 3.1.6.2.

To assist administrations, further study is required within ITU-R to develop a methodology (either in a new Recommendation or a modification to an existing Recommendation) to determine the actual EPFD level radiated by the non-GSO FSS systems into a 240 cm GSO BSS antenna. It was agreed that a Resolution by WRC-2000 to undertake these studies as a matter of urgency would be appropriate.

3.1.3.2 Interference to non-GSO FSS systems from BSS systems

The use by non-GSO FSS systems of the frequency bands subject to Appendices **S30** and **S30A** Plans at 12 and 17 GHz was addressed by WRC-97 (Resolution **538 (WRC-97)**). It should be noted that *considering c)* of Resolution **538 (WRC-97)** states that "non-GSO systems should not be entered into these Plans and therefore should not apply the procedures associated with the Plans and should not be protected by these procedures".

A study presented to WRC-97 (Document CMR-97/62) advised that the interference from Appendices **S30** and **S30A** Plans into non-GSO FSS systems sharing the same bands would be acceptable, assuming that the e.i.r.p. levels of the assignments in the Plan do not exceed the levels of the 1977 and 1983 Plans.

On this basis, the ITU-R, noting that the plan modification process would in practice limit the possibility of exceeding these levels, concluded that there would be no need to introduce specific provisions to protect non-GSO FSS systems from modifications to Appendices **S30** and **S30A** Plans.

Further study on this issue may be required in the future if higher power levels appeared to be necessary in the BSS and BSS feeder links in Appendices **S30** and **S30A** Plans.

Concerning the interference that may be caused into non-GSO FSS uplinks by GSO BSS feeder links in the 17.8-18.1 GHz band in Region 2 and, should WRC-2000 decide an allocation to non-GSO FSS (Earth-to-space) in this band, in the 18.1-18.4 GHz band in all three Regions, it was concluded that off-axis e.i.r.p. limits similar to those considered for the 13.75-14.5 GHz might be appropriate. Further study is required however, to determine the appropriate level for these limits.

3.1.3.3 Regulatory and procedural considerations

There is a need to ensure that the aggregate EPFD produced by all co-frequency non-GSO FSS systems does not exceed the maximum interference levels, as determined by the agreed to aggregate EPFD masks, that are necessary to protect these GSO BSS systems.

Some of the considerations in § 3.1.2.4 (including 3.1.2.4.9) apply also in this case.

3.1.4 Sharing between non-GSO FSS systems and terrestrial and space science services in the bands 10.7-12.75 GHz, 12.75-13.25 GHz, 13.75-14.5 GHz, 17.3-18.4 GHz (Earth-to-space), 17.7-19.3 GHz (space-to-Earth), and 27.5-28.6 GHz

3.1.4.1 Protection of fixed-service systems from interference caused by non-GSO FSS space stations in bands covered by Article S21

3.1.4.1.1 Protection of the fixed service in the 10.7-12.75 GHz band

a) Characteristics of the fixed-service systems in the 10.7-12.75 GHz band

The FS characteristics used for the evaluation of pfd limits for non-GSO FSS satellites in the 10.7-12.75 GHz band are given in the following:

Elevation angles	0 and 0.2°
Antenna height	0 metres
Antenna gain	45 and 49 dBi
Antenna pattern	Recommendation ITU-R F.1245
Latitudes	25, 45 and 60°
Gaseous attenuation	Recommendation ITU-R SF.1395
Feeder loss	3 dB
Polarization loss	Note 7 of Recommendation ITU-R F.1245
Receiver thermal noise	-140 dB(W/MHz)

These characteristics are representative of a majority of links in that frequency range.

b) Fixed service protection criteria in the 10.7-12.75 GHz band

The aggregate FS protection criteria in the 10.7-12.75 GHz range are given as follows in draft new Recommendation ITU-R F.[Doc. 9A/TEMP/65] to be submitted to RA-2000 for approval:

- Maximum I/N = +20 dB
- Long-term interference: D_{ltEPO} or FDP (see Recommendation ITU-R F.1108-2) of 10%, where:

$$D_{ltEPO} = (0.89 \times \int_{10^{-6}}^{1} \frac{I(t)}{N} dt) \times 100\%$$

D_{ltEPO} is the error performance objective degradation due to long-term interference.

I(t)/N is the interference-to-noise ratio that could be exceeded during no more than "t" fraction of any month time.

These aggregate FS interference criteria have been derived from considerations of the allowable degradation of Error Performance Objective (EPO) due to interference from systems operating co-primary, on typical FS links using ATPC features.

c) Methodologies used to assess the adequacy of the limits to protect the fixed service in the 10.7-12.75 GHz band

Many analyses using the pfd mask simulation method have been used for assessing the adequacy of the pfd limits for the protection of the FS. In this method, the statistics of the theoretical aggregate power levels received at an FS station are calculated by applying pfd limits under consideration to each visible satellite of the non-GSO FSS constellation[1].

In the derivation of the pfd limits defined in § 3.1.4.1.1 d), it was determined that if the calculated FDP results exceed the criteria of § 3.1.4.1.1 b) by no more than a few per cent for worst-case geometries, this does not mean that the FS links would actually be impaired. It must be noted that the pfd mask analysis is overly conservative in that it computes interference (both long term and short term) that exceeds what would be produced by an operating non-GSO FSS system. This is

[1] Annex 1 of Recommendation ITU-R F.1108-2 provides guidance on the calculation of visibility statistics of space stations operating in circular non-GSO orbits as seen by a terrestrial station.

because the analysis assumes that all the visible satellites of the non-GSO FSS constellation radiate simultaneously the maximum pfd limit in the direction of the FS system under consideration, which is unrealistic. In addition, such an assumption does not take into account the patterns of real satellite antennas, the power limitation of each satellite or the restrictions that self-interference would impose on a non-GSO FSS system.

Calculations are made assuming that the FS receiver antenna is pointing in the direction of the worst-case azimuth for the non-GSO constellation under consideration, since in that pointing direction, the long-term and short-term power levels generated by the non-GSO constellation into the FS receivers are maximum.

Studies in other bands that have considered a more realistic modelling of a similar problem have produced results providing further evidence supporting that the pfd limits defined in § 3.1.4.1.1 d) are adequate. The method used takes into account some fundamental operational constraints of non-GSO FSS systems by using more realistic downlink models developed to generate pfd distribution profiles for a range of arrival angles which are used in place of the maximum-allowed pfd mask.

Given the methodology and assumptions used for evaluating the pfd limits, it can be assumed that the FS aggregate interference criteria given in draft new Recommendation ITU-R F.[Doc. 9A/TEMP/65], can be applied for each single non-GSO FSS constellation. These conclusions remain valid if the number of co-frequency non-homogeneous non-GSO FSS systems were in the range three to five.

d) Results of studies relating to the review/revision of the power limits appearing in Article S21 in the 10.7-12.75 GHz band

The current Article **S21** per satellite pfd limits, as defined below and as discussed more fully in draft new Recommendation ITU-R SF.[Doc. 4-9S/AI] (submitted to RA-2000 for approval), are adequate for the protection of the FS in the 10.7-12.75 GHz band from aggregate interference from three assumed non-homogeneous, non-GSO FSS systems. Moreover, the contribution of GSO interference to the sharing has been shown as not being significant. Studies support and validate this conclusion. These results would remain valid if the number of non-GSO FSS systems were in the range three to five.

- In the 10.7-11.7 GHz band:

-126	$dB(W/(m^2 \cdot MHz))$ for $0° \le \delta < 5°$
$-126 + (\delta - 5)/2$	$dB(W/(m^2 \cdot MHz))$ for $5° \le \delta < 25°$
-116	$dB(W/(m^2 \cdot MHz))$ for $25° \le \delta < 90°$

where δ is the angle of arrival above the horizontal plane.

- In the 11.7-12.75 GHz band:

-124	$dB(W/(m^2 \cdot MHz))$ for $0° \le \delta < 5°$
$-124 + (\delta - 5)/2$	$dB(W/(m^2 \cdot MHz))$ for $5° \le \delta < 25°$
-114	$dB(W/(m^2 \cdot MHz))$ for $25° \le \delta < 90°$

where δ is the angle of arrival above the horizontal plane.

3.1.4.1.2 Protection of the fixed service in the 17.7-19.3 GHz band

a) Characteristics of the fixed service systems in the 17.7-19.3 GHz band

The FS characteristics used for the evaluation of pfd limits for non-GSO FSS satellites in the 17.7-19.3 GHz band are given in the following:

Elevation angles	0 and 2.2°
Antenna height	0 metres
Antenna gain	32, 38 and 48 dBi
Antenna pattern	Recommendation ITU-R F.1245
Latitudes	25, 45 and 60°
Gaseous attenuation	Recommendation ITU-R SF.1395
Feeder loss	3 dB
Polarization loss	Note 7 of Recommendation ITU-R F.1245
Receiver thermal noise	-139 dB(W/MHz)

These characteristics are representative of a majority of links in that frequency range.

b) Fixed-service protection criteria in the 17.7-19.3 GHz band

The aggregate FS protection criteria in the 17.7-19.3 GHz band are given as follows in draft new Recommendation ITU-R F.[Doc. 9A/TEMP/64] to be submitted to RA-2000 for approval:

Long term: I/N = -10 dB not to be exceeded for more than 20% of the time.

Short term: I/N = +14 dB not to be exceeded for more than 0.01% of the time.

I/N = +18 dB not to be exceeded for more than 0.0003% of the time.

Note that the short-term criteria were established to protect sensitive FS links.

c) Methodologies used to assess the adequacy of the limits to protect the fixed service in the 17.7-19.3 GHz band

Many analyses using the pfd mask simulation method have been used for assessing the adequacy of the pfd limits for the protection of the FS. In this method, the statistics of the theoretical aggregate power levels received at an FS station are calculated by applying pfd limits under consideration to each visible satellite of the non-GSO FSS constellation. Annex 1 of Recommendation ITU-R F.1108 provides guidance on the calculation of visibility statistics of space stations operating in circular non-GSO orbits as seen by a terrestrial station.

In the derivation of the pfd limits defined in § 3.1.4.1.2 d), it was determined that if the calculated I/N results exceed the criteria of § 3.1.4.1.2 b) by no more than a few dB for worst-case geometries, this does not mean that the FS links would actually be impaired. It must be noted that the pfd mask analysis is overly conservative in that it computes interference (both long term and short term) that exceeds what would be produced by an operating non-GSO FSS system. This is because the analysis assumes that all the visible satellites of the non-GSO FSS constellation radiate simultaneously the maximum pfd limit, in the direction of the FS system under consideration, which is unrealistic. In addition, such an assumption does not take into account the patterns of the real satellite antenna, the power limitations of each satellite or the restrictions that self-interference would impose on a non-GSO system.

Calculations are made assuming that the FS receiver antenna is pointing in the direction of the worst-case azimuth for the non-GSO constellation under consideration, since in that pointing direction, the long-term and short-term power levels generated by the non-GSO constellation into the FS receivers are maximum.

Studies that have considered a more realistic modelling of the problem have produced results providing further evidence supporting that the pfd limits defined in § 3.1.4.1.2 d) are adequate. The method used takes into account some fundamental operational constraints of non-GSO FSS systems by using more realistic downlink models developed to generate pfd distribution profiles for a range of arrival angles which are used in place of the maximum-allowed pfd mask.

Given the methodology and assumptions used for evaluating the pfd limits, it can be assumed that the FS aggregate interference criteria given in draft new Recommendation ITU-R F.[Doc. 9A/TEMP/64], can be applied for each single non-GSO FSS constellation. These conclusions remain valid if the number of co-frequency non-homogeneous non-GSO FSS systems were in the range three to five.

d) Results of studies relating to the review/revision of the power limits appearing in Article S21 in the 17.7-19.3 GHz band

The following per satellite pfd limits (also described in draft new Recommendation ITU-R SF.[Doc. 4-9S/TEMP/94]) (submitted to RA-2000 for approval) are adequate for the protection of the FS in the 17.7-19.3 GHz band from aggregate interference from three assumed non-homogeneous, non-GSO FSS systems. Moreover, the contribution of GSO interference to the sharing has been shown as not being significant. Studies support and validate this conclusion. These results would remain valid if the number of non-GSO FSS systems were in the range three to five.

$-115 - X$	$dB(W/(m^2 \cdot MHz))$ for $0° \le \delta < 5°$
$-115 - X + ((10 + X)/20)(\delta - 5))$	$dB(W/(m^2 \cdot MHz))$ for $5° \le \delta < 25°$
-105	$dB(W/(m^2 \cdot MHz))$ for $25° \le \delta < 90°$

where δ is the angle of arrival above the horizontal plane and X is defined as a function of the number of satellites in the non-GSO FSS constellation, n, as follows:

for $n \le 50$	$X = 0$	(dB)
for $50 < n \le 288$	$X = (5/119)(n - 50)$	(dB)
for $n > 288$	$X = (1/69)(n + 402)$	(dB)

The scaling function, X, was developed on the basis of non-GSO FSS constellations with 96, 288 and 840 satellites. Further simulations with different non-GSO FSS constellations comprising a wide range in the number of satellites (63, 126, 189, 252 and 504 satellites) and using the conservative pfd mask simulation method have confirmed the adequacy of this scaling function.

Extensive studies have provided technical justification that the pfd limits above are certainly adequate to protect the FS from aggregate interference from the satellites of three to five, co-frequency non-GSO FSS systems operating in the 17.7-19.3 GHz band. Therefore these pfd limits are acceptable in that they protect the FS without unduly constraining the development of non-GSO FSS networks.

3.1.4.2 Protection of non-GSO FSS space station receivers from interference caused by FS systems in the 12.75-18.1 GHz frequency range and in the 27.5-28.6 GHz band

Studies have been undertaken to evaluate the interference from fixed-service systems into non-GSO FSS space stations in the bands where the two services are allocated on a co-primary basis in the 12.75-18.1 GHz frequency range and in the 27.5-28.6 GHz band.

3.1.4.2.1 12.75-18.1 GHz frequency range

The study was based on the characteristics of typical FS point-to-point systems and on the characteristics of the space stations of F-SAT MULTI 1B non-GSO FSS system. The study concluded that, even under pessimistic assumptions, the interference from FS systems into non-GSO FSS (Earth-to-space) in the 12.75-18.1 GHz frequency range would be acceptable.

3.1.4.2.2 27.5-28.6 GHz band

The study was based on the characteristics of typical FS point-to-multipoint systems and on the characteristics of the space stations of LEOSAT-1 non-GSO FSS system. The study considered the interference from high deployment of FS subscribers terminals into the main beam and the near side lobes of the non-GSO FSS satellite antenna. This study concluded that the interference levels would be acceptable since they are significantly lower than the generally agreed criterion. However, the study did not consider the aggregate impact of all transmitters located within the entire portion of the Earth visible to the satellite, the interference from a terminal's main beam into the side lobes of the satellite, or the interference between the FS hub transmitters using sectoral antennas into the non-GSO FSS satellite receiver. There was also concern expressed with the assumptions used in the study that might not be worst case in terms of transmit power levels or elevation angles. On this basis, further studies would be required before definitive conclusions can be reached.

It must also be noted that the current RR allow higher e.i.r.p. values to be transmitted in this band than the P-MP FS stations studied in this paper. Limits of 10 dBW on the transmit power and 55 dBW on the e.i.r.p. are specified in Article **S21** and Recommendation ITU-R SF.406, with no restriction placed on the bandwidth or elevation angle. Therefore, there may be a need to review the e.i.r.p. limits considering bandwidth and elevation angle for FS transmitters operating in this band.

3.1.4.3 Sharing between non-GSO FSS earth stations and fixed-service stations

The deployment needs of viable FS and FSS services range from sparse, low density to increasingly higher density. This affects the sharing conditions in terms of coordination between fixed stations and FSS earth stations. At one extreme is the low-density deployment of both services, which facilitates sharing. At the other extreme is the high-density deployment of both services, which creates the most difficult sharing environment. In this instance, either one or both services may be excessively constrained or prevented from offering a viable service in the same geographical area.

In the 10-30 GHz range, the fixed service applications are rapidly evolving to support cellular and PCS infrastructures as well as direct access to business and residential subscribers. There are also proposals for high-density FSS earth station applications. Some administrations are considering the authorization of such systems using area-wide (blanket) licensing. Such licensing schemes lead to a requirement for new approaches in order to facilitate sharing.

The case of sharing between FS and non-ubiquitous FSS earth stations can be handled through classical case-by-case coordination procedures which have already proved to work successfully. In the case of deployment of ubiquitous FSS terminals, in principle, the use of mitigation techniques by one or both services improves the ability of those services to share the same frequency bands.

The feasibility of potential mitigation techniques and their relative effectiveness are currently being studied. This involves a wide range of technical, economic and regulatory trade-offs. In cases where mitigation is insufficient or not practicable in those bands that are already or planned to be heavily used by the one type of service, possible solutions range from frequency separation to constraining the introduction of the other type of service to low-density, non-ubiquitous applications. However, so far, there is no practical experience to demonstrate fully unconstrained, co-frequency deployment of both FS and non-GSO FSS terminals is feasible, where the deployment of either system is of an ubiquitous nature. Furthermore, as the density of either service grows, the effectiveness of mitigation techniques decreases.

If either the FS or FSS deploys terminals in an unconstrained ubiquitous manner, co-frequency sharing in the same geographic area would be very difficult. However, this is a national issue except in the vicinity of international borders, where coordination between administrations may be required.

3.1.4.4 Sharing between non-GSO FSS and RLS, RNS and SRS in the bands 13.75-14 GHz and 17.3-17.7 GHz

3.1.4.4.1 Characteristics of the non-GSO FSS, radiolocation, radionavigation and space research systems

13.75-14.0 GHz

The band 13.75-14 GHz is allocated on a co-primary basis to FSS, RLS. It is also allocated, in some countries, to FS and MS (Nos. **S5.499** and **S5.500**) and to RNS (No. **S5.501**). GSO systems of SRS use this band in accordance with No. **S5.503**. Additionally, non-GSO SRS and EESS operate with protection from the FSS (No. **S5.503A**) until 1 January 2000. After 2001 the only space research system that will remain in the band on a co-primary basis with the FSS is the DRS system. For the sharing between FSS, RLS, RNS and SRS, the 13.75-14 GHz band can be split as follows:

- 13.75-13.8 GHz: FSS uplinks, RNS, radiolocation emissions and GSO-DRS links to both earth stations and LEO spacecraft (e.g. Shuttle);
- 13.8-14 GHz: FSS uplinks, RNS, radiolocation emissions and GSO-DRS links to earth stations only.

Technical and operational characteristics of radiolocation stations in the band 13.75-14 GHz are described in Recommendation ITU-R S.1068. These radars have peak e.i.r.p.s of 79 dBW and average e.i.r.p.s of 59 dBW and operate in both scanning and tracking modes. They are predominately shipborne radars, but some are land based. It is estimated that there are about 600 radars of this type in operational use.

17.3-17.7 GHz

The band 17.3-17.7 GHz is allocated to the RLS on a secondary basis, to FSS on a primary basis (limited by **S5.516** to BSS feeder links) and, in Region 2, to the BSS beginning 1 April 2007. Numerous types of radiolocation stations operate in the band 17.3-17.7 GHz. These stations include ship, ground and airborne equipment, some of which are tracking objects in space. These space-tracking radars could cause an instantaneous e.i.r.p. of 116 dBW to be directed at a satellite and may at times track it. These radars are also pointed at zenith and off-zenith for lengthy periods to provide maintenance of the space object catalog and data for space debris analysis and mapping. Although there are no limits imposed on radars in the band 17.3-17.7 GHz, sharing between BSS feeder links and the RLS is currently feasible if the radiolocation service limits the e.i.r.p. towards the GSO to approximately 50 dBW. Emissions could be 66 dB higher toward a non-GSO satellite than toward the GSO.

3.1.4.4.2 Protection criteria

At WARC-92 and WRC-95, Nos. **S5.502**, **S5.503** and **S5.503A** were added to the Table of Frequency Allocations to facilitate compatibility between the existing applications in these services. It was agreed that any modifications to any of these footnotes in order to accommodate new technology, new requirements and applications of the FSS should consider the overall interference environment in the 13.75-14 GHz band and be undertaken with great care in order to avoid upsetting the delicate balance previously achieved between the services. The present operational constraints, that satisfy the protection criteria of current operational applications and technology in the band 13.75-14 GHz, are to be found in Nos. **S5.502** and **S5.503**.

The protection criteria of the space research links used are those included in Recommendation ITU-R SA.1155.

3.1.4.4.3 Methodologies used to assess the adequacy of the protection of non-GSO FSS, RLS, RNS and SRS

Regarding the impact of radiolocation transmissions on non-GSO FSS applications, the methodology used is similar to that given in Recommendation ITU-R S.1068, assuming the characteristics given in that Recommendation together with additional parameters provided by relevant ITU-R Study Groups. Extensive analyses were also performed on space science and non-GSO FSS systems compatibility based on the space research and F-SAT MULTI 1B characteristics.

3.1.4.4.4 Results of studies

These technical analyses have led to possible solutions which will maintain the present balance in the sharing conditions between radiolocation, space science and FSS, and accommodate non-GSO/FSS systems within the 13.75-14 GHz band.

With reference to No. **S5.502**, reduction or suppression of the minimum e.i.r.p. requirement for FSS earth stations coupled with appropriate regulatory measures to address the concerns of the radiolocation services, could achieve this objective. Under the current provisions, provided a radar observes the restriction put on its maximum e.i.r.p. averaged over 1 second, the FSS cannot claim protection from the radiolocation service regardless of the FSS earth station e.i.r.p. used.

Further analyis is needed to better define the interference environment of non-GSO FSS systems with regard to radiolocation emissions. In reviewing the radar characteristics provided in Recommendation ITU-R S.1068, clarification is needed on the possibility of extending the maximum e.i.r.p. averaged over one second from the GSO arc direction to the whole space.

In the case of footnote No. **S5.503** the present balance could be maintained through the addition of a maximum e.i.r.p. requirement of 51 dB(W/6 MHz) and a minimum antenna diameter of 4.5 m placed on the non-GSO FSS earth station in the band 13.772-13.778 GHz, combined with other appropriate regulatory provisions taking into consideration the overall interference environment in the 13.75-14 GHz band.

Other possibilities have been considered in order to assess how a relaxation of present operational constraints on the different services could be obtained and how more flexibility could be afforded to the different applications within the services. These possibilities require further studies within the

ITU-R. Information was given that future development of radars in this band may need a higher average e.i.r.p. limit, the impact of which would require a study. Some studies have been brought to the attention of the CPM about the sharing conditions between GSO FSS services and radiolocation in the band 13.75-14 GHz and between GSO FSS services and space research in the band 13.772-13.778 GHz. These studies related to the possible relaxation of the minimum antenna diameter of 4.5 m contained in footnote **S5.502**. Reconsideration of this limit requires further study within ITU-R.

In the band 17.3-17.7 GHz some analyses have been carried out on the basis of the radar characteristics available. Under the assumptions that there were few high power radars (maximum e.i.r.p. 116 dBW) and that the maximum pulse duration was 256 μs, it was found that a system like F-SAT MULTI 1B could handle such interference. Since these radars may at times track non-GSO space stations, more information needs to be made available on the operational characteristics of the high power radars in order to determine more accurately the impact of the radar on non-GSO FSS systems.

3.1.4.5 Regulatory and procedural considerations

3.1.4.5.1 Fixed service and non-GSO FSS systems

Resolution **131 (WRC-97)** invites ITU-R to study the appropriate pfd values to be applied to non-GSO networks in the bands 10.7-12.75 GHz and 17.7-19.3 GHz to ensure protection of the fixed service without unduly constraining the development of either type of network. Additionally, text is needed to reflect *resolves* 2 of Resolution **131 (WRC-97)** in Article **S.21**. Annex 4 provides an example of possible modifications of Article **S21**, Table **S21-4** including consideration of *resolves* 2 of Resolution **131 (WRC-97)**.

3.1.5 Identification and validation of software which could be used by the BR to check whether a system for which application for spectrum has been made would comply with the APFD and EPFD limits

The equivalent power flux-density (EPFD) limits apply to the sum of all emissions from the space stations (for $EPFD_{down}$ or $EPFD_{is}$) and earth stations (for $EPFD_{up}$) of a non-geostationary orbit (non-GSO) satellite system. Furthermore, the limits are specified for various percentages of time and as a function of GSO antenna characteristics. This complex combination precludes the use of a formula to determine compliance with the limits. Software can be used to accumulate the statistics of EPFD for any proposed non-GSO system and then compare these statistics with the limits and time percentages in the RR. Draft new Recommendation ITU-R BO.[Doc. 11/136] provides a functional description of the BR software, including sections on testing, documentation, and verification of the software. One or more candidate software programs that comply with this specification should be available for BR to evaluate prior to WRC-2000 and selection of software to be used for EPFD compliance testing should be approved at WRC-2000.

3.1.5.1 Summary of specification for the software

Draft new Recommendation ITU-R BO.[Doc. 11/136] provides the specification for the software which the BR/ITU would use to verify that a non-GSO network meets the $EPFD_{down}$/$EPFD_{up}$/$EPFD_{is}$ limits. This specification has been made available to administrations.

A software implementation that includes all the inputs, functions, and outputs described draft new Recommendation ITU-R BO.[Doc. 11/136] would enable BR to check compliance of any non-GSO system with the EPFD limits. Input parameters include the following:

- reference parameters (earth station and space station reference antenna radiation patterns, etc.);
- inputs from the appendix **S4** supplied by the administration for the non-GSO system;
- GSO earth station location test points.

The block diagram of the software algorithm is shown in Fig. 3-3. It consists of two sections: that of Initial Data and that of Calculation. The Initial Data Section contains the whole set of parameters relevant to the notified non-GSO satellite system, a set of reference GSO system parameters as well as $EPFD_{down}/EPFD_{up}/EPFD_{is}$ limits. The Calculation Section is designed for estimations required to examine notified non-GSO systems compliance with the $EPFD_{down}/EPFD_{up}/EPFD_{is}$ limits. The Calculation Section is based on a concept of a downlink pfd mask[2], an uplink e.i.r.p. mask[3], and an inter-satellite pfd mask[4].

A pfd/e.i.r.p. mask is calculated in Block 1 based on the notified non-GSO system parameters delivered from the Initial Data Section. Block 4 tests the aggregate interference produced by non-GSO network stations for meeting $EPFD_{down}/EPFD_{up}/EPFD_{is}$ limits. The verification in Block 4 is effected on the basis of the non-GSO system constellation characteristics from the Initial Data Section, a pfd/e.i.r.p. mask from Block 1 and output data from Block 3. The output data are verified for validity in Block 2.

Taking into account the significant complexity regarding specific features of different non-GSO system configurations in the software it would seem appropriate to impose some burden of responsibility relevant to testing for $EPFD_{down}/EPFD_{up}/EPFD_{is}$ limits on administrations notifying appropriate non-GSO systems. Therefore the examination procedure for meeting $EPFD_{down}/EPFD_{up}/EPFD_{is}$ limits would consist of two stages. The first stage would include the software development (Block 1) and conducting all the calculations by the administrations notifying non-GSO satellite systems. The stage would also include estimation of a mask for pfd/e.i.r.p. produced by interfering non-GSO network stations. The mask would account for all the features of specific non-GSO systems arrangements. The first stage would be finalized with delivering the pfd/e.i.r.p. mask in analytical or documented formats to the BR/ITU. Moreover the notifying administration would provide the BR/ITU with the software used in Block 1 for the pfd/e.i.r.p. mask estimation, the complete software description and parameters from Block "a": the information will also be available to other administrations.

The second stage calculations would be effected at the BR/ITU. The second stage would feature the following operations:

1) Definition of the maximum EPFD geometry of a GSO space station and an earth station of that network (Block 3). It would ensure verification of sharing feasibility for a notified non-GSO network with any GSO network in the FSS and BSS.
2) $EPFD_{down}/EPFD_{up}/EPFD_{is}$ statistics estimation (Block 4).
3) Software results verification for validity (Block 2).
4) Making a decision on interference compliance with $EPFD_{down}/EPFD_{up}/EPFD_{is}$ limits (Block 4).

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[2] A pfd mask is the maximum pfd produced by a non-GSO space station.

[3] An e.i.r.p. mask is the maximum e.i.r.p. radiated by a non-GSO earth station and is a function of the off-axis angle from the transmitting antenna main beam.

[4] This is the maximum e.i.r.p. radiated by a non-GSO space station and is a function of the off-axis angle from the transmitting antenna main beam.

The estimations are based on the non-GSO system parameters (Block "a") delivered by a notifying administration and the initial data (Block "b") available at the BR/ITU.

Any administration may use as required software that uses the algorithms defined in this document together with data on the non-GSO networks to estimate statistics for interference into its own GSO networks and check for compliance with $EPFD_{down}$/$EPFD_{up}$/$EPFD_{is}$ limits.

For checking compliance with these limits, BR will use certain increments and will test against the more fractionally severe value. For example, if the increment is 0.1 dB, where the $EPFD_{down}$ limit is -165.841 dB(W/(m^2.40 kHz)) the software will test against a criterion of -165.9 dB(W/(m^2.40 kHz)). The same rules should be applied when computing the $EPFD_{down}$ statistics.

3.1.5.2 Software validation process

Several administrations and other organizations are understood to be developing such software.

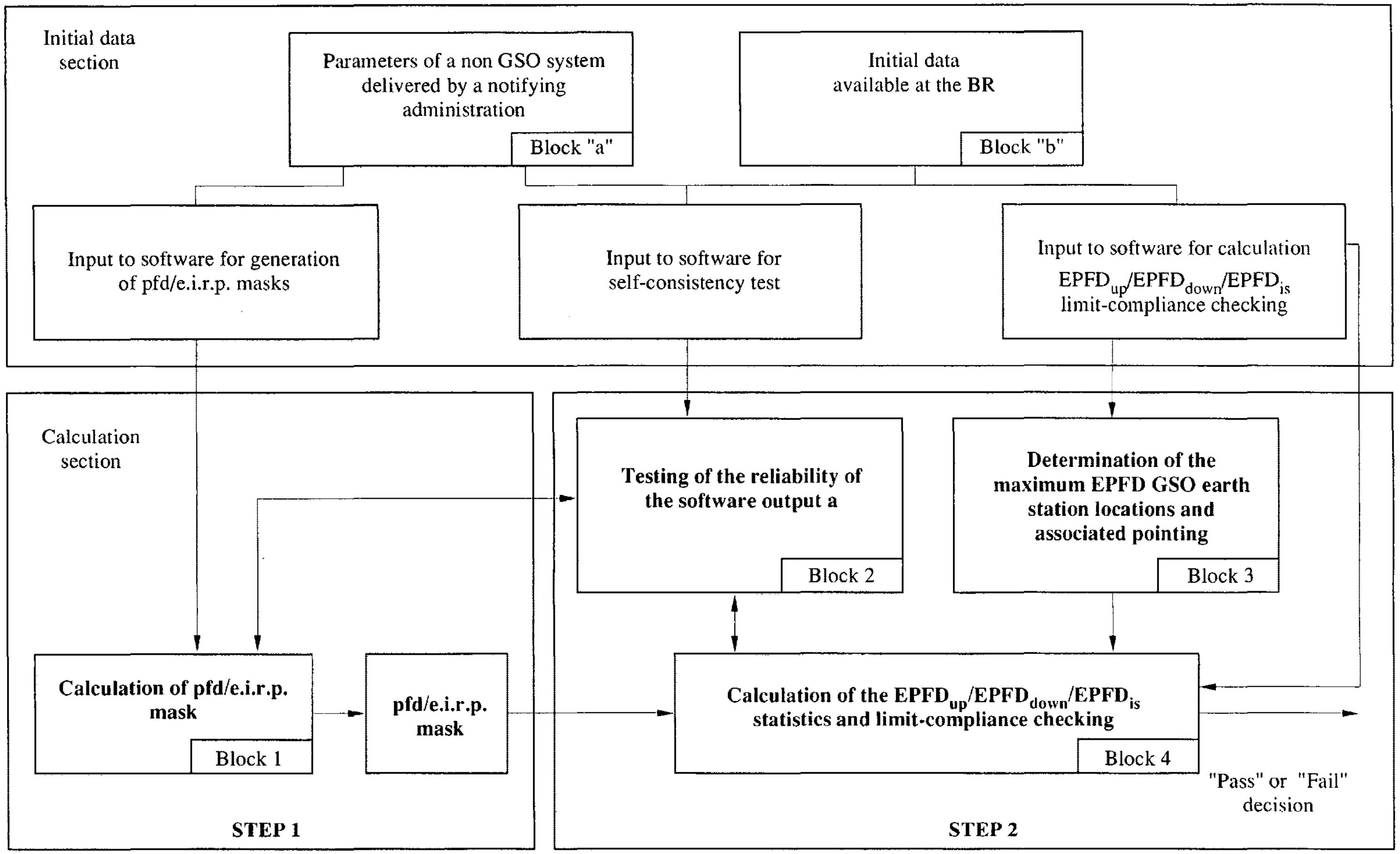
The candidate software shall be tested for accuracy using the guidelines stated in Annex 1 of draft new Recommendation ITU-R S.[Doc. 11/136]. The procedures given in draft new Recommendation ITU-R S.[11/136] shall be used for the validation of the candidate software.

In order to allow sufficient time for the BR to evaluate the candidate software and prepare its report, administrations have been requested to supply the candidate software to the BR by mid-January 2000.

3.1.5.3 Further work required

Upgrading of the software would be necessary to take account of decisions of future radio conferences.

FIGURE 3-3



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3.1.6 Regulatory procedures for the implementation of aggregate and operational limits

3.1.6.1 Aggregate limits

Section 3.1.1.3.2 identifies the need for a regulatory mechanism that would ensure protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where EPFD validation limits have been adopted. One possible mechanism for meeting this objective is a WRC-2000 Resolution that would take the form of the example draft Resolution (example Resolution **WWW**).

It was noted that Resolution **WWW** involves circumstances where several non-GSO administrations may need to jointly address interference concerns where it may be difficult for them to collectively resolve the problems in an expeditious manner. Furthermore, there is no recourse in the case of inability to reach agreement. An example procedure is included as section 1 in Annex 8 to this Chapter.

It is noted that in Steps 2) and 6) of section 1 in Annex 8, there are references to an [X] day period representing the requirement for "expeditious" resolution of an excess operational EPFD situation. The value of X is not yet agreed, but it should reflect the need for expeditious action, taking into account administrative and mailing delays.

Also, in section 1 in Annex 8, no conclusion was reached in the case of an administration failing to respond to BR request for cooperation. There needs to be further discussion on choosing the appropriate remedial measures, for the purpose of including such measures as Step 8) in the procedure. Some administrations were of the view that Step 8) could be replaced by the following: "In case the administration fails to respond to BR's request for information, BR shall commence with proceedings to cancel the entry of the relevant non-GSO network(s) from the Master Register". The view was also expressed that the procedures should be included in Article **S15**, or in a new stand-alone Article **[S15A]** or in a WRC Resolution. A further view was expressed that such procedures should be extended to any situation where permissible/accepted interference levels are exceeded or where the provisions of No. **S22.2** are not satisfied.

Administrations as well as BR are invited to review the practicability of the procedure outlined.

3.1.6.2 Operational limits

Section 3.1.2.4.7 defines "Operational Limits" to the $EPFD_{down}$ by non-GSO systems in certain frequency bands. This section also notes that additional regulatory work to develop a procedure based on this concept may be needed. In order to implement the operational limit concept, a procedure is needed which: i) identifies non-GSO systems exceeding the operational limits; and ii) ensures immediate reduction of the interference level to the operational limits by any non-GSO system exceeding those limits. It may be appropriate for this procedure to include the possibility of arriving at an alternative permanent solution acceptable to both parties. An example procedure is given in section 2 to Annex 8 to this Chapter.

Also, no conclusion was reached in the case of an administration failing to respond to BR request for cooperation. There needs to be further discussion on choosing the appropriate remedial measures, for the purpose of including such measures as Step 7) in the procedure in section 2 to Annex 8. Some administrations were of the view that Step 7) could be replaced by the following: "In case the administration fails to respond to BR's request for information, BR shall commence with proceedings to cancel the entry of the relevant non-GSO network(s) from the Master Register". The view was also expressed that the procedures should be included in Article **S15**, or in a new stand-alone Article [S15A] or in a WRC Resolution. A further view was expressed that such procedures should be extended to any situation where permissible/accepted interference levels are exceeded or where the provisions of No. **S22.2** are not satisfied.

Administrations as well as BR are invited to review the practicability of the procedure outlined.

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3.2 Agenda item 1.13.2

"to consider the inclusion in other frequency bands of similar limits in Articles **S21** and **S22**, or other regulatory approaches to be applied in relation to sharing situations"

3.2.1 Sharing considerations between non-GSO FSS and GSO BSS receive earth stations in the 17.3-17.8 GHz band

Resolution **538 (WRC-97)** introduced provisional EPFD and $EPFD_{up}$ limits for non-GSO FSS systems in certain bands intended to protect GSO BSS systems. Resolution **538 (WRC-97)** did not designate use of the 17.3-17.8 GHz band in Region 2 by non-GSO FSS, stating that such use required further study as to the feasibility of non-GSO FSS to share with the allocated BSS service in this band. The ITU-R considered the sharing situations identified in Resolution **538 (WRC-97)**.

Regarding sharing between transmit GSO BSS space stations and receive non-GSO FSS space stations, it was concluded that there would be no need for specific provisions since the sharing situation would be similar to that existing between GSO FSS transmit space stations and non-GSO FSS receive space stations in the adjacent band 17.8-18.4 GHz.

Regarding the feasibility of sharing between transmitting non-GSO FSS earth stations and ubiquitous BSS receive earth stations in the 17.3-17.8 GHz band, it was noted that this situation would require coordination, using the existing provisions under **S9.17A**, between the administrations on the territories of which the non-GSO FSS transmitting earth stations and BSS receive earth stations are located. It was also noted that the frequency band 17.7-17.8 GHz is also allocated to the fixed-satellite service (space-to-Earth).

It was concluded that sharing is not feasible between ubiquitous non-GSO FSS user terminals and ubiquitous BSS receive terminals located in the same geographical area.

Regarding non-GSO gateway operation, the studies reported to the ITU-R concluded that the coordination distance with BSS receive terminals would be the default value of 100 km. This means that coordination would have to take place between administrations when the distance between a non-GSO gateway and the territory of another administration intending to deploy BSS receive terminals is smaller than 100 km. During this coordination the separation distances required to avoid unacceptable interference would be assessed.

One study determined the separation distance to be between 15.8 and 93.9 km for non-GSO FSS gateways for the particular system studied (F-SAT MULTI 1B).

It was based on:

- A steady state long-term protection criterion of I/N = -18 dB. This value was selected to provide sufficient protection of the GSO BSS from non-GSO FSS when the interfering source is not time varying.
- A 2.5 m non-GSO gateway antenna with a minimum 10° elevation angle.

- Use of both a worst-case and best-case relative azimuth angle between the source and victim antennas, bounding the time varying nature of the interference.
- A free space loss propagation model.

Further analysis was performed based on ITU-R agreed protection criteria developed for sharing between GSO BSS and non-GSO FSS downlinks again assuming the non-GSO FSS earth station operates at 10° minimum elevation angle. The I/N value used in the calculations corresponds to an increase in unavailability of the BSS link of 2.86% (10% ÷ 3.5 effective non-GSO FSS systems).

Using this long-term criteria, this study calculated a separation distance of 65 km. It was noted that the acceptable interference level used was derived assuming the wanted and interfering signals were equally faded. In actual practice, the BSS signal can be faded while the gateway interference may not be faded. This will lead to the need for larger separation distances.

Another study to assess the required separation distance considered the same non-GSO FSS system (F-SAT MULTI 1B) and was based on:

- the statistical method included in the draft new Recommendation ITU-R S.[Doc. 4/60] that is being considered for possible inclusion in Appendix **S7** to deal with non-GSO FSS earth station interference; and
- the I/N criterion of 8 dB not to be exceeded for more than 0.003% of the time. This I/N is 1.3 dB less conservative than the upper bound I/N range of the current preliminary criteria to calculate the coordination contour.

This study concluded that, for a 0° horizon elevation around a non-GSO FSS gateway, the separation distances for the gateways of this particular system are typically 20 km, ranging from 1 km to 45 km, depending on the azimuths considered around the gateway. It also showed that, for a particular case assuming a 1° horizon elevation around the gateway in every direction (i.e. 20 m horizon height at a 1 km distance), this separation distance would fall to 1 km in all directions.

The difference in the results of the above studies are due to the difference in BSS criteria, propagation models and methodologies used. These criteria and methodologies used for separation distance calculation, are provisional pending the adoption of final criteria and methodologies within ITU-R.

One result from these studies is that in order to avoid interference from non-GSO gateway terminals within or near a BSS service area, some separation distance is required between the gateway terminal and ubiquitously deployed BSS receive terminals. BSS user terminals located closer to the non-GSO gateway terminal than the required separation distance would not receive unconstrained interference-free service. These terminals would require special treatment on an installation-by-installation basis to ensure service to all BSS users.[5]

Views were expressed that, since the BSS, by definition, is intended for general reception by the public and therefore dependent on the ability to ubiquitously deploy receive earth stations, reception within the BSS service area should not be limited or restricted, therefore non-GSO FSS use of the 17.3-17.8 GHz band in Region 2 would not be feasible.

[5] BSS receive terminals that will operate in the 17.3-17.8 GHz band may have to share the band with Appendix **S30A** BSS feeder-link earth stations depending upon the implementation of BSS in the 17 GHz band by each Region 2 administration. The BSS feeder links are quite limited in number, operate towards relatively fixed positions in space, and typically not towards the horizon. The band 17.7-17.8 GHz is also allocated to the FSS (s-E) and the FS.

Several views were also expressed that, given that the number of non-GSO FSS gateways proposed in this band would not be large, and given the small separation distances shown in the second study, the use of non-GSO FSS gateway transmit earth stations in this band would be feasible without undue constraints on the development of GSO BSS.

3.2.2 Frequency band 17.3-17.8 GHz

The question was raised as to whether the 17.3-17.8 GHz band was allocated for use by the non-GSO FSS in Region 2 at WRC-97. Reference was made to footnote **S5.516** which states:

S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2 by non-geostationary-satellite systems in the fixed-satellite service is subject to the provisions of Resolution **538 (WRC-97)**.

Some administrations consider that it was not the intent of WRC-97 to make this band available for the non-GSO FSS (uplink) in Region 2 and that this allocation is not effected by the footnote.

Other administrations consider the footnote to mean that an allocation is available in this band for non-GSO FSS (uplink) use and that only further sharing studies are required.

The question was submitted by one administration to the RRB requesting the Board to prepare a Rule of Procedure stating that the band 17.3-17.8 GHz is not allocated to the non-GSO FSS (uplink) in Region 2. At the Board's 18th meeting 8-12 November 1999 the Board considered this matter and concluded that "***... a Rule of Procedure was not necessary in this case***". Presumably it is being left to WRC-2000 to take any action that is deemed necessary on this matter.

Should WRC-2000 decide that the band 17.3-17.8 GHz is allocated to non-GSO FSS (uplink) in Region 2 it is proposed that the -160 dB(W/(m^2.40 kHz)) $EPFD_{up}$ limit should also be applicable to the frequency band 17.3-17.8 GHz (Region 2) in order to protect BSS feeder links from non-GSO FSS (uplinks) in Region 2 (see also 3.1.3.1.4).

It was recognized that there is currently an allocation to BSS in Region 2 in the frequency band 17.3-17.8 GHz, allocation entering into effect on 1 April 2007 (No. **S5.517**). If power limits were to be used for sharing between non-GSO BSS systems in Region 2 and GSO BSS feeder links, the single entry $EPFD_{is}$ applicable to the frequency band 17.8-18.1 GHz (-160 dB(W/m^2·40 kHz) would be appropriate in the frequency band 17.3-18.1 GHz.

3.2.3 18.1-18.4 GHz band

The ITU-R examined the possibility of applying $EPFD_{up}$ limits in the band 18.1-18.4 GHz, intended to protect GSO BSS feeder links in this band from interference caused by non-GSO FSS systems operating in the Earth-to-space direction.

It was noted that the sharing and regulatory situations in the 17.8-18.1 GHz band and in the 18.1-18.4 GHz band currently differ only on the following aspects:

- In the 17.8-18.1 GHz band, sharing between BSS feeder links and non-GSO FSS (Earth-to-space) is effected by the $EPFD_{up}$ limits which have been reviewed ITU-R.
- In the 18.1-18.4 GHz band, sharing between BSS feeder links and non-GSO FSS (Earth-to-space) is effected by the application of No. **S22.2**.

As No. **S5.520** currently restricts the use of this band by FSS (Earth-to-space) to BSS feeder links, the use of this band by non-GSO FSS (Earth-to-space) other than BSS feeder links would therefore require a modification to this footnote.

It was also concluded that there would be a need to include $EPFD_{up}$ limits in Article **S22** to protect GSO BSS feeder links in this band, if WRC-2000 decides that this band may be used by non-GSO FSS Earth-to-space other than BSS feeder links. The level considered appropriate for these limits to protect GSO BSS feeder links is that proposed by in Annex 1 for the $EPFD_{up}$ limits in the adjacent band (17.8-18.1 GHz) and for $EPFD_{is}$ limits in the 18.1-18.4 GHz band.

The ITU-R also noted that no regulatory approaches other than the power limits approach were studied or proposed for this band. Regulatory approaches other than power limits may also be considered.

Concerns were raised about the impact of coordination distances required between non-GSO FSS transmitting earth stations and receiving FSS earth stations on the ability to ubiquitously deploy receiving terminals in the FSS in this band. It was noted however, that the selection of either type of service in a particular country is a matter of national decisions. In the case of non-GSO FSS transmitting gateways, coexistence with other FSS receiving terminals in neighbouring countries could be ensured through bilateral coordination, when necessary.

With regard to the fixed service, studies have been undertaken to evaluate the interference from fixed service systems into non-GSO FSS space stations in the 18.1-18.4 GHz band, where the two services are allocated on a co-primary basis. The studies were based on the characteristics of typical FS point-to-point systems and on the characteristics of the space stations of the F-SAT MULTI 1B non-GSO FSS system. The study concluded that, even under pessimistic assumptions, the interference from FS systems into non-GSO FSS (Earth-to-space) in the 18.1-18.4 GHz frequency range would be acceptable. However, the ITU-R notes that studies on the potential interference to FS receiving stations from non-GSO FSS transmitters have not been completed. . Therefore, the possible introduction of limits in the 18.1-18.4 GHz band would be considered after these studies have been completed.

3.2.4 Frequency outside of range 10-30 GHz

When it adopted Resolution **130 (WRC-97)** and the provisional limits that would apply to non-GSO FSS systems in certain bands between 10 and 30 GHz, WRC-97 determined that for these specific bands, non-GSO systems in the FSS should bear more of the burden of accommodating sharing than should co-frequency GSO FSS systems. WRC-97 did not decide how to assign sharing burdens between GSO and non-GSO systems in any FSS bands above 30 GHz or below 10 GHz, but instead requested that the ITU-R "undertake the development of power limits or other frequency sharing mechanisms" - at least in such bands where non-GSO FSS systems are likely to be implemented and GSO systems are used or expected to be used extensively. This direction is consistent with § 4.3.7.2 of the CPM-97 Report, which recognized that a power limits approach of the type that is now reflected in Resolution **130 (WRC-97)** "is not suited for sharing situations where more burden would be placed on the GSO FSS systems or the burden would be equally shared between the GSO and non-GSO ... systems," and that the "establishment of e.i.r.p. and pfd limits may not be a suitable approach for all types of non-GSO ... networks in every FSS band."
There are fundamental differences between the situation in the 10-30 GHz FSS bands identified in Resolution **130 (WRC-97)** where a non-GSO FSS service concept is being overlaid upon an existing and/or imminent GSO FSS service and other bands where both GSO and non-GSO FSS systems are just now beginning to emerge. In these 10-30 GHz bands, there is extensive deployment or long-standing development of GSO systems and GSO operators have limited or no flexibility to

adjust to the introduction of non-GSO systems. In these bands, non-GSO systems must thus bear most or all of the burden of implementing technical criteria to protect the GSO arc. In bands where there has been little or no deployment of satellite systems to date and satellite networks (GSO and non-GSO alike) have only recently begun to be communicated to ITU-R, the absence of current and imminent use by GSO and non-GSO FSS systems means that both types of operators should expect to exhibit greater flexibility in achieving the appropriate balance among the competing technical, regulatory and policy considerations that will affect their sharing environment.

Technical studies of interference mitigation techniques that may be employed by non-GSO and/or GSO FSS operators in bands outside 10-30 GHz to enable co-frequency sharing are under way in ITU-R. Simulation results on a planned non-GSO FSS system in the 40-50 GHz band were provided, analysing the impact of two mitigation techniques. The first set of results assumed polarization discrimination between the GSO and the non-GSO systems. To use this mitigation technique, the non-GSO system has to be on the opposite polarization from every GSO system with which it will have in-line events. The second set of results assumes that the GSO satellite can also use satellite diversity as an interference mitigation technique. This technique would improve the GSO link availability and increase the system capacity because the propagation impairments at these frequency bands are severe. Both techniques proved to be efficient in mitigating the mainbeam-to-mainbeam interference that can appear between non-GSO and GSO systems operating co-frequency in these bands. However, both would constrain the GSO FSS to either use only one polarization or to double the number of satellites required.

Although the techniques examined in bands outside 10-30 GHz offer promise in mitigating the mainbeam-to-mainbeam interference that can appear between co-frequency non-GSO and GSO systems, further work needs to be done on these potential mitigation techniques and other approaches and refinements that have yet to be addressed within ITU-R. Matters that remain to be addressed in these bands include whether there would be coordination between non-GSO and GSO systems, the appropriateness of retaining No. **S22.2**, the impact of other co-frequency services in a particular band on the GSO/non-GSO sharing situation and the impact of any regulatory approach for GSO and non-GSO sharing on innovation in all services in a particular band.

As a result, ITU-R is not in a position to make a final recommendation on whether power limits on the non-GSO FSS operator or some other frequency sharing mechanism or combination of mechanisms should be imposed to facilitate GSO/non-GSO FSS sharing in any FSS band outside the 10-30 GHz range. There is no technical basis at this time for extending to FSS bands above 30 GHz and below 10 GHz either the regulatory scheme that is established in Resolution **130 (WRC-97)** for certain FSS bands between 10 and 30 GHz or any other regulatory/procedural approach (e.g. Resolution **46 (Rev. WRC-97)/S9.11A**). The regulatory scheme in Resolutions **130 (WRC-97)** and **538 (WRC-97)** reflects the particular circumstances at 10-30 GHz and is inappropriate for application by default to the very different circumstances that exist in the FSS bands above 30 GHz and in certain of the FSS bands below 10 GHz.

Regarding the possible introduction of limits in bands outside of the range 10-30 GHz, insufficient proposals have been received by the ITU-R Study Groups to allow the introduction of limits or alternative regulatory approaches in other bands.

3.2.5 Other regulatory approaches

A number of studies considered by ITU-R presented the per-satellite pfd approach as an approach to enable sharing between GSO and non-GSO FSS systems. However, there is concern that the current form of per-satellite pfd limits would unacceptably constrain the design flexibility of non-GSO FSS systems. Further study is required before this per-satellite pfd approach may be considered to be a viable regulatory option.

ANNEX 1 TO CHAPTER 3

Example of possible modifications to Section II of Article S22

ARTICLE S22

Space services[1]

Section II – Control of interference to geostationary-satellite systems

NOC S22.2 to S22.5A

SUP S22.5B

Existing texts from **S22.5C** to **S22.5G**, including **S22.5C.1** and **S22.5D.1,** are proposed to be replaced by the provisions below as modified from the draft CPM text.

MOD S22.5~~C~~B § 5 1) The equivalent power flux-density[2], $EPFD_{down}$ at any point on the Earth's surface visible from the geostationary-satellite orbit, produced

[1] **A.S22.1** In applying the provisions of this Article, the level of accepted interference (see No. **S1.168**) shall be fixed by agreement between the administrations concerned, using the relevant ITU-R Recommendations as a guide.

[2] **S22.5~~C~~B.1, C.1, D.1** The equivalent power flux-density is defined as the sum of the power flux-densities produced at a GSO receive station~~point~~ on the Earth's surface or in the geostationary orbit, as appropriate, by all the transmit ~~space~~ stations within a non-geostationary-satellite system, taking into account the off-axis discrimination of a reference receiving antenna assumed to be pointing ~~towards the geostationary-satellite orbit~~in its nominal direction. The equivalent power flux-density is calculated using the following formula:

$$\cancel{epfd = 10 \cdot \log_{10}\left[\sum_{i=1}^{N_s} 10^{pfd_i/10} \cdot \frac{G_r(\theta_i)}{G_{max}}\right]}$$

$$EPFD = 10 \cdot \log_{10}\left[\sum_{i=1}^{N_a} 10^{\frac{P_i}{10}} . \frac{G_t(\theta_i)}{4.\pi d_i^2} . \frac{G_r(\phi_i)}{G_{r,\max}}\right]$$

where:

N_a is the number of transmit stations in the non-geostationary-satellite system that are visible from the GSO receive station considered on the Earth's surface or in the geostationary orbit, as appropriate;

i is the index of the transmit station considered in the non-geostationary-satellite system;

by emissions from all the space stations of a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Tables ~~S22-1,~~ S22-1A to S22-1D, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the limits given in Tables ~~S22-1~~ S22-1A to S22-1D for the given percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions, into a reference antenna and in the reference bandwidth specified in Tables ~~S22-1~~ S22-1A to S22-1D, for all pointing directions towards the geostationary-satellite orbit. ~~(WRC-97)~~

P_i is the RF power at the input of the antenna of the transmit station, considered in the non-geostationary satellite system in dBW in the reference bandwidth;

θ_i is the off-axis angle between the boresight of the transmit station considered in the non-geostationary satellite system and the direction of the GSO receive station;

$G_t(\theta_i)$ is the transmit antenna gain (as a ratio) of the station considered in the non-geostationary satellite system in the direction of the GSO receive station;

d_i is the distance in metres between the transmit station considered in the non-geostationary satellite system and the GSO receive station;

ϕ_i is the off-axis angle between the boresight of the antenna of the GSO receive station and the direction of the ith transmit station considered in the non-geostationary satellite system;

$G_r(\phi_i)$ is the receive antenna gain (as a ratio) of the GSO receive station in the direction of the ith transmit station considered in the non-geostationary satellite system;

$G_{r,max}$ is the maximum gain (as a ratio) of the antenna of the GSO receive station;

$EPFD$ is the computed equivalent power flux-density in dB(W/m^2) in the reference bandwidth.

~~N_s: number of non-geostationary space stations visible from the point considered at the Earth's surface, within an elevation angle greater than or equal to 0°;~~

~~i: index of the non-geostationary space station considered;~~

~~pfd_i: power flux-density produced at the point considered on the Earth's surface in dB(W/m^2) in the reference bandwidth;~~

~~θ_i: angle between the direction considered towards the geostationary-satellite orbit and the direction of the interfering space station in the non-geostationary-satellite system;~~

~~$G_r(\theta_i)$: gain (as a ratio) of the receive reference antenna to be considered as part of a geostationary-satellite network;~~

~~G_{max}: maximum gain (as a ratio) of the above receive reference antenna;~~

~~$epfd$: computed equivalent power flux-density in dB(W/m^2) in the reference bandwidth.~~

~~TABLE S22-1 (WRC-97)~~

~~Frequency band allocated to the broadcasting-satellite service~~	~~Antenna diameter (cm)~~	~~Equivalent pfd level (dB(W/m²/4 kHz)) which may not be exceeded during the percentage of time shown~~		~~Reference antenna radiation pattern~~
		~~99.7%~~	~~100%~~	
~~11.7-12.5 GHz in Region 1, 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3~~	~~30~~ ~~60~~ ~~90~~	~~−172.3~~ ~~−183.3~~ ~~−186.8~~	~~−169.3~~ ~~−170.3~~ ~~−170.3~~	~~Recommendation ITU-R BO.1213~~
~~12.2-12.7 GHz in Region 2~~	~~45~~ ~~100~~ ~~120~~ ~~180~~	~~−174.3~~ ~~−186.3~~ ~~−187.9~~ ~~−191.4~~	~~−165.3~~ ~~−170.3~~ ~~−170.3~~ ~~−170.3~~	~~§ 3.7.2 of Annex 5 of Appendix **S30**~~
~~17.3-17.8 GHz in Region 2~~	~~For further study*~~			

~~* The interference from non-geostationary fixed-satellite service (non-GSO FSS) systems into geostationary broadcasting-satellite service (GSO BSS) systems operating in the frequency bands 17.3-17.8 GHz relates to the two following sharing situations:~~

~~– non-GSO FSS transmit earth station into GSO receive earth station;~~

~~– GSO BSS transmit space station into non-GSO FSS receive space stations.~~

~~Both situations need to be studied, in particular since coexistence of receive BSS earth stations and large numbers of transmit non-GSO FSS terminals would not be feasible within the same country~~

MOD

TABLE ~~S22-1~~S22-1A[1,3]

Limits to the EPFD$_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	~~Equivalent pfd~~EPFD$_{down}$ dB(W/m^2)	Percentage of time during which ~~equivalent pfd~~EPFD$_{down}$ level may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[2]
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3	–175.4	0	40	60 cm Recommendation S. ~~{~~(4/57)~~}~~
	–174.0	90		
	–170.8	99		
	–165.3	99.73		
	–160.4	99.991		
	–160.0	99.997		
	–160.0	100		
	–181.9	0	40	1.2 m Recommendation S. ~~{~~(4/57)~~}~~
	–178.4	99.5		
	–173.4	99.74		
	–173.0	99.857		
	–164.0	99.954		
	–161.6	99.984		
	–161.4	99.991		
	–160.8	99.997		
	–160.5	99.997		
	–160.0	99.9993		
	–160.0	100		
	–190.45	0.00	40	3 m Recommendation S.~~{~~(4/57)~~}~~
	–189.45	90.00		
	–187.45	99.50		
	–182.4	99.70		
	–182	99.855		
	–168	99.971		
	–164	99.988		
	–162	99.995		
	–160	99.999		
	–160	100.000		

	−195.45 −195.45 −190.00 −190 −172.5 −160 −160	0.00 99.00 99.65 99.71 99.99 99.998 100.000	40	10 m Recommendation S.~~[~~(4/57)~~]~~

1 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

2 Under this Section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS ~~and BSS~~ systems.

~~* No agreement could be reached on EPFD$_{down}$ values for protection of the 3 m and 10 m GSO FSS antennas. See § 3.1.4.1.4.2 a) of the text.~~

3 In addition to the limits shown in this table~~FSS single-entry masks above~~, the ~~a second single-entry~~ EPFD$_{down}$ limits in Table **S22-1A'** apply to all antenna sizes greater than 60cm in the frequency bands listed in this table.~~-was identified~~:

TABLE S22-1A'

Limits to the EPFD$_{down}$ radiated by non-GSO FSS systems at certain latitudes

100% of the time EPFD$_{down}$ dB(W/(m^2 ~~/~~ 40 kHz))	**Latitude (North or South) (°)**
-160	0 < |Latitude| ~~<~~≤ 57.5
-160 + 3.4~~8~~(57.5 - ~~ABS(~~|Latitude|~~)~~)/4~~5~~	57.5 < |Latitude| ~~<~~≤ ~~62.5~~63.75
-165.3~~TBD~~	~~62.5~~63.75 ~~<~~≤ |Latitude|

MOD

TABLE ~~S22-1~~S22-1B[1]

Limits to the $EPFD_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$EPFD_{down}$ dB(W/m²)	Percentage of time during which ~~equivalent pfd~~$EPFD_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference pattern[2]
17.8-18.6	−164 −164 −167 −172.5 −175.4 −175.4	100 99.971 99.714 99 90 0	40[3]	1 m Recommendation S.~~[~~(4/57)~~]~~
	−150 −150 −153 −158.5 −161.4 −161.4	100 99.971 99.714 99 90 0	1000	
17.8-18.6	−164 −164 −166 −170.5 −171.4 −178.4 −178.4	100 99.977 99.971 99.913 99.9 99.4 0	40[3]	2 m Recommendation S.~~[~~(4/57)~~]~~
	−150 −150 −152 −156.5 −157.4 −164.4 −164.4	100 99.977 99.971 99.913 99.9 99.4 0	1 000	
17.8-18.6	−164 −164 −172 −180 −180 −185.4 −185.4	100 99.998 99.943 99.943 99.8 99.8 0	40[3]	5 m Recommendation S.~~[~~(4/57)~~]~~
	−150 −150 −158 −166 −166 −171.4 −171.4	100 99.998 99.943 99.943 99.8 99.8 0	1 000	

[1] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[2] Under this Section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS~~ and BSS~~ systems.

~~[3] For non-GSO emission bandwidths greater than 40 kHz, the EPFD$_{down}$ limits may be scaled by adding 10 log(non-GSO emission bandwidth/40 kHz) in a reference bandwidth equal to the emission bandwidth.~~

MOD

TABLE ~~S22-1~~S22-1C[1]

Limits to the EPFD$_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	EPFD$_{down}$ dB(W/m^2)	Percentage of time during which ~~equivalent pfd~~EPFD$_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference pattern[2]
19.7-20.2	–154 –154 –172 –182 –187.4	100 99.983 97.143 71.429 0	40[3]	70 cm Recommendation S.~~[~~(4/57)~~]~~
	–140 –140 –158 –168 –173.4	100 99.983 97.143 71.429 0	1 000	
19.7-20.2	–154 –154 –160 –165 –168.6 –170.4 –181.4 –190.4	100 99.997 99.943 99.943 99.8 99.8 91 0	40[3]	90 cm Recommendation S.~~[~~(4/57)~~]~~
	–140 –140 –146 –151 –154.6 –156.4 –167.4 –176.4	100 99.997 99.943 99.943 99.8 99.8 91 0	1 000	
19.7-20.2	–154~~.35~~ –154~~.35~~ –162 –196.4	100 99.99943 ~~9971~~ 99.98 0	40[3]	2.5 m Recommendation S.~~[~~(4/57)~~]~~ ~~see Note 4~~
	–140 –140 –148 –182.4	100 99.99943 99.98 0	1 000	

19.7-20.2	−154.~~35~~ −154 −154.6~~35~~ −164.2~~163.5~~ −175 −184 −187.8~~9~~ −189.4 ~~−195~~ −200.4	100 99.9992 99.999 99.99 99.886 97.143 94~~92~~ 90 ~~66~~ 0	40[3]	5 m Recommendation S.~~[~~(4/57)~~]~~ ~~see Note 4~~
	−140 −140 −140.6 −150.2 −161 −170 −173.8 −175.4 −186.4	100 99.9992 99.999 99.99 99.886 97.143 94 90 0	1 000	

[1] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

2 Under this Section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS~~-and BSS~~ systems.

~~[3] For non-GSO emission bandwidths greater than 40 kHz, the EPFD$_{down}$ limits may be scaled by adding 10 log(non-GSO emission bandwidth/40 kHz) in a reference bandwidth equal to the emission bandwidth.~~

~~[4] The masks for the 2.5m and 5m antennas have not been agreed. Further adjustments to these masks are required.~~

Examples of possible modifications to Section II of Article S22

TABLE **S22-1D**[2]

Limits to the $EPFD_{down}$ radiated by non-GSO FSS systems in certain frequency bands 30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm and 300 cm BSS antennas

Frequency band (GHz)	$EPFD_{down}$ dB(W/m^2)	Percentage of time during which $EPFD_{down}$ level may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[1]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	−165.841 −165.541 −164.041 −158.600 −158.600 −158.330 −158.330	0.000 25.000 96.000 98.857 99.429 99.429 100.000	40	30 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	−175.441 −172.441 −169.441 −164.000 −160.750 −160.000 −160.000	0.000 66.000 97.750 99.357 99.809 99.986 100.000	40	45 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	−176.441 −173.191 −167.750 −162.000 −161.000 −160.200 −160.000 −160.000	0.000 97.800 99.371 99.886 99.943 99.971 99.997 100.000	40	60 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]

11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	−178.94	0.000	40	90 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	−178.44	33.000		
	−176.44	98.000		
	−171.00	99.429		
	−165.50	99.714		
	−163.00	99.857		
	−161.00	99.943		
	−160.00	99.991		
	−160.00	100.000		
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	−182.440	0.000	40	120 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	−180.690	90.000		
	−179.190	98.900		
	−178.440	98.900		
	−174.940	99.500		
	−173.750	99.680		
	−173.000	99.680		
	−169.500	99.850		
	−167.800	99.915		
	−164.000	99.940		
	−161.900	99.970		
	−161.000	99.990		
	−160.400	99.998		
	−160.000	100		
11.7-12.5 GHz in Region 1 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3 12.2-12.7 GHz in Region 2	−184.941	0.000	40	180 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	−184.101	33.000		
	−181.691	98.500		
	−176.250	99.571		
	−163.250	99.946		
	−161.500	99.974		
	−160.350	99.993		
	−160.000	99.999		
	−160.000	100.000		

11.7-12.5 GHz in Region 1 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3 12.2-12.7 GHz in Region 2	−187.441	0.000	40	240 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	−186.341	33.000		
	−183.441	99.250		
	−178.000	99.786		
	−164.400	99.957		
	−161.900	99.983		
	−160.500	99.994		
	−160.000	99.999		
	−160.000	100.000		
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	−191.941	0.000	40	300 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	−189.441	33.000		
	−185.941	99.500		
	−180.500	99.857		
	−173.000	99.914		
	−167.000	99.951		
	−162.000	99.983		
	−160.000	99.991		
	−160.000	100.000		

[1] Under this Section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO~~ FSS and~~ BSS systems.

[2] For BSS antenna diameters 180 cm, 240 cm and 300 cm, in addition to the single-entry limits shown in Table **S22-1D**, the following single-entry 100% of the time $EPFD_{down}$ limit also applies in the frequency band listed in Table **S22-1D**:

100% of the time $EPFD_{down}$ dB(W/(m^2 · 40 kHz))	**Latitude (North or South) (°)**
-160.0	$0 \leq \lvert latitude \rvert \leq 57.5$
-160.0 + 3.4 * (57.5 – $\lvert latitude \rvert$)/4	$57.5 \leq \lvert latitude \rvert \leq 63.75$
-165.3	$63.75 \leq \lvert latitude \rvert$

For BSS antenna diameter 240 cm, in addition to the above single-entry 100% of the time $EPFD_{down}$ limit, a -167 dB(W/(m^2 · 40 kHz)) single-entry 100% of the time operational $EPFD_{down}$ limit also applies to receive antennas located in Region 2, west of 140° W, north of 60° N, pointing toward

GSO BSS satellites at 91° W, 101° W, 110° W, 119° W and 148° W with elevation angles greater than 5°. [This limit is implemented during a transition period of [15] years.]*

MOD **S22.5~~D~~C** 2) The ~~aggregate~~equivalent power flux-density~~[2]~~[3], $EPFD_{up}$, produced at any point in the geostationary-satellite orbit by emissions from all the earth stations in a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Table S22-2, for all conditions and for all methods of modulation, shall not exceed the limits given in Table **S22-2** for the specified percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions, into a reference antenna and in the reference bandwidth specified

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* This transitional regime would be applicable only if the pfd limits in section 5c of Annex 1 to Appendix **S30** are sufficiently relaxed.

~~[3] **S22.5D.1** The aggregate power flux-density is defined as the sum of the power flux-densities produced at a point in the geostationary-satellite orbit by all the earth stations of a non-geostationary-satellite system. The aggregate power flux-density is computed by means of the following formula:~~

$$\cancel{apfd = 10 \cdot \log_{10} \left[\sum_{i=1}^{N_e} 10^{P_i/10} \cdot \frac{G_t(\theta_i)}{4 \pi d_i^2} \right]}$$

~~where:~~

~~N_e: number of earth stations in the non-geostationary-satellite system with an elevation angle greater than or equal to 0°, from which the point considered in the geostationary-satellite orbit is visible;~~

~~i: index of the earth station considered in the non-geostationary-satellite system;~~

~~P_i: RF power at the input of the transmitting antenna of the earth station considered in the non-geostationary-satellite system in dBW in the reference bandwidth;~~

~~θ_i: off-axis angle between the boresight of the earth station considered in the non-geostationary-satellite system and the direction of the point considered in the geostationary-satellite orbit;~~

~~$G_t(\theta_i)$: transmit antenna gain (as a ratio) of the earth station considered in the non-geostationary-satellite system in the direction of the point considered in the geostationary-satellite orbit;~~

~~d_i: distance in metres between the earth station considered in the non-geostationary-satellite system and the point considered in the geostationary-satellite orbit;~~

~~$apfd$: aggregate power flux-density in dB(W/m^2) in the reference bandwidth.~~

~~NOTE – Tables **S22-1** to **S22-4** and Nos. **S22.26** to **S22.29** contain provisional limits corresponding to an interference level caused by one non-geostationary fixed-satellite service system in the frequency bands to be applied in accordance with Resolutions **130 (WRC-97)** and **538 (WRC-97)**. These provisional limits are subject to review by ITU-R and are subject to confirmation by WRC-99. (WRC-97)~~

in Table **S22-2**, for all pointing directions towards the Earth's surface visible from any given location in the geostationary-satellite orbit.~~(WRC-97)~~

~~TABLE S22-2 (WRC-97)~~

~~Frequency band (GHz)~~	~~Aggregate pfd dB(W/m²/4 kHz)~~	~~Percentage of time during which aggregate pfd level may not be exceeded~~
~~17.3-18.1 in Regions 1 and 3 and 17.8-18.1 in Region 2~~	~~−163~~	~~100%~~

~~**S22.5E**~~ ~~3) The equivalent power flux-density[4], at any point on the Earth's surface visible from the geostationary-satellite orbit, produced by emissions from all the space stations of a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Table **S22-3**, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the limits given in Table **S22-3** for the given percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions into all the reference antennas and in the reference bandwidths specified in Table **S22-3**, and for all pointing directions towards the geostationary-satellite orbit. (WRC-97)~~

TABLE S22-2

Limits to the $EPFD_{up}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$EPFD_{up}$ dB(W/m²)	Percentage of time $EPFD_{up}$ level may not be exceeded	Reference bandwidth (kHz)	Reference antenna beamwidth and reference radiation pattern[2]
12.50-12.75 12.75-13.25 13.75-14.5	−160	100	40	4 degrees ITU-R S.672, Ls = -20[1]
*	−160	100	40	4 degrees ITU-R S.672, Ls = -20[1]
27.5-28.6	−162	100	40	1.55 degrees ITU-R S.672, Ls = -10[1]
29.5-30.0	−162	100	40	1.55 degrees ITU-R S.672, Ls = -10[1]

~~[4] **S22.5E.1** See No. **S22.5C.1**. (WRC-97)~~

[1] For the case of Ls=-10, the values a=1.83 and b=6.32 should be used in the equations in Annex 1 of Recommendation ITU-R S.672 for single-feed circular beams. In all cases of Ls, the parabolic main beam equation should start at zero.

* This $EPFD_{up}$ limit applies to the bands 17.3-18.1 GHz (Regions 1 and 3) and 17.8-18.1 GHz (Region 2). It is proposed that the above-mentioned limit be also applicable to the frequency band 17.3-17.8 GHz (Region 2), in order to protect BSS feeder links in Region 2 from non-GSO FSS uplinks in Regions 1 and 3. See also section 3.2.2.

~~TABLE S22-3 (WRC-97)~~

~~PART A~~

~~Frequency band (GHz)~~	~~Equivalent pfd dB(W/m²)~~	~~Percentage of time during which equivalent pfd level may not be exceeded~~	~~Reference bandwidth (kHz)~~	~~Reference antenna diameter, and reference radiation pattern~~
~~10.7-11.7; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3~~	~~–179~~	~~99.7~~	4	~~60 cm, Rec. ITU-R S.465-5~~
	~~–192~~	~~99.9~~	4	~~3 m, Rec. ITU-R S.465-5~~
	~~–186~~	~~99.97~~	4	~~3 m, Rec. ITU-R S.465-5~~
	~~–195~~	~~99.97~~	4	~~10 m, Rec. ITU-R S.465-5~~
	~~–170~~	~~99.999~~	4	~~60 cm, Rec. ITU-R S.465-5~~
	~~–173~~	~~99.999~~	4	~~3 m, Rec. ITU-R S.465-5~~
	~~–178~~	~~99.999~~	4	~~10 m, Rec. ITU-R S.465-5~~
	~~–170~~	~~100~~	4	~~≥ 60 cm, Rec. ITU-R S.465-5~~

~~TABLE S22-3 (WRC-97)~~

~~PART B~~

~~Frequency band (GHz)~~	~~Equivalent pfd dB(W/m^2)~~	~~Percentage of time during which equivalent pfd level may not be exceeded~~	~~Reference bandwidth (kHz)~~	~~Reference antenna diameter, and reference radiation pattern~~
~~17.8-18.6~~	~~–165~~ ~~–151~~	~~99.0~~	~~40~~ ~~1 000~~	~~30 cm, Rec. ITU-R S.465-5~~
	~~–165~~ ~~–151~~	~~99.0~~	~~40~~ ~~1 000~~	~~70 cm, Rec. ITU-R S.465-5~~
	~~–165~~ ~~–151~~	~~99.5~~	~~40~~ ~~1 000~~	~~90 cm, Rec. ITU-R S.465-5~~
	~~–167~~ ~~–153~~	~~99.8~~	~~40~~ ~~1 000~~	~~1.5 m, Rec. ITU-R S.465-5~~
	~~–180~~ ~~–166~~	~~99.9~~	~~40~~ ~~1 000~~	~~5 m, Rec. ITU-R S.465-5~~
	~~–184~~ ~~–170~~	~~99.9~~	~~40~~ ~~1 000~~	~~7.5 m, Rec. ITU-R S.465-5~~
	~~–188~~ ~~–174~~	~~99.9~~	~~40~~ ~~1 000~~	~~12 m, Rec. ITU-R S.465-5~~
	~~–165~~ ~~–151~~	~~100~~	~~40~~ ~~1 000~~	~~30 cm to 12 m, Rec. ITU-R S.465-5~~
~~19.7-20.2~~	~~–154~~ ~~–140~~	~~99.0~~	~~40~~ ~~1 000~~	~~30 cm, Rec. ITU-R S.465-5~~
	~~–164~~ ~~–150~~	~~99.9~~	~~40~~ ~~1 000~~	~~90 cm, Rec. ITU-R S.465-5~~
	~~–167~~ ~~–153~~	~~99.8~~	~~40~~ ~~1 000~~	~~2 m, Rec. ITU-R S.465-5~~
	~~–174~~ ~~–160~~	~~99.9~~	~~40~~ ~~1 000~~	~~5 m, Rec. ITU-R S.465-5~~
	~~–154~~ ~~–140~~	~~100~~	~~40~~ ~~1 000~~	~~30 cm to 12 m, Rec. ITU-R S.465-5~~

MOD S22.5FD 43) The ~~aggregate~~ equivalent power flux-density[25], EPFD$_{is}$, produced at any point in the geostationary-satellite orbit by emissions from all the ~~earth-~~ space stations in a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Table S22-3, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the limits given in Table **S22-43** for the specified ~~any~~ percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions into a ~~the~~ reference

~~[5] **S22.5F.1** See No. **S22.5D.1**. (WRC-97)~~

antenna and in the reference bandwidth specified in Table **S22-4~~3~~**, for all pointing directions towards the Earth's surface visible from any given location in the geostationary-satellite orbit. ~~(WRC-97)~~

MOD

TABLE **S22-3**

Limits to the $EPFD_{is}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$EPFD_{is}$ dB(W/m²)**	**Percentage of time $EPFD_{is}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna beamwidth and reference radiation pattern[1]**
10.7-11.7 (Region 1) 12.5-12.75 (Region 1) 12.7-12.75 (Region 2)	–160	100	40	4 degrees ITU-R S.672, Ls = -20
17.8-18.4	–160	100	40	4 degrees ITU-R S.672, Ls = -20

1 Under this Section, this reference pattern is to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

~~TABLE S22-4 (WRC-97)~~

~~PART A~~

~~**Frequency band (GHz)**~~	~~**Aggregate pfd dB(W/m²)**~~	~~**Percentage of time during which aggregate pfd level may not be exceeded**~~	~~**Reference bandwidth (kHz)**~~
~~12.5-12.75~~	~~–170~~	~~100~~	~~4~~
~~12.75-13.25~~	~~–186~~	~~100~~	~~4~~
~~13.75-14.5~~	~~–170~~	~~100~~	~~4~~

~~TABLE S22-4 (WRC-97)~~

~~PART B~~

~~Frequency band (GHz)~~	~~Aggregate pfd dB(W/m²)~~	~~Percentage of time during which aggregate pfd level may not be exceeded~~	~~Reference bandwidth (kHz)~~
~~27.5-28.6 and~~	~~−159~~	~~100~~	~~40~~
~~29.5-30~~	~~−145~~	~~100~~	~~1 000~~

MOD **S22.5~~G~~E** The limits given in Tables **S22-1**A to **S22-1D**~~and **S22-3**~~ may be exceeded on the territory of any country whose administration has so agreed~~. (WRC-97)~~

ADD **S22.5~~H~~F** The limits specified in No. **S22.5B** to **S22.5D** apply to non-GSO FSS systems for which complete coordination or notification information, as appropriate, has been received after 22 November 1997.

Reasons: Reflect the "*instructs the Radiocommunication Bureau*" in Resolutions 130 (WRC-97) and 538 (WRC-97), and *resolves* 2 of Resolution 130 (WRC-97). Review of the findings by the Bureau under "*instructs the Radiocommunication Bureau*" in Resolution 130 (WRC-97) and Resolution 538 (WRC-97) should be kept in an updated version of these resolutions to cover transitional aspects. It was noted that no notification was received prior to 22 November 1997 for non-GSO FSS systems (Earth-to-space) in the bands 17.3-18.1 GHz (Regions 1 and 3) and 17.8-18.1 GHz (Region 2).

ADD **S22.5~~I~~G** An administration operating a non-GSO FSS system which is in compliance with the limits in No. **S22.5B** to **S22.5D** (see also Resolution **WWW**) shall be considered as having fulfilled its obligations under No. **S22.2** with respect to any GSO network, irrespective of the dates of receipt by the Bureau of the complete coordination or notification information, as appropriate, for the non-GSO system and of the complete coordination information for the GSO network, provided that the $EPFD_{down}$ radiated by the non-GSO FSS system into any operating GSO FSS earth station does not exceed the operational limits given in Table **S22-4**A and **S22-4B**, when the gain of this earth station is equal to or greater than the corresponding value given in Table **S22-4**A and **S22-4B** for the corresponding orbital inclination of the GSO FSS satellite as given in Table **S22-4**A and **S22-4B**. Except as otherwise agreed between concerned administrations. ~~A~~an administration operating a non-GSO FSS system that is subject to the limits in No. **S22.5B** to **S22.5D** and which radiates $EPFD_{down}$ into any operating GSO FSS earth station at levels in excess of the operational limits given in Table **S22-4**A and **S22-4B**, when the gain of this earth station is equal to or greater than the corresponding value given in Table **S22-4**A and **S22-4B** for the corresponding orbital inclination of the GSO FSS satellite as given in Table **S22-4**A and **S22-4B**, shall be considered to be in violation of its obligations under No. **S22.2.**

Reasons: Reflect the *resolves* 4 and 1.4 of Resolutions 130 (WRC-97) and 538 (WRC-97), and the principles provided in section 3.1.2.1.4.2 c). Other additions to the provision correct the language, and make explicit the intention that any non-GSO FSS system that exceeds the validation or operational limits, as applicable, shall, except otherwise agreed between concerned administrations be deemed to be in violation of its obligations under No. S22.2.

TABLE S22-4A[1, 3]

Operational limits to the $EPFD_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$EPFD_{down}$ dB(W/m^2)	Percentage of time during which $EPFD_{down}$ may not be exceeded	Reference bandwidth (kHz)	Receive GSO earth station antenna diameter[2] (m)	Orbital inclination of GSO satellite (degrees)
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3 (prior to 31 December 2005)	-163 -166 -167.5 -169.5	100	40	3 6 9 ≥18	≤2.5
	-160 -163 -164.5 -166.5	100	40	3 6 9 ≥18	≤4.5
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3 (after 31 December 2005)	-161.25 -164 -165.5 -167.5	100	40	3 6 9 ≥18	≤2.5
	158.25 -161 -162.5 -164.5	100	40	3 6 9 ≥18	≤4.5

1 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

2 Linear interpolation of EPFD levels in decibels should be performed for other intermediate antenna diameters.

3 In addition to the operational limits shown in Table **S22-4A**, the additional operational limits in Tables **S22-4A1** and **S22-4A2** apply to certain GSO FSS earth station antenna sizes in the frequency bands listed in Table **S22-4A**.

ADD

TABLE **S22-4A1**

Additional operational limits to the $EPFD_{down}$ radiated by non-GSO FSS systems into 3 m GSO FSS earth station antenna

$EPFD_{down}$ (dB(W/(m^2/40 kHz)))	**Percentage of time during which $EPFD_{down}$ may be exceeded**
-182	0.1
-179	0.06
-176	0.03
-171	0.02
-168	0.016
-165	0.007
-163	0.001
-161.25	0.00025
-161.25	0

ADD

TABLE **[S22-4A2]**

Additional operational limits to the $EPFD_{down}$ radiated by non-GSO FSS systems into 10 m GSO FSS earth station antenna

$EPFD_{down}$ (dB(W/(m^2/40 kHz)))	**Percentage of time during which $EPFD_{down}$ may be exceeded**
-185	0.03
-183	0.02
-179	0.01
-175	0.004
-171	0.002
-168	0.001
-166	0.0002
-166	0

MOD

TABLE ~~S22-4~~S22-4B[1]

Operational limits to the EPFD$_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	EPFD$_{down}$ dB(W/m^2)	Percentage of time during which ~~equivalent pfd~~EPFD$_{down}$ may not be exceeded	Reference bandwidth (kHz)	Receive GSO earth station antenna Gain (dBi)	Orbital inclination of GSO satellite (degrees)
19.7–20.2	−157 −157 −155~~TBD~~	100 100 100	40 40 40	≥49~~55~~ ≥43[2] ≥49~~TBD~~	~~{~~≤2.5~~}~~ ~~{~~≤2.5~~}~~ ~~{~~≥2.5 and ≤4.5~~}~~
19.7–20.2	−143 −143 −141	100 100 100	1 000 1 000 1 000	≥49 ≥43[2] ≥49	≤2.5 ≤2.5 ≥2.5 and ≤4.5
17.8–18.6	−164 −162~~TBD~~	100 100	40 40	≥49 ≥49~~TBD~~	≤2.5 ~~{~~>2.5 and ≤4.5~~}~~
17.8–18.6	−150 −148	100 100	1 000 1 000	≥49 ≥49	≤2.5 ≥2.5 and ≤4.5

[1] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

~~1~~2 The operational limit applies to non-GSO systems operating at altitudes of 7 000 km or above in order to protect GSO FSS systems employing adaptive coding.

ADD **S22.5H** In case of *force majeure*, telecommand and ranging carriers transmitted to non-geostationary satellites in the fixed-satellite service are not subject to the limits given in Table **S22-2**.

Reasons: Specific provision needed to cover emergency situations.

ANNEX 2 TO CHAPTER 3

EXAMPLE RESOLUTION WWW (WRC-2000)

Protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where EPFD limits have been adopted

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-97 has adopted, in Article **S22**, provisional EPFD limits to be met by non-GSO FSS systems in order to protect GSO FSS and GSO BSS networks in parts of the frequency range 10.7-30 GHz;

b) that WRC-2000 has revised these limits to ensure that they provide adequate protection to GSO systems without causing undue constraints to any of the systems and services sharing these frequency bands;

c) that Article **S22** includes single entry EPFD limits which apply to non-GSO FSS systems in these bands;

d) that these single-entry limits have been derived from aggregate equivalent power flux-density (EPFD) masks that are intended to protect GSO networks, assuming a maximum effective number of non-GSO FSS systems of 3.5;

e) that the aggregate interference caused by all co-frequency non-GSO FSS systems in these bands into GSO FSS systems should not exceed the maximum interference levels that are necessary to protect these GSO systems;

f) that WRC-97 decided, and WRC-2000 confirmed, that non-GSO FSS systems in these bands are to coordinate the use of these frequencies between themselves under the provisions of No. **S9.12** of the Radio Regulations;

g) that the orbital characteristics of such systems are likely to be inhomogeneous;

h) that as a result of this likely inhomogeneity, the aggregate EPFD levels from multiple non-GSO FSS systems are not directly related to the number of actual systems sharing a frequency band, and the number of such systems operating co-frequency is likely to be small~~,~~;

i) that the possible misapplication of single entry limits should be avoided,

recognizing

a) that non-GSO FSS systems are likely to need to implement interference mitigation techniques to share frequencies among themselves;

b) that because the use of such interference mitigation techniques will likely keep the number of non-GSO systems small, the aggregate interference caused by non-GSO FSS systems into GSO systems will also likely be small;

c) that notwithstanding *considering d)*, there may be instances where the aggregate interference from non-GSO systems could exceed the interference levels given in Annex 1;

d) that administrations operating GSO systems may wish to ensure that the aggregate EPFD produced by all operating co-frequency non-GSO FSS systems in the frequency bands referred to in *considering a)* above into GSO FSS and/or GSO BSS networks does not exceed the aggregate interference levels given in Annex 1,

resolves

1 that administrations operating or planning to operate non-GSO FSS systems in the frequency bands referred to in *considering a)* above, individually or in collaboration, take all possible steps, including by means of appropriate modifications to their systems if necessary, to ensure that the actual aggregate interference into GSO FSS and GSO BSS networks caused by such systems operating co-frequency in these frequency bands does not exceed the aggregate power levels shown in Annex 1;

2 that, in the event that the aggregate interference levels in Annex 1 are exceeded into an operational GSO earth station, administrations operating non-GSO FSS systems in these frequency bands shall expeditiously take all necessary measures to reduce the aggregate EPFD levels to those in Annex 1 or to reduce such interference to higher levels that are acceptable to the affected GSO administration,

requests ITU-R

1 to develop, as a matter of urgency, and complete, in time for consideration by the next WRC, a methodology for calculating the aggregate EPFD produced by all non-GSO FSS systems operating or planning to operate co-frequency in the frequency bands referred to in *considering a)* above into GSO FSS and GSO BSS networks and for comparing the calculated levels with the aggregate power levels shown in Annex 1;

2 to continue its studies on the accurate modelling of interference from non-GSO FSS systems into GSO FSS and GSO BSS networks in the frequency bands referred to in *considering a)* above in order to assist the administrations planning or operating non-GSO FSS systems in their efforts to limit the aggregate EPFD levels produced by their systems into GSO networks,

requests the Director of the Radiocommunication Bureau

to assist in the development of the methodology referred to in *requests ITU-R* 1 above.

ANNEX 1 (TO RESOLUTION WWW)

This Annex to Resolution WWW contains tables of interference levels concerning aggregate interference from multiple non-GSO FSS systems, which individually meet the Table **S22-1A** limits, into GSO FSS and GSO BSS systems.

Studies are continuing in order to avoid unnecessary entries in this Table and in order to provide maximum protection for the GSO FSS and GSO BSS.

TABLE **WWW-1A**[1, 3]

Limits to the aggregate $EPFD_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$EPFD_{down}$ ~~Equivalent pfd~~ dB(W/m^2)**	**Percentage of time during which ~~equivalent pfd level~~ $EPFD_{down}$ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern**[2]
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3	−170.0	0	40	60 cm Recommendation S.(~~[~~4/57~~]~~)
	−168.6	90		
	−165.3	99		
	−160.4	99.97		
	−160.0	99.99		
	−160.0	100		
	−176.5	0	40	1.2 m Recommendation S.(~~[~~4/57~~]~~)
	−173.0	99.5		
	−164.0	99.84		
	−161.6	99.945		
	−161.4	99.97		
	−160.8	99.99		
	−160.5	99.99		
	−160	99.9975		
	−160	100		

	−185 −184 −182 −168 −164 −162 −160 −160	0 90 99.5 99.9 99.96 99.982 99.997 100.00	40	3 m Recommendation S.(~~[~~4/57~~]~~)
	−190 −190 −166 −160 −160	0 99 99.99 99.998 100	40	10 m Recommendation S.(~~[~~4/57~~]~~)

1 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

2 Under this Section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS ~~and BSS~~ systems.

3 In addition to the limits shown in this table, the aggregate $EPFD_{down}$ limits in Table **WWW-1A'** apply to all antenna sizes greater than 60 cm in the frequency bands listed in this table.

TABLE **WWW-1A'**

Aggregate $EPFD_{down}$ radiated by non-GSO FSS systems at certain latitudes

100% of the time $EPFD_{down}$ dB(W/(m^2·40 kHz))	**Latitude (North or South) (°)**
-160	0 < |Latitude| ≤ 57.5
-160 + 3.4(57.5 - |Latitude|)/4	57.5 < |Latitude| ≤ 63.75
-165.3	63.75 ≤ |Latitude|

* ~~No agreement could be reached on $EPFD_{down}$ values for protection of the 3 m and 10 m GSO FSS antennas. See § 3.1.4.1.4.2 a) of the text.~~

MOD

TABLE ~~1-FSS~~WWW-1B[1]

Limits to the aggregate $EPFD_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$EPFD_{down}$ dB(W/m²)	Percentage of time during which ~~equivalent pfd~~ $EPFD_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[2]
17.8-18.6	–164 –164 –170 –170	100 99.9 90 0	40[3]	1 m Recommendation S.(~~[~~4/57~~]~~)
	–150 –150 –156 –156	100 99.9 90 0	1 000	
17.8-18.6	–164 –164 –166 –173 –173	100 99.92 99.9 99.4 0	40[3]	2 m Recommendation S.(~~[~~4/57~~]~~)
	–150 –150 –152 –159 –159	100 99.92 99.9 99.4 0	1 000	
17.8-18.6	–164 –164 –172 –180 –180	100 99.992 99.8 99.8 0	40[3]	5 m Recommendation S.(~~[~~4/57~~]~~)
	–150 –150 –158 –166 –166	100 99.992 99.8 99.8 0	1 000	

1 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

2 Under this Section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS~~ and BSS~~ systems.

~~3 For non-GSO emission bandwidths greater than 40 kHz, the $EPFD_{down}$ limits may be scaled by adding 10 log(non-GSO emission bandwidth/40 kHz) in a reference bandwidth equal to the emission bandwidth.~~

MOD

TABLE **WWW-1C**[1]

Limits to the aggregate EPFD$_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	EPFD$_{down}$ dB(W/m^2)	Percentage of time during which ~~equivalent pfd~~EPFD$_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[2]
19.7-20.2	–154 –154 –172 –182	100 99.94 90 0	40[3]	70 cm Recommendation S.(4/57)
	–140 –140 –158 –168	100 99.94 90 0	1 000	
19.7-20.2	–154 –154 –160 –165 –176 –185	100 99.99 99.8 99.8 91 0	40[3]	90 cm Recommendation S.(4/57)
	–140 –140 –146 –151 –162 –171	100 99.99 99.8 99.8 91 0	1 000	
19.7-20.2	–154~~.35~~ –154~~.35~~ –162 –191	100 99.998 99.933 0	40[3]	2.5 m Recommendation S.(4/57)~~-see Note 4~~
	–140 –140 –148 –177	100 99.998 99.933 0	1 000	

19.7-20.2	–154~~.35~~ –154~~.35~~ –161 –175 –184 –195	100 99.9992~~6~~ 99.984 99.6 90 0	40[3]	5 m Recommendation S.(4/57) ~~see Note 4~~
	–140 –140 –147 –161 –170 –181	100 99.9992 99.984 99.6 90 0	1 000	

1 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

2 Under this Section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS ~~and BSS~~ systems.

3 ~~For non-GSO emission bandwidths greater than 40 kHz, the EPFD~~$_{down}$ ~~limits may be scaled by adding 10 log (non-GSO emission bandwidth/40 kHz) in a reference bandwidth equal to the emission bandwidth.~~

4 ~~The masks for the 2.5 m and 5 m antennas have not been agreed. Further adjustments to these masks are required.~~

TABLE **WWW-1D**[2]

Limits to the aggregate EPFD$_{down}$ radiated by non-GSO FSS systems in certain frequency bands 30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm and 300 cm BSS antennas

Frequency band (GHz)	**EPFD$_{down}$ dB(W/m^2)**	**Percentage of time during which EPFD$_{down}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern**[1]
11.7- 12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	−160.400	0.000	40	30 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]
	−160.100	25.000		
	−158.600	96.000		
	−158.600	98.000		
	−158.330	98.000		
	−158.330	100.000		
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	−170.000	0.000	40	45 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]
	−167.000	66.000		
	−164.000	97.750		
	−160.750	99.330		
	−160.000	99.950		
	−160.000	100.000		
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	−171.000	0.000	40	60 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	−168.750	90.000		
	−167.750	97.800		
	−162.000	99.600		
	−161.000	99.800		
	−160.200	99.900		
	−160.000	99.990		
	−160.000	100.000		

11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–173.75 –173 –171 –165.5 –163 –161 –160 –160.000	0.000 33.000 98.000 99.100 99.500 99.800 99.970 100.000	40	90 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–177.000 –175.250 –173.750 –173.000 –169.500 –167.800 –164.000 –161.900 –161.000 –160.400 –160.000	0.000 90.000 98.900 98.900 99.500 99.700 99.820 99.900 99.965 99.993 100	40	120 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz in Region 1 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3 12.2-12.7 GHz in Region 2	–179.500 –178.660 –176.250 –163.250 –161.500 –160.350 –160.000 –160.000	0.000 33.000 98.500 99.810 99.910 99.975 99.995 100.000	40	180 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

	–182.000	0.000		
11.7-12.5 GHz	–180.900	33.000		
in Region 1	–178.000	99.250		240 cm
11.7-12.2 GHz and	–164.400	99.850	40	DNR ITU-R BO. [Doc. 11/137(Rev.1)
12.5-12.75 GHz	–161.900	99.940		Annex 1]
in Region 3	–160.500	99.980		
12.2-12.7 GHz	–160.000	99.995		
in Region 2	–160.000	100.000		
	–186.500	0.000		
11.7-12.5 GHz	–184.000	33.000		
In Region 1	–180.500	99.500		
11.7-12.2 GHz and	–173.000	99.700	40	300 cm
12.5-12.75 GHz In Region 3	–167.000	99.830		DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
12.2-12.7 GHz In Region 2	–162.000	99.940		
	–160.000	99.970		
	–160.000	100.000		

1 Under this Section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO BSS systems.

2 For BSS antenna diameters 180 cm, 240 cm and 300 cm, in addition to the aggregate limit shown in Table **WWW-1D**, the following aggregate 100% of the time $EPFD_{down}$ limit also applies:

100% of the time $EPFD_{down}$ dB(W/(m^2 · 40 kHz))	**Latitude (North or South) (°)**
-160.0	0 ≤ |latitude| ≤ 57.5
-160.0 + 3.4 * (57.5 – |latitude|)/4	57.5 ≤ |latitude| ≤ 63.75
-165.3	63.75 ≤ |latitude|

For BSS antenna diameter 240 cm, in addition to the above aggregate 100% of the time $EPFD_{down}$ limit, a -167 dB(W/(m^2 · 40 kHz)) aggregate 100% of the time operational $EPFD_{down}$ limit also applies to receive antennas located in Region 2, west of 140° W, north of 60° N, pointing toward GSO BSS satellites at 91° W, 101° W, 110° W, 119° W and 148° W with elevation angles greater than 5°. [This limit is implemented during a transition period of [15] years.]*

* This transitional regime would be applicable only if the pfd limits in section 5c of Annex 1 to Appendix **S30** are sufficiently relaxed.

ANNEX 3 TO CHAPTER 3

Example of possible modifications for coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antennas

This Annex contains example of regulatory and procedural text for coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antennas, including additions and/or modifications to Articles **S9, S11** and **S22** and Appendices **S4** and **S5**.

ARTICLE S9

Sub-Section IIA - Requirement and request for coordination

ADD S9.7A *a1)* [12, 13] for a specific earth station within a geostationary-satellite network in the fixed-satellite service in certain frequency bands in respect of a non-geostationary-satellite system in the fixed-satellite service;

ADD S9.7B *a2)* [12, 13] for a non-geostationary-satellite system in the fixed-satellite service in certain frequency bands in respect of a specific earth station within a geostationary-satellite network in the fixed-satellite service;

ADD S9.7.A.1 and S9.7.B.1 [12] The coordination of a specific earth station under **S9.7A** or **S9.7B** shall remain within the authority of the administration having this station located on its territory.

ADD S9.7.A.2 and S9.7.B.2 [13] Coordination information relating to a specific earth station received by the Bureau prior to [date ~~TBD~~to be established by WRC-2000] is considered as complete **S9.7A** or **S9.7B** information from the date of receipt of complete information of the associated satellite network under **S9.7** provided that the characteristics of the specific earth stations are within the parameters of any typical earth station included in the GSO FSS network coordination request.

MOD S9.8.1 and S9.9.1 [~~12~~14] Application of this provision with respect to Articles **6** and **7** of Appendices **S30** and **S30A** is suspended pending a decision of WRC-99 on the revision of these two Appendices.

Reasons: GSO FSS earth stations with very large antennas may not be adequately protected by the $EPFD_{down}$ limits contained in Table MOD **S22-1** and case-by-case coordination of systems operating co-frequency, co-directional links in the space-to-Earth direction would then be required. The proposed ADD **S9.7A** and ADD **S9.7B** would require coordination between non-GSO FSS transmit satellites and GSO FSS receive earth stations with very large antennas. By referring to coordination provisions under **S9.7A** and **S9.7B**, the request for coordination would be sent by the requesting administration to the Bureau under **S9.30**. The Bureau would act under **S9.34** to identify administrations with which coordination may need to be effected and publish the information in the Weekly Circular. Since coordination between a non-GSO FSS space station and very large GSO FSS earth stations is a new type of coordination that does not currently exist in Article **S9**, it is necessary to add two new entry points in Article **S9**:

- One entry point to enable the non-GSO space station administration to request coordination with administrations having specific very large earth station antennas located on their territory.
- Another entry point to enable the reciprocal coordination to take place, i.e. the possibility for an administration planning to implement a specific very large GSO earth station stations located on their territory to request coordination with administrations having non-GSO FSS transmit space.

TABLE **S22-1 (MOD)**[1]

TABLE **S22-4 (MOD)**[1]

ADD [1] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

Reasons: Case-by-case coordination is required by the proposed modifications in ADD **S9.7A** and ADD **S9.7B**.

ARTICLE S11

Section II – Examination of notices and recording of frequency assignments in the Master Register

MOD S11.32A *c)* with respect to the probability of harmful interference that may be caused to or by assignments recorded with a favourable finding under Nos. **S11.36** and **S11.37** or **S11.38**, or recorded in application of No. **S11.41**, or published under Nos. **S9.38** or **S9.58** but not yet notified, as appropriate, for those cases for which the notifying administration states that the procedure for coordination under Nos. **S9.7**, **S9.7A or S9.7B** could not be successfully completed (see also No. **S9.65**);[10] or

MOD S11.32A.1 [10] The examination of such notices with respect to any other frequency assignment for which a request for coordination under Nos. **S9.7**, **S9.7A or S9.7B** has been published under No. **S9.38** but not yet notified shall be effected by the Bureau in the order of their publication under the same number using the most recent information available.

Reasons: The insertion of a coordination trigger related to $EPFD_{down}$ level radiated by the non-GSO FSS system into the earth station employing the very large antenna considered when this earth station is pointed to the wanted GSO satellite provides a mechanism to examine the notice with respect to the probability of harmful interference that may be caused to or by above-listed assignments, and therefore S11.38 and S11.41 are applicable.

MOD TO APPENDIX S4

ANNEX 2B (TO APPENDIX S4)

Table of characteristics to be submitted for space and radio astronomy services

The required characteristics for coordinating specific very large GSO earth stations with non-GSO FSS transmit space stations could be items for "Notification or coordination of a GSO network (including Appendix **S30B**)" or "Notification or coordination of an earth station."

(The modifications in either column two or column three need to be incorporated into the full table.)

C – Characteristics to be provided for each group of frequency assignments for a satellite antenna beam or an earth station antenna

MOD

Items in Appendix	Notification or coordination of a GSO network (including Appendix S30B)	Notification or coordination of an earth station
C.1		
C.2.a	X	X
C.2.b		
C.3.a	X	X
C.3.b		
C.4	X	X
C.5a	X	
C.5.b		
C.5.c		
C.6	X	X
C.7.a	X[~~zz~~9]	X[~~zz~~9]
C.7.b	C[~~zz~~9]	C[~~zz~~9]
C.7.c	C[~~zz~~9]	C[~~zz~~9]
C.7.d	C	C
C.8.a	X[7]	C[8]
C.8.b	X[7]	X[7]
C.8.c	X[6]	X[6]
C.8.d	X[2]	
C.8.e	X[6]	X[6]
C.8.f		
C.8.g	C[4]	C[4, 5]
C.8.h		
C.8.i		
C.8.j		
C.9.a	C	
C.9.b		
C.9.c		
C.10.a	X[~~zz~~9]	C[~~zz~~9]
C.10.b	X[~~zz~~9]	C[~~zz~~9]
C.10.c.1	X[~~zz~~9]	C[~~zz~~9]
C.10.c.2	X[~~zz~~9]	C[~~zz~~9]
C.10.c.3	X	
C.10.c.4	X	
C.10.c.5	X[~~zz~~9]	C[~~zz~~9]
C.10.c.6		

C.11.a	X	
C.11.b		
C.11.c		
C.11.d		
C.12		
C.13		
C.14		

X Mandatory information.

O Optional information.

C This information need only be furnished when it has been used as a basis to effect coordination with another administration.

~~##~~9 Information mandatory for coordination under No. ADD **S9.7A**.

NOTE – Additional characteristics to be provided may include A.4.c, A.1.e.1, A.1.e.2, C.4, B.5 and C.5.b. As a result of decisions that may be made at WRC-2000, these additional characteristics may replace C.10.a, C.10.b, C.10.c.1, C.10.c.2 and C.10.c.5 in the notification or coordination of an earth station column.

Reasons: This is consequential to ADD **S9.7A** and ADD **S9.7B**. Administrations will need to submit specific earth station information for earth stations associated with geostationary-satellite networks in the fixed-satellite service meeting the conditions in the proposed addition to Appendix **S5**.

MOD (to RR App. S4)

D – Overall link characteristics

(The modifications in either column two or column three need to be incorporated into the full table.)

Items in Appendix	Notification or coordination of a geostationary satellite network (including Appendix S30B)	Notification or coordination of an earth station
D.1	X	
D.2.a	X[9]	C[9]
D.2.b	X	

X Mandatory information.

O Optional information.

C This information need only be furnished when it has been used as a basis to effect coordination with another administration.

[9] Information mandatory for coordination under No. ADD **S9.7A**.

Reasons: This is consequential to ADD **S9.7A** and ADD **S9.7B** and will be required when simple frequency-changing transponders are used on the space station.

ADD

APPENDIX S5

TABLE **S5-1** *(continued)*

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.7A** GSO earth station/ non-GSO system	A specific earth station in a geostationary-satellite network in the fixed-satellite service in respect of a non-geostationary-satellite system in the fixed-satellite service.	The following frequency bands: 10.7-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 17.8-18.6 GHz (space-to-Earth), and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) the frequency bands overlap; and ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations and meets all of the following conditions: a) Earth station antenna maximum isotropic gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; b) G/T_1 of 44 dB/K or higher; c) space station emission bandwidth of 250 MHz or higher for the frequency bands 10.7-12.75 GHz or 800 MHz or higher for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; iii) the $EPFD_{down}$ from the satellite system using the non-geostationary orbit exceeds:	i) compare frequency bands; ii) use the maximum antenna gain of the specific receive earth station (Appendix **S4** C.10 *c)* 2)), the lowest equivalent satellite link noise temperature (Appendix **S4** C.10 *c)* 5)), and the space station emission bandwidth (Appendix **S4** C.7 *a)*) in the geostationary-satellite network as given in Appendix **S4** data; and iii) use the $EPFD_{down}$ radiated by the non-GSO FSS system into the earth station employing the very large antenna when this antenna is pointed towards the wanted GSO satellite.	The threshold/ condition for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit.

			a) either –174.5 dB(W/(m^2 · 40 kHz)) for any percentage of time or [x] dB(W/(m^2 · 40 kHz)) for [y]% of the time in the frequency band 10.7-12.75 GHz; b) either –151 dB(W/(m^2 · MHz)) for any percentage of time or [x'] dB(W/(m^2 · MHz)) for [y']% of the time in the frequency bands 17.8-18.6 GHz or 19.7-20.2 GHz.		
No. **S9.7B** non-GSO system/ GSO earth station/	A non-geostationary-satellite system in the fixed-satellite service in respect of a specific earth station in a geostationary-satellite network in the fixed-satellite service.	The following frequency bands: 10.7-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 17.8-18.6 GHz (space-to-Earth), and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) the frequency bands overlap; and ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations and meets all of the following conditions: a) Earth station antenna maximum isotropic gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; b) G/T_1 of 44 dB/K or higher;	i) compare frequency bands; ii) use the maximum antenna gain of the specific receive earth station (Appendix **S4** C.10 *c)* 2)), the lowest equivalent satellite link noise temperature (Appendix **S4** C.10 *c)* 5)), and the space station emission bandwidth (Appendix S4 C.7 *a)*) in the geostationary-satellite network as given in Appendix **S4** data; and	The threshold/ condition for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit.

			c) space station emission bandwidth of 250 MHz or higher for the frequency bands 10.7-12.75 GHz or 800 MHz or higher for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; iii)the $EPFD_{down}$ from the satellite system using the non-geostationary orbit exceeds: a) either –174.5 $dB(W/(m^2 \cdot 40\ kHz))$ for any percentage of time or [x] $dB(W/(m^2 \cdot 40\ kHz))$ for [y]% of the time in the frequency band 10.7-12.75 GHz b) either –151 $dB(W/(m^2 \cdot MHz))$ for any percentage of time or [x'] $dB(W/(m^2 \cdot MHz))$ for [y']% of the time in the frequency bands 17.8-18.6 GHz or 19.7-20.2 GHz.	iii) use the $EPFD_{down}$ radiated by the non-GSO FSS system into the earth station employing the very large antenna when this antenna is pointed towards the wanted GSO satellite.	

Reasons: This is consequential to ADD **S9.7A** and **S9.7B**.

ANNEX 4 TO CHAPTER 3

(relative to the current Radio Regulations)

Examples of modifications to TABLE **S21-4** *(continued)*

Frequency band	Service*	Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	**5°-25°**	**25°-90°**	
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	−150~~[14]~~	−150 + 0.5(δ – 5)~~[14]~~	−140~~[14]~~	4 kHz
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	-126	-126 + 0.5(δ – 5)	-116	1 MHz
11.7-12.5 GHz (Region 1) 12.5-12.75 GHz (Region 1 countries listed in Nos. **S5.494** and **S5.496** 11.7-12.~~2~~75 GHz (Region 3) 11.7-12.~~2~~7 GHz (Region 2) ~~12.2-12.7 GHz (Region 2)~~	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	~~−148[15]~~ -124	~~−148 + 0.5(δ – 5)[15]~~ -124 + 0.5(δ – 5)	~~−138[15]~~ -114	~~4 kHz~~ 1 MHz
12.2-12.~~5~~75 GHz[7] (Region 3) 12.5-12.75 GHz[7] (Region 1 ~~and Region 3~~ countries listed in Nos. **S5.494** and **S5.496**)	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	−148~~[14]~~	−148 + 0.5(δ – 5)~~[14]~~	−138~~[14]~~	4 kHz
15.43-15.63 GHz No change	Fixed-satellite (space-to-Earth)	−127	5°-20°: −127 20°-25°: −127 + 0.56(δ – 20)²	25°-29°: −113 29°-31°: −136.9 + 25 log (δ – 20) 31°-90°: −111	1 MHz

17.7-19.3 GHz[7, 8]	Fixed-satellite (space-to-Earth) Meteorological-satellite (space-to-Earth)	−115[aa] or ~~−125[12]~~ -115-X[12]	−115 + 0.5(δ − 5)[aa] or ~~−125 + (δ − 5)[12]~~ -115-X((10+X)/20) (δ − 5)[12]	−105[aa] or −105[12]	1 MHz
19.3-19.7 GHz 22.55-23.55 GHz 24.45-24.75 GHz 25.25-27.5 GHz	Fixed-satellite (space-to-Earth) Earth exploration-satellite (space-to-Earth) Inter-satellite	-115	-115 + 0.5(δ − 5)	-105	1 MHz

MOD

12 **S21.16.6** ~~These values shall apply provisionally only to emissions of space stations on non-geostationary satellites in networks operating with a large number of satellites, that is systems operating with more than 100 satellites (see Resolution **131 (WRC-97)**). (WRC-97)~~

The function X is defined as a function of the number, N, of satellites in the non-GSO FSS constellation as follows:

– for $N \leq 50$ $X = 0$ (dB)

– for $50 < N \leq 288$ $X = \frac{5}{119}(N - 50)$ (dB)

– for $N > 288$ $X = \frac{1}{69}(N + 402)$ (dB)

In the band 18.8-19.3 GHz, these limits apply to emissions of a space station on a non-geostationary FSS satellite for which complete coordination or notification information, as appropriate, has been received by the Radiocommunication Bureau after 17 November 1995, and which was not operational by that date.

ADD[aa]
S21.16.*6bis* These limits apply to emissions of a space station on a meteorological-satellite and on a geostationary FSS satellite. These limits also apply to emissions of a space station on a non-geostationary FSS satellite in the bands 18.8-19.3 GHz for which complete coordination or notification information has been received by the Radiocommunication Bureau by 17 November 1995, or are in operation by that date~~(WRC-2000)~~.

Reasons: The above regulatory text reflects the date-specific provisions currently in Resolution **131 (WRC-97)**.

Reasons: The above regulatory text maintains the original limits for non-GSO FSS systems in the band 18.8-19.3 GHz that were notified or operational prior to the end of WRC-95 per the decision in Resolution 131 (WRC-97). In the band 17.7-18.8 GHz, the new limits would apply to all non-GSO systems irrespective of the date of receipt of information or date of bringing into operation.

NOC
13 **S21.16.7**

SUP
14 **S21.16.8**

SUP
15 **S21.16.9**

ANNEX 5 TO CHAPTER 3

Example of possible modifications to Resolutions 130 and 538

RESOLUTION 130 (WRC-~~97~~2000)

Use of non-geostationary systems in the fixed-satellite service in certain frequency bands

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that the International Telecommunication Union has, among its purposes, "to promote the extension of the benefit of the new telecommunication technologies to all the world's inhabitants" (No. 6 of the Constitution of the International Telecommunication Union (Geneva, 1992));

b) that it is desirable, in this respect, to promote systems capable of providing universal service;

c) that new telecommunication services need advanced and reliable networks permitting high-capacity communications;

d) the need to encourage the development and implementation of new technologies;

e) that systems based on the use of new technologies associated with both geostationary (GSO) and non-geostationary (non-GSO) satellite constellations are capable of providing the most isolated regions of the world with high-capacity and low-cost means of communication;

f) that there should be equitable access to the radio-frequency spectrum and orbital resources in a mutually acceptable manner that allows for new entrants in the provision of services;

g) that all Member States would benefit from the implementation of proposed systems in the allocated spectrum and from avoidance of monopolization or exclusive use of an allocation by a single system;

h) that the operation of such systems requires a suitable amount of spectrum in appropriate frequency bands;

i) that decisions on this matter should permit the operation of as many systems as possible;

j) that~~, in spite of the urgency attached to the development of such systems,~~ technical, operational and regulatory issues should be studied in order to achieve the most efficient use of the spectrum that may be available for these systems;

k) that there is a need for the provision of services on a competitive basis between GSO fixed-satellite service (FSS) and non-GSO FSS systems as well as between non-GSO FSS and non-GSO FSS systems;

l) that the Radio Regulations must be sufficiently flexible to accommodate the introduction and implementation of innovative technologies as they evolve, and allow the further development and implementation of any proposed system in conformity with their provisions,

considering further

a) that the ITU-R has conducted ~~further~~ technical, operational and regulatory studies ~~are required~~ in order to determine ~~further~~ the conditions under which sharing of the frequency bands 10-30 GHz which are allocated to the FSS and where ~~Resolution **46 (Rev.WRC-97)**~~No. **S9.11A** does not apply is feasible between GSO and non-GSO systems, between non-GSO systems and between non-GSO and terrestrial systems and other space systems;

~~*b)* that it is likely that non-GSO FSS systems communicated to the Radiocommunication Bureau will not be brought into use before the WRC-99;~~

~~*c*~~*b)* that the diverging interpretations arising from No. **S22.2** result in an ambiguous regulatory status for both existing and future GSO and non-GSO systems in the FSS in the bands where this provision applies, with consequential risks for both types of systems;

~~*d*~~*c)* that the harmonious development of non-GSO and GSO systems in the FSS requires that these ambiguities be resolved with no further delay in all bands subject to this provision;

~~*e*~~*d)* that in resolving these ambiguities in the bands referred to in *resolves* 1 below, the GSO arc must be protected to ensure continued use of existing FSS systems and the development of new GSO technologies and systems in both non-planned bands and bands where plans exist;

~~*f*~~*e)* that these ambiguities can ~~may~~ be resolved in certain frequency bands by adopting power flux-density (pfd) limits which ~~would~~ apply to non-GSO FSS systems to protect GSO FSS systems, and by including in Article **S22** limits on the power radiated by non-GSO FSS systems in order adequately to protect GSO FSS systems in the frequency bands and sharing situations where ~~Resolution **46 (Rev.WRC-97)**~~ No. **S9.11A** does not apply;

~~*g*~~*f)* that in certain frequency bands which are currently used or planned to be used extensively by GSO FSS systems, ~~provisional~~ power flux-density limits applicable to non-GSO FSS systems have been developed;

~~h~~g) that non-GSO FSS systems have been proposed in some of these bands which could meet these limits and would not require specific protection from existing and future GSO FSS systems, provided that minimum constraints are applied to GSO FSS systems, such as off-axis earth station e.i.r.p. limits;

~~i~~h) that in the bands where the limits referred to in *considering further ~~e~~f), ~~f~~g)* and *~~g~~h)* ~~would~~ apply, there is ~~would be~~ no need for a coordination procedure between non-GSO FSS and GSO systems, with the exception of coordination between earth stations operating in opposite directions of transmission and coordination with earth stations using very large antennas;

~~j~~i) that there ~~would be~~ is a need for a coordination procedure between non-GSO systems in the FSS and between non-GSO FSS systems and non-GSO systems in other services and for specific sharing criteria associated with this procedure, taking into consideration various types of non-GSO systems, including those in highly elliptical orbits;

~~k~~j) the need to protect other co-primary services having allocations in the frequency bands referred to in *considering further a)* above and the need to assess further the sharing conditions between non-GSO FSS systems and these services;

~~l~~k) that there is a need for further studies on sharing conditions in frequency bands other than the 10-30 GHz frequency bands, where ~~Resolution 46 (Rev.WRC-97)~~No. S9.11A does not apply and Article S22 does not include limits for non-GSO FSS systems, ~~may also be necessary~~ on the basis of the requirements that may emerge,

noting

1 that information relating to GSO and non-GSO systems in the FSS in the 10-30 GHz bands has been communicated to the Bureau;

2 that some of these systems are in operation and others will be operated in the near future and, consequently, difficulties may be experienced in modifying their characteristics;

3 the need to protect existing and future terrestrial and space services and systems;

4 that No. **S22.2** is an operational provision which is to be applied between administrations, and does not require any specific action or finding by the Bureau,

recognizing

that the geostationary-satellite orbit and its associated spectrum are a uniquely valuable resource and that equitable access to this resource needs to be protected for all countries in the world,

resolves

1 that, as of 22 November 1997, in the frequency bands specified in Tables **S22-1A, S22-1B, S22-1C** and **S22-2** of Article **S22**, ~~and in Tables 1 and 2 in Annex 1 to this Resolution,~~ non-GSO FSS systems ~~shall apply the procedures of Section I of Article S9, Nos. S9.17 and S9.17A/Sections I and III of Article 11 and the procedures of Article S11/13, and the non-GSO FSS systems~~ for which complete notification or coordination information, as appropriate, has been received by the Bureau after 21 November 1997 shall be subject to the ~~provisional~~ power limits in Article **S22**, as revised by this Conference ~~and in Annex 1 to this Resolution~~;

CPM Comment: WRC-2000 may be in a position to determine that resolves 1 is no longer required after WRC-2000 because:

- *Articles 11 and 13 have been suppressed.*
- *Sections I and III of **S9**, **S9.17** and **S9.17A** apply to all non-GSO FSS not subject to **S9.11A**.*

- *The limits in Article **S22** are enabled by the fact they appear in Article **S22** itself.*

~~2 that these limits shall be applied provisionally until the end of WRC-99, and that non-GSO FSS systems for which complete notification information has been received by the Bureau after 21 November 1997 shall be subject to the power limits in Article **S22**, as revised, if appropriate, by WRC-99;~~

CPM Comment: WRC-2000 may be in a position to determine that resolves 2, a transitional measure until WRC-2000 is no longer required after WRC-2000.

~~3 that, as of 22 November 1997, in applying No. **S22.2**, administrations may consider these provisional power limits as corresponding to permissible levels of interference from a non-GSO system into a GSO system, irrespective of the dates of receipt by the Bureau of the complete notification information relating for the non-GSO system and of the complete coordination information for the GSO network;~~

CPM Comment: WRC-2000 may be in a position to determine that resolves 3, a transitional measure until WRC-2000 is no longer required after WRC-2000.

~~4 that, as of the end of WRC-99, an administration operating a non-GSO FSS system which is in compliance with the limits in Article **S22**, as revised, if appropriate, by WRC-99, shall be considered as having fulfilled its obligations under No. **S22.2** with respect to any GSO network, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO system and of the complete coordination information for the GSO network;~~

*CPM Comment: If WRC-2000 elects to move this fundamental provision to Article **S22**, resolves 4 may be able to be suppressed.*

~~5 that, as of the end of WRC-99, in the frequency bands specified in No. **S22.29** and § 2.4 of Annex 1 to this Resolution, GSO FSS systems for which complete coordination information has been received by the Bureau after the end of WRC-99 shall be subject to the limits in Article **S22** and in § 2.1, 2.2 and 2.3 of Annex 1 to this Resolution, as revised, if appropriate, by WRC-99;~~

*CPM Comment: WRC-2000 may be in a position to determine that resolves 5 is no longer required after WRC-2000; the limits in Article **S22** are enabled by the fact they appear in Article **S22** itself.*

~~6 that, as of 22 November 1997, in the frequency bands specified in No. **S22.29** and Tables 1 and 2 of Annex 1 to this Resolution, non-GSO systems shall not claim protection from GSO networks in the FSS operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO FSS systems and of the complete coordination information for the GSO networks;~~

OR

6 that, as of 22 November 1997, in the frequency bands specified in No. **S22.29** and Tables **S22-1A, S22-1B, S22-1C** and **S22-2** ~~Tables 1 and 2 of Annex 1 to this Resolution~~, non-GSO systems shall not claim protection from GSO networks in the FSS operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO FSS systems and of the complete coordination information for the GSO networks;

*CPM Comment: If WRC-2000 determines that resolves 6 may be suppressed, WRC-2000 may also need to determine whether, in view of considering further g) above, retaining resolves 6 in Resolution **130** or Article **S5** would require the establishment of minimum constraints on GSO FSS systems (such as earth station off-axis power limits). If, in the alternative, WRC-2000 determines that resolves 6 is an essential measure that is not dependent on the establishment of minimum* *constraints on GSO FSS systems, the resolves (suitably modified) will need either to be reflected in appropriate fashion in footnotes of Article **S5** or retained in Resolution **130 (MOD WRC-2000)**.*

~~6.1 that, between 22 November 1997 and the end of WRC-99, if an administration operating or bringing into use a GSO FSS system before the end of WRC-99 considers that a non-GSO FSS system proposed by another administration might cause unacceptable interference into its GSO system, then:~~

~~6.1.1 the administration operating the GSO system shall send to the administration operating the non-GSO FSS system the technical details upon which its disagreement is based,~~

~~6.1.2 in the bands from 10.7 GHz to 14.5 GHz, the administration operating the non-GSO FSS system shall resolve the difficulties,~~

~~6.1.3 in the bands 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space) and 29.5-30.0 GHz (Earth-to-space), the administrations concerned shall make every possible effort to resolve the difficulties by means of mutually acceptable adjustments to their networks;~~

OR

6.1 that, between 22 November 1997 and the end of WRC-2000~~99~~, if an administration operating or bringing into use a GSO FSS system before the end of WRC-2000~~99~~ considers that a non-GSO FSS system proposed by another administration might cause unacceptable interference into its GSO system, then:

6.1.1 the administration operating the GSO system shall send to the administration operating the non-GSO FSS system the technical details upon which its disagreement is based,

6.1.2 in the bands from 10.7 GHz to 14.5 GHz, the administration operating the non-GSO FSS system shall resolve the difficulties,

6.1.3 in the bands 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space) and 29.5-30.0 GHz (Earth-to-space), the administrations concerned shall make every possible effort to resolve the difficulties by means of mutually acceptable adjustments to their networks;

CPM Comment: If WRC-2000 determines that resolves 6.1, 6.1.1, 6.1.2, and 6.1.3 are transitional measures until WRC-2000, these provisions may be able to be suppressed. If, however, administrations have invoked the provisions of resolves 6.1, WRC-2000, in addressing this situation, may determine that it is necessary to retain or modify resolves 6.1, 6.1.1, 6.1.2, and 6.1.3.

~~7 that, if an administration bringing into use a GSO FSS system after the end of WRC-99 considers that a non-GSO FSS system proposed by another administration and which complies with the limits in Article **S22**, as revised, if appropriate, by WRC-99, might cause unacceptable interference into its GSO system, the administrations concerned shall make every possible effort to resolve the difficulties by means of mutually acceptable adjustments to their networks;~~

*CPM Comment: If WRC-2000 determines that resolves 7 is adequately covered by RR No. **S9.4**, resolves 7 may be able to be suppressed. Because an administration bringing a GSO FSS system into use may not be in a position to know if the non-GSO FSS system proposed by the other administration complies with the applicable WRC-2000 power limits under the time-table established in RR No. **S9.3**, WRC-2000 may find it appropriate to retain a suitably modified resolves 7.*

~~8 that, as of 22 November 1997, non-GSO systems in the FSS in the frequency bands referred to in *resolves* 1 above, shall, for coordination with other non-GSO FSS systems, be subject to application of the provisions of § 2.1 of Section II of Resolution 46 (Rev.WRC-97)/No. S9.12;~~

*CPM Comment: If WRC-2000 elects to move this fundamental provision into footnotes of Article **S5**, resolves 8 may be suppressed.*

requests ITU-R

1~~1~~ taking into account *considering further a)*, to conduct, as a matter of urgency, and complete, in time for consideration by WRC-~~99~~02/03~~:~~, ~~1.3~~ the studies relating to the sharing criteria to be applied during the coordination between non-GSO FSS systems and the need for coordination between terrestrial services and non-GSO systems in the FSS and in other space services, with a view to promoting efficient use of spectrum/orbit resources and equitable access to these resources by all countries;

~~1.1 the appropriate technical, operational and regulatory studies to review the regulatory conditions relating to the coexistence of non-GSO and GSO systems in the FSS, in order to ensure that they do not impose undue constraints on the development of non-GSO and GSO FSS systems;~~

~~1.2 the development of a methodology for calculating the power levels produced by non-GSO FSS systems and the compliance of these levels with the limits referred to in *resolves* 1 and 2 above;~~

2~~1~~ taking into account *considering further ~~l~~k)*~~, to undertake the development~~ to conduct the appropriate technical, operational and regulatory studies towards the possible adoption of power limits or other frequency sharing mechanisms among GSO, non-GSO and terrestrial systems in the frequency bands other than those referred to in *resolves* 1 above and where non-GSO FSS systems are likely to be implemented and GSO systems are used or expected to be used extensively,

CPM Comment: WRC-2000 may find it advisable to repeat requests 1.1 (with conforming modifications) following requests 2, as a new requests 3.

instructs the Radiocommunication Bureau

as of the end of WRC-~~99~~2000, to review and, if appropriate, revise, any finding previously made on the compliance with the limits contained in Article **S22** of a non-GSO FSS system for which complete notification or coordination information, as appropriate, has been received between 22 November 1997 and the end of WRC-2000~~99~~. This review shall be based on the values in Article **S22**, as revised~~, if appropriate,~~ by WRC-~~99~~2000.

~~1 See Annex 2 for further details concerning specific aspects of these studies in relation to frequency sharing between systems in the non-GSO FSS and the GSO FSS.~~

SUP ~~ANNEX 1 TO RESOLUTION 130 (WRC-97)~~

~~**Provisional limits**~~

SUP ~~ANNEX 2 TO RESOLUTION 130 (WRC-97)~~

~~**ITU-R studies on frequency sharing between non-GSO FSS and GSO FSS**~~

RESOLUTION 538 (WRC-~~97~~2000)

Use of the frequency bands covered by Appendices S30/30 and S30A/30A by non-geostationary-satellite systems in the fixed-satellite service

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that provisional limits have been revised ~~established~~ and included in Article **S22** ~~and in the Annex to this Resolution~~ to ensure that the interference caused by non-geostationary-satellite (non-GSO) systems in the fixed-satellite service (FSS) into assignments operated in conformity with the Appendices **S30** and **S30A** Plans is maintained within negligible levels;

b) that the integrity of the above-mentioned Plans and their future modifications is to be ensured;

c) that non-GSO systems should not be entered into those Plans and therefore should not apply the procedures associated with the Plans and should not be protected by those procedures;

d) that WRC-97 ~~this Conference~~ has decided to introduce in Article **S5** a new allocation to the FSS in the frequency bands 11.7-12.5 GHz in Region 1, 12.2-12.7 GHz in Region 2 and 11.7-12.2 GHz in Region 3, limited to non-GSO FSS systems,

resolves

~~1~~

~~1.~~1 that, as of 22 November 1997, a non-GSO FSS system operating in the frequency bands covered by Appendices **S30** and **S30A** shall comply with the ~~provisional limits specified in Article S22 and in the Annex to this Resolution; 1.2 that such a system shall, as of the end WRC-99, comply with the~~ limits specified in Article **S22**, as revised~~, if appropriate,~~ by WRC-~~99~~2000, irrespective of the date of receipt of the complete notification information relating to the non-GSO FSS system;

~~1.3 that as of 22 November 1997, in applying No. **S22.2**, administrations may consider these provisional power limits as corresponding to permissible levels of interference from a non-GSO system into a GSO system, irrespective of the dates of receipt by the Radiocommunication Bureau of the complete notification information for the non-GSO system and for the GSO network;~~

CPM Comment: WRC-2000 may be in a position to determine that resolves 1.3, a transitional measure until WRC-2000 is no longer required after WRC-2000.

~~1.4 that as of the end of WRC-99, an administration operating a non-GSO FSS system in the band 17.8-18.1 GHz (space-to-Earth) which is in compliance with the limits appearing in Article **S22** as revised, if appropriate, by WRC-99, shall be considered as having fulfilled its obligations under No. **S22.2** with respect to any GSO network operating in the Earth-to-space direction, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO system and of the complete coordination or notification information, as appropriate, for the GSO network;~~

*CPM Comment: If WRC-2000 elects to move this fundamental provision to Article **S22**, resolves 1.4 may be able to be suppressed. It may also be appropriate to extend this provision to all the bands subject to Resolution **538 (WRC-97)**, since RR No. **S22.2** now applies to both GSO FSS and GSO BSS protection from non-GSO systems.*

~~1.5 that between 22 November 1997 and the end of WRC-99, if an administration operating or bringing into use a GSO system before the end of WRC-99 considers that a non-GSO FSS system proposed by another administration might cause unacceptable interference into its GSO system, then:~~

- ~~the administration operating the GSO system shall send to the administration operating the non-GSO FSS system the technical details upon which its disagreement is based;~~
- ~~the administration operating the non-GSO FSS system shall resolve the difficulties, taking into account especially degradation of picture and sound quality or signal availability with regard to GSO systems in operation;~~

OR

~~1.5~~2 that between 22 November 1997 and the end of WRC-2000~~99~~, if an administration operating or bringing into use a GSO system before the end of WRC-2000~~99~~ considers that a non-GSO FSS system proposed by another administration might cause unacceptable interference into its GSO system, then:

– the administration operating the GSO system shall send to the administration operating the non-GSO FSS system the technical details upon which its disagreement is based;

– the administration operating the non-GSO FSS system shall resolve the difficulties, taking into account especially degradation of picture and sound quality or signal availability with regard to GSO systems in operation;

CPM Comment: If WRC-2000 determines that resolves 1.5 is a transitional measure until WRC-2000, this provision may be able to be suppressed. If, however, administrations have invoked the provisions of resolves 1.5, WRC-2000, in addressing this situation, may determine that it is necessary to retain or modify resolves 1.5.

~~1.6 that, as of 22 November 1997, a non-GSO FSS system operating in the frequency bands covered by Appendices **S30** and **S30A** shall apply the procedures of Section I of Article **S9**, and Nos. **S9.17** and **S9.17A** Sections I and III of Article **11**, and the procedures of Article **S11/13**;~~

CPM Comment: WRC-2000 may be in a position to determine that resolves 1.6 is no longer required after WRC-2000 because:

- *Articles 11 and 13 have been suppressed; and*
- *Sections I and III of **S9**, **S9.17** and **S9.17A** apply to all non-GSO FSS not subject to **S9.11A**.*

~~1.7 that, as of 22 November 1997, such a system shall be subject, for the coordination with non-GSO systems, to the application of the provisions of § 2.1 of Section II of Resolution **46 (Rev.WRC-97)**/No. **S9.12**;~~

CPM Comment: If WRC-2000 elects to move this fundamental provision into footnotes of Article S5, resolves 1.7 may be suppressed.

~~1.8 that, as of 22 November 1997, such a system shall apply, using an equivalent power flux-density threshold of –185.3 dB(W/m²/4 kHz) for 99.7% of the time, calculated with the reference 90 cm diameter antenna pattern provided in Annex 5 of Appendix **S30** for Regions 1 and 3, the provisions of No. **S9.8**/Article 7 of Appendix **S30** with respect to assignments which appear in Article 11 of Appendix **S30** with the symbols AE or PE;~~

*CPM Comment: WRC-2000 may be in a position to determine that resolves 1.8 is no longer required after WRC-2000 because this provision was intended to provide the protection of 90 cm antennas corresponding to the "old" assignments in the pre-1997 Appendix **30** Plan in Regions 1 and 3. Since the antenna diagram used to protect BSS antennas is now expected to be the same for all Regions and diameters, this specific provision is no longer required.*

~~2 that non-GSO FSS systems in the frequency bands referred to in *resolves* 1 above shall not be operated before the end of WRC-99,~~

CPM Comment: WRC-2000 may be in a position to determine that resolves 2, a transitional measure until WRC-2000, is no longer required after WRC-2000.

requests ITU-R

SUP a), b), c) and d)

*CPM Comment: Alternative to requests ITU-R, WRC-2000 may consider extending the scope of ITU-R studies under the Resolution to other bands allocated to the BSS and associated feeder links if required. For these studies, frequency overlap with bands in Resolution **130 (WRC-2000)** should be avoided.*

instructs the Radiocommunication Bureau

as of the end of WRC-~~99~~2000, to review and, if appropriate, revise, any finding previously made on the compliance with the limits contained in Article **S22** of a non-GSO FSS system for which complete coordination and notification information, as appropriate, has been received between 22 November 1997 and the end of WRC-2000~~99~~. This review shall be based on the values in Article **S22**, as revised~~, if appropriate,~~ by WRC-2000~~99~~.

SUP ~~ANNEX TO RESOLUTION 538 (WRC-97)~~

~~**Provisional limits**~~

ANNEX 6 TO CHAPTER 3

Example of possible modifications to Footnotes in Article S5 (Resolutions 130 and 538)

REGULATORY/PROCEDURAL TEXT FOR WRC-2000 AGENDA ITEM 1.13

Section 3.1.2.4.1 notes that as a result of the need to modify Resolutions **130** and **538**, consequential changes will be required to footnotes in Article **S5** that make reference to these Resolutions.

1 Example modifications to footnotes based on Resolution 130 (WRC-97) and Resolution 538 (WRC-97)

Option 1A Example modifications to footnotes to reflect *resolves* 6 and 8 from Resolution 130 (WRC-97) and *resolves* 1.7 from Resolution 538 (WRC-97)

Depending on the revisions to Resolution **130 (WRC-97)** that are made by WRC-2000, it may be necessary to reflect *resolves* 6 and 8 from that Resolution in modifications to pertinent footnotes. Similarly, depending on the revisions to Resolution **538 (WRC-97)** that are made by WRC-2000, it may be necessary to reflect the *resolves* (1.7) from that Resolution in modifications to pertinent footnotes.

Resolves 8 from Resolution **130** and *resolves* 1.7 from Resolution **538** concerning coordination under Resolution **46**/No. **S9.12** are needed to allow non-GSO FSS systems to coordinate with other non-GSO FSS systems. *Resolves* 6 from Resolution **130** concerning non-GSO FSS systems not claiming protection from GSO networks in the FSS may be needed to implement the intent of WRC-97 and so that the BR or administrations operating GSO FSS systems will not be required under the Radio Regulations to consider interference complaints from administrations operating non-GSO systems.

The following are examples of possible modifications to Nos. **S5.441**, **484A**, **487A**, and **516** to reflect these *resolves*:

MOD S5.441 The use of the bands 4 500-4 800 MHz (space-to-Earth), 6 725-7 025 MHz (Earth-to-space) by the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by a non-geostationary-satellite systems in the fixed-satellite service ~~shall be in accordance with the provisions of Resolution 130 (WRC-97)~~is subject to the application of the provisions of No. **S9.12** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations.

MOD S5.484A The use of the bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 13.75-14.5 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), 29.5-30 GHz (Earth-to-space) by a non-geostationary~~ and geostationary~~-satellite systems in the fixed-satellite service is subject to application of the provisions of ~~Resolution 130 (WRC-97). The use of the band 17.8-18.1 GHz (space-to-Earth) by non-geostationary fixed-satellite service systems is also subject to the provisions of Resolution 538 (WRC-97)~~ No. **S9.12** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations.

MOD S5.487A *Additional allocation:* in Region 1, the band 11.7-12.5 GHz, in Region 2, the band 12.2-12.7 GHz and, in Region 3, the band 11.7-12.2 GHz, are also allocated to the fixed-satellite service (space-to-Earth) on a primary basis, limited to non-geostationary systems and subject to the application of the provisions of ~~Resolution 538 (WRC-97)~~No. **S9.12** for coordination between non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from GSO networks in the broadcasting-satellite service operating in accordance with the Radio Regulations.

MOD S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2 by non-geostationary-satellite systems in the fixed-satellite service is subject to the application of the provisions of ~~Resolution 538 (WRC-97)~~No. **S9.12** for coordination between non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations.

Reasons: As a result of changes to Resolutions 130 and 538, these modifications to footnotes contained in Article S5 will be needed, including the incorporation of the appropriate *resolves* from these Resolutions.

Option 1B **Example modifications to footnotes to reflect possible modifications to Resolution 130 (WRC-97) and Resolution 538 (WRC-97) that include suppression of *resolves* 6 and transfer of *resolves* 8 from Resolution 130 (WRC-97) and *resolves* 1.7 from Resolution 538 (WRC-97)**

MOD S5.441 The use of the bands 4 500-4 800 MHz (space-to-Earth), 6 725-7 025 MHz (Earth-to-space) by the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by non-geostationary-satellite systems in the fixed-satellite service ~~shall be in accordance with the provisions of Resolution 130 (WRC-97)~~is subject to the application of the provisions of No. **S9.12** for the coordination with other non-geostationary-satellite systems in the fixed-satellite service. The provisions of Resolution **130 (WRC-2000)** apply.

MOD S5.484A The use of the bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 13.75-14.5 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), 29.5-30 GHz (Earth-to-space) by non-geostationary~~- and geostationary-~~ satellite systems in the fixed-satellite service is subject to application of the provisions ~~of Resolution 130 (WRC-97). The use of the band 17.8-18.1 GHz (space-to-Earth) by non-geostationary fixed-satellite service systems is also subject to the provisions of Resolution 538 (WRC-97)~~No. **S9.12** for the coordination with other non-geostationary-satellite systems in the fixed-satellite service. The provisions of Resolutions **130 (WRC-2000)** and **538 (WRC-2000)** apply.

MOD S5.487A *Additional allocation:* in Region 1, the band 11.7-12.5 GHz, in Region 2, the band 12.2-12.7 GHz and, in Region 3, the band 11.7-12.2 GHz, are also allocated to the fixed-satellite service (space-to-Earth) on a primary basis, limited to non-geostationary systems and subject to the application of the provisions of ~~of Resolution 538 (WRC-97)~~No. **S9.12** for the coordination with other non-geostationary-satellite systems in the fixed-satellite service. The provisions of Resolution **538 (WRC-2000)** apply.

MOD S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2 by non-geostationary-satellite systems in the fixed-satellite service is subject to the application of the provisions of ~~Resolution 538 (WRC-97).~~No. **S9.12** for the coordination with other non-geostationary-satellite systems in the fixed-satellite service. The provisions of Resolution **538 (WRC-2000)** apply.

2 Example modifications to footnotes S5.488 and S5.491 to reflect relevant RRB Rule of Procedure

2.1 Limitations concerning subregional systems contained in S5.488 and S5.491

It was noted that footnotes **S5.488** and **S5.491** currently restrict the use by FSS (space-to-Earth) of certain bands in the 12 GHz range to national and subregional systems. In 1998, the Radio Regulations Board adopted a Rule of Procedure on subregional systems, which states that "In the case where a service area covers a territory under the jurisdiction of other administrations, it shall be limited to the territories of the administrations concerned and it shall be notified by one of the participating administrations on behalf of other administrations."

These limitations lead to significant burden to the administrations and the Bureau, and unnecessary constraints on the development of GSO and non-GSO FSS systems, without clear advantage since those administrations associated with the sub-regional system keep the same rights as those which do not associate.

2.2 Application of these footnotes to non-GSO FSS systems

Concerning the application of these two footnotes to non-GSO FSS systems, a Rule of Procedure was adopted by the RRB in April 1998. The Board considered that these provisions should be waived in the case of non-GSO FSS systems in order to align them with the decisions of WRC-97 allowing the development of such systems in these bands.

Concerning the need specified by **S5.488** for previous agreement from administrations which services may be affected, the limitations introduced by WRC-97 in Articles **S21** and **S22** are intended to preclude that such services be affected. Therefore, this restriction does not appear to be applicable to non-GSO FSS systems.

2.3 Possible options

The possible options available with respect to footnotes **S5.488** and **S5.491** are therefore the following:

Option 2A – NOC

Under this option, footnotes **S5.488** and **S5.491** would be maintained unchanged. This would maintain significant burden to the administrations and the Bureau, and unnecessary constraints on the development of global, regional and subregional GSO and non-GSO FSS systems in Regions 2 and 3, without clear advantage. Some administrations considered that there would be a national regulatory risk in changing these provisions.

Option 2B – Exemption of non-GSO FSS systems from the scope of S5.488 and S5.491

Under this option, **S5.488** and **S5.491** may be amended as provided in the example below so as to align the regulatory situation with the Rule of Procedure adopted by the RRB in April 1998 with respect to non-GSO FSS systems. This would allow non-GSO FSS systems, which are by essence global systems, to avoid the constraints resulting from these two footnotes and would align these provisions with the decisions of WRC-97 allowing the development of such systems in these bands.

S5.488 The use of the bands 11.7-12.2 GHz by geostationary-satellite networks in the fixed-satellite service in Region 2 and 12.2-12.7 GHz by the broadcasting-satellite service in Region 2 is limited to national and subregional systems. The use of the band 11.7-12.2 GHz by geostationary-satellite networks in the fixed-satellite service in Region 2 is subject to previous agreement between the administrations concerned and those having services, operating or planned to operate in accordance with the Table, which may be affected (see Articles **S9** and **S11**). For the use of the band 12.2-12.7 GHz by the broadcasting-satellite service in Region 2, see Appendix **S30**.

S5.491 *Additional allocation:* in Region 3, the band 12.2-12.5 GHz is also allocated to the fixed-satellite (space-to-Earth) service on a primary basis~~,~~. The use of this allocation by geostationary-satellite networks is limited to national and sub-regional systems. The power flux-density limits in Article **S21**, Table **S21-4** shall apply to this frequency band. The introduction of the service in relation to the broadcasting-satellite service in Region 1 shall follow the procedures specified in Article 7 of Appendix **S30**, with the applicable frequency band extended to cover 12.2-12.5 GHz.

Option 2C – Exemption of both GSO and non-GSO FSS systems from the scope of S5.488 and S5.491

Under this option, **S5.488** and **S5.491** may be amended as provided in the example below, so as to eliminate all restrictions to national and subregional systems for the FSS in the corresponding bands. Concerning the need specified by **S5.488** for previous agreement from administrations which services may be affected, it is to be noted that it might also be waived for GSO FSS systems if pfd limits were to be introduced in Article **S21 (see also Section xxx, PP-98)** to ensure the protection of terrestrial services. This would have the advantage of avoiding any unnecessary constraints on the development of both GSO and non-GSO FSS systems in the corresponding bands in both Regions 2 and 3.

S5.488 The use of the bands ~~11.7-12.2 GHz the fixed-satellite service in Region 2 and~~ 12.2-12.7 GHz by the broadcasting-satellite service in Region 2 is limited to national and subregional systems. The use of the band 11.7-12.2 GHz by geostationary-satellite networks in the fixed-satellite service in Region 2 is subject to previous agreement between the administrations concerned and those having services, operating or planned to operate in accordance with the Table, which may be affected (see Articles **S9** and **S11**). For the use of the band 12.2-12.7 GHz by the broadcasting-satellite service in Region 2, see Appendix **S30**.

S5.491 *Additional allocation:* in Region 3, the band 12.2-12.5 GHz is also allocated to the fixed-satellite (space-to-Earth) service on a primary basis~~,~~ ~~limited to national and sub-regional systems~~. The power flux-density limits in Article **S21**, Table **S21-4** shall apply to this frequency band. The introduction of the service in relation to the broadcasting-satellite service in Region 1 shall follow the procedures specified in Article 7 of Appendix **S30**, with the applicable frequency band extended to cover 12.2-12.5 GHz.

3 Example modification to footnote RR No. S5.516 (in addition to modification in No. 1B above) and to footnote RR No. S5.520 if WRC-2000 decides to include limits in the frequency bands 17.3-17.8 GHz (Earth-to-space) in Region 2 and 18.1-18.4 GHz (Earth-to-space) in Regions 1, 2, and 3*

WRC-2000 may determine to impose limits in the bands 17.3-17.8 GHz (Earth-to-space) in Region 2 and 18.1-18.4 GHz (Earth-to-space) in Regions 1, 2 and 3, on the condition that the use of earth stations within non-GSO FSS systems in these bands is limited to gateway stations, in order to limit the number of such stations. This condition could be reflected from a regulatory point of view by imposing a limitation on the minimum antenna diameter (e.g. 4.5 metres). Should WRC-2000 decide to include limits in these frequency bands under this condition, there would be a need to reflect this decision in Article **S5** as follows:

MOD S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1, 2 and 3 ~~and 17.8-18.1 GHz (Earth-to-space) in Region 2~~ by non-geostationary-satellite systems in the fixed-satellite service is subject to the application of the provisions of ~~Resolution **538 (WRC-97)**~~No. **S9.12** for the coordination with other non-geostationary-satellite systems in the fixed-satellite service. In Region 2, such use is limited to earth station antennas greater than 4.5 metres. The provisions of Resolution **538 (WRC-2000)** apply.

MOD S5.520 The use of the band 18.1-18.4 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. The use of this band by non-geostationary systems in the fixed-satellite service (Earth-to-space) is limited to earth station antennas greater than 4.5 metres and is subject to the application of the provisions of **S9.12** for the coordination with other non-geostationary-satellite systems in the fixed-satellite service (Earth-to-space and space-to-Earth).

4 Example modification to footnote RR No. S5.516 (in addition to modification in No. 1A above) if WRC-2000 decides to limit the 17.3-17.8 GHz (Earth-to-space) band in Region 2 to geostationary FSS operations*

If WRC-2000 determines that in Region 2 the band 17.3-17.8 GHz should continue to be limited to geostationary FSS operations, then the following is an example of a possible additional modification to No. **S5.516**. This modification encompasses the modification to No. **S5.516** in No. 1A above.

* Refer to sections 3.2.2 and 3.2.3 for discussion concerning these bands.

MOD S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2 by non-geostationary-satellite systems in the fixed-satellite service is subject to the application of the provisions of ~~Resolution 538 (WRC-97)~~No. S9.12 for coordination between non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations. The use of the band 17.3-17.8 GHz in Region 2 by systems in the fixed-satellite service (Earth-to-space) is limited to geostationary-satellites.

5 Example modification to footnote RR No. S5.520 if WRC-2000 determines that the 18.1-18.4 GHz (Earth-to-space) band in Regions 1, 2, and 3 should be limited to geostationary FSS operations

If WRC-2000 determines that the band 18.1-18.4 GHz should be limited to geostationary FSS operations in the Earth-to-space direction in Regions 1, 2, and 3, then the following is an example of a possible modification to RR No. **S5.520**.

MOD S5.520 The use of the band 18.1-18.4 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service using the geostationary-satellite orbit.

ANNEX ~~1~~7 TO CHAPTER 3

Examples of possible modifications to Section VI of Article S22

Three options were identified for how the off-axis e.i.r.p. issue should be considered. The following text includes examples of possible modifications to Section VI of Article **S22** for each of these options. In case of option 2 the example is intended for GSO FSS earth stations, recognizing that the current provisions of Section VI of Article **S22** are suspended until the review of these limits by WRC-2000 (RR **S22.VI.1**)[11].

[11] **S22.VI.1** The provisions of this section are suspended pending the review of the values in Nos. **S22.26**, **S22.27** and **S22.28** by WRC-~~99~~2000.

Option 1

Suppress the current Section VI of Article **S22** of the Radio Regulations. Thus no FSS earth station off-axis e.i.r.p. limitations would be included in the Radio Regulations.

SUPPRESS current Section VI of Article **S22**.

Option 2

Example of off-axis e.i.r.p. limits in Section VI of Article **S22** for GSO FSS earth stations in some Earth-to-space frequency bands 12.75-13.25 GHz, 13.75-14 GHz, 14-14.5 GHz and 29.5-30 GHz.

It is noted that the current Section VI of Article S22 is not restricted to GSO FSS earth stations. Further studies are required to the applicability of values in Section VI to non-GSO FSS earth stations (see § 3.1.2.2.6).

REPLACE current Section VI of Article **S22** by the following text.

Section VI – GSO ~~E~~earth station off-axis power limitations in the fixed-satellite service[11]

MOD S22.26 § 9 The level of equivalent isotropically radiated power (e.i.r.p.) emitted by an earth station within a geostationary-satellite network shall not exceed the following values for any off-axis angle φ which is ~~2.5~~3° or more off the main-lobe axis of an earth station antenna:

Off-axis angle	Maximum e.i.r.p. density
~~2.5~~3° ≤ φ ≤ 7°	(~~39~~42-25 log φ) dB(W/40 kHz)
7° < φ ≤ 9.2°	~~18~~21 dB(W/40 kHz)
9.2° < φ ≤ 48°	(4~~2~~5-25 log φ) dB(W/40 kHz)
48° < φ ≤ 180°	~~0~~3 dB(W/40 kHz)

MOD S22.27 For FM-TV emissions with energy dispersal, the limits in No. **S22.26** above may be exceeded by up to 3 dB provided that the off-axis total e.i.r.p. of the transmitted FM-TV carrier does not exceed the following values:

Off-axis angle	Maximum e.i.r.p.
~~2.5~~3° ≤ φ ≤ 7°	(~~53~~56-25 log φ) dBW
7° < φ ≤ 9.2°	~~32~~35 dBW
9.2° < φ ≤ 48°	(~~56~~59-25 log φ) dBW
48° < φ ≤ 180°	~~14~~17 dBW

MOD S22.28 FM-TV carriers which operate without energy dispersal should be modulated at all times with programme material or appropriate test patterns. In this case, the off-axis total e.i.r.p. of the emitted FM-TV carrier shall not exceed the following values:

Off-axis angle	Maximum e.i.r.p.
~~2.5~~3° ≤ φ ≤ 7°	(~~53~~56-25 log φ) dBW
7° < φ ≤ 9.2°	~~32~~35 dBW

9.2° < φ ≤ 48°	(~~56~~59-25 log φ) dBW
48° < φ ≤ 180°	~~14~~17 dBW

NOC S22.29 The e.i.r.p. limits given in Nos. **S22.26**, **S22.27** and **S22.28** are applicable in the following frequency bands allocated to the fixed-satellite service (Earth-to-space):

12.75-13.25 GHz

13.75-14 GHz

14-14.5 GHz.

ADD S22.30 The e.i.r.p. limits given in Nos. **S22.26, S22.27** and **S22.28** do not apply to earth station antennas ready to be in service[12] prior to 2 June 2000 nor to earth stations associated with a satellite network in the fixed-satellite service for which complete coordination or notification information has been received before 2 June 2000.

ADD S22.30.1 [12] "Ready to be in service" relates to the case where antennas have been installed but the start of service has been delayed due to *force majeure*.

ADD S22.31 Telecommand and ranging carriers transmitted to geostationary satellites in the fixed-satellite service in normal mode of operation (i.e. earth station transmitting telecommand and ranging carriers to a directive receiving antenna on the space station) may exceed the levels given in **S22.26** by no more than 16 dB in the frequency bands 12.75-13.25 and 13.75-14.5 GHz. In all other modes of operation, and in case of *force majeure*, telecommand and ranging carriers transmitted to geostationary satellites in the fixed-satellite service are exempted from the levels given in **S22.26**.

ADD S22.32 § 10 The level of equivalent isotropically radiated power (e.i.r.p.) density emitted by an earth station within a geostationary-satellite network in the 29.5-30.0 GHz frequency band shall not exceed the following values for any off-axis angle φ which is 3° or more off the main-lobe axis of an earth station antenna:

Off-axis angle	Maximum e.i.r.p. density*
3° ≤ φ ≤ 7°	(28-25 log φ) dB(W/40 kHz)
7° < φ ≤ 9.2°	7 dB(W/40 kHz)
9.2 < φ ≤ 48°	(31-25 log φ) dB(W/40 kHz)
48° < φ ≤ 180°	1 dB(W/40 kHz)

ADD S22.33 The e.i.r.p. limits given in **S22.32** do not apply to earth station antennas ready to be in service prior to [XXXX] nor to earth stations associated with satellite networks in the fixed-satellite service which have been brought into use before 2 June 2000.

* The above values are 6 dB higher than the corresponding values in Recommendation ITU-R S.524-5 (Doc. 4/66).

ADD **S22.34** Telecommand and ranging*** carriers transmitted to geostationary satellites in the fixed-satellite service in normal mode of operation (i.e. earth station transmitting telecommand and ranging carriers to a directive receiving antenna on the space station) may exceed the levels given in **S22.32** by no more than 10 dB** in the frequency band 29.5-30.0 GHz.

In all other modes of operation, and in case of *force majeure,* telecommand and ranging carriers transmitted to geostationary satellites in the fixed-satellite service are exempted from the levels given in **S22.32.**

ADD **S22.35** For GSO systems in which the earth stations are expected to transmit simultaneously in the same 40 kHz band, e.g. for the GSO systems employing CDMA, the maximum e.i.r.p., values in **S22.32** should be decreased by 10*log(N) dB, where N is the number of earth stations which are in the receive satellite beam of the satellite to which these earth stations are communicating and which are expected to transmit simultaneously on the same frequency.

ADD **S22.36** Earth stations operating in the 29.5-30 GHz frequency band should be designed in such a manner that 90% of the their peak off-axis e.i.r.p. density levels do not exceed the values given in **S22.32**. Further study is needed to determine the off-axis angular range over which these exceedances would be permitted, taking into account the interference level into adjacent satellites. The statistical processing of the off-axis e.i.r.p. density peaks should be dealt with using the method given in Recommendation ITU-R S.732.

ADD **S22.37** The values given in **S22.32** are maximal values under clear-sky conditions. In case of systems employing uplink power control, these levels include any additional margins above the minimum clear-sky level necessary for the implementation of uplink power control. During rain faded conditions, the levels in **S22.32** may be exceeded by earth stations when implementing uplink power control.

ADD **S22.38** FSS earth stations operating in the 29.5-30 GHz band, which have lower elevation angles to the GSO will require higher e.i.r.p. levels relative to the same terminals at higher elevation angles to achieve the same power flux-densities at the GSO due to the combined effect of increased distance and atmospheric absorption. Earth stations with low elevation angles may exceed the levels given in **S22.32** by the following amount:

Elevation angle to GSO (ε)	Increase in e.i.r.p. density (dB).
$\varepsilon \leq 5°$	2.5
$5 < \varepsilon \leq 30°$	$0.1(25 - \varepsilon) + 0.5$

ADD **S22.39** The values in **S22.32** applicable to the off-axis angle range from 48° to 180° is intended to account for spillover effects.

*** Measurement of the distance to the satellite.

** Further studies are required to confirm the value of 10 dB.

Option 3

Example of incorporation by reference of an ITU-R Recommendation, when available, to specify off-axis e.i.r.p. limits in Section VI of Article **S22** for FSS earth stations in some Earth-to-space frequency bands that are specified in Resolution **130**.

SUPPRESS Section VI of Article **S22.**

MOD S22.26 § 9 The level of equivalent isotropically radiated power (e.i.r.p.) emitted by an earth station shall not exceed the ~~following~~ values ~~for any off-axis angle φ which is 2.5° or more off the main lobe axis of an earth station antenna:~~included in an appropriate Recommendation.

ANNEX 8 TO CHAPTER 3

1 Example procedure for assuring compliance with aggregate EPFD limits

When an administration operating a GSO network in accordance with the Radio Regulations identifies EPFD levels from non-GSO systems in excess of the "aggregate" limits given in Annex 1 of Resolution **WWW**:

a) The affected administration shall immediately send a letter, by fax or other mutually agreed electronic means, to the administrations concerned and request immediate corrective action. It shall provide the necessary evidence identifying the excess interference and the source of such interference. A copy of the request shall be sent to the BR.

b) Upon receipt of the request, the interfering administrations shall acknowledge receipt within [X] days and immediately reduce emissions, equitably, to the required levels pending final determination of solutions to the problem. A copy of the acknowledgement and confirmation of the action taken shall be sent to the BR.

c) The non-GSO parties concerned work together thereafter in order to find a permanent solution to the problem, within an additional [30] days.

d) If after [30] days a solution cannot be found, then any of the parties may request the assistance of the BR.

e) The BR will study the matter and report its conclusion to the parties involved, recommending its solution to the problem within an additional [30] days. The affected administration may elect to accept the higher level of interference received.

f) If an interfering administration fails to respond within the [X]-day period in Step 3, the affected administration shall send a reminder fax requesting response within an additional [X] days.

g) If any administration fails to respond within that period, the affected administration may request the assistance of the Bureau, who will promptly send a fax to the concerned administrations.

h) See 3.1.6.1 for the case the administration fails to respond to the BR's request for cooperation.

2 Example procedure for assuring compliance with operational limits

When an administration operating a GSO network in accordance with the Radio Regulations identifies EPFD levels from non-GSO systems in excess of the "operational limit" given in Table **S22-4**, as determined by the use of ITU-R agreed measurement techniques or until such ITU-R agreed measurement techniques are available by use of the actual earth station monitoring capability:

a) That administration first attempts to identify the source of the excess EPFD.

b) If the source of the excess EPFD is readily identifiable, the administration may proceed to Step 8 below.

c) In case, after Step 1, an administration is unable to determine the source of interference, it shall send a request for cooperation to all administrations responsible for non-GSO systems using over-lapping frequency bands, providing all relevant details. A copy of the request shall be sent to the BR.

d) The requested administrations shall acknowledge receipt immediately and dispatch to the requesting administration within [y] days, with a copy to the BR, the information which may be used to identify the source of the problem.

e) If an administration fails to respond within [y] days, the affected administration shall follow up with a reminder by fax with a request for response within an additional [y] days.

f) If the administration still fails to respond, the affected administration may request the assistance of the BR, in which case the BR shall immediately send a fax to the administration responsible for the non-GSO system, requesting action within an additional [z] days.

g) See 3.1.6.2 for the case where the administration fails to respond to the BR's request for information.

h) Once the sources of the excess EPFD are identified, the affected administration sends a letter, by fax or other mutually agreed electronic means, to the administrations concerned and requests immediate corrective action. It shall provide the necessary evidence identifying the amount of excess interference and the source of such interference. A copy of the request shall be sent to the BR.

i) Upon receipt of the request, the interfering administration shall immediately reduce emissions to the required levels pending final determination of solutions to the problem and, within [y] days, so advise the administration whose network is affected. A copy of the acknowledgement and confirmation of the action taken shall be sent to the BR.

j) See comments in 3.1.6.2 on the possibility of arriving at an alternative solution.

k) The BR will study the matter within an additional [30] days, and report its conclusion to the parties involved, recommending its solution to the problem.

ANNEX 9 TO CHAPTER 3

Additional data items required in Appendix S4 for the EPFD calculations

1 Section A.4b

ADD In addition, if the stations operate in a frequency band subject to the provisions of Resolution **130 (WRC-97)** or Resolution **538 (WRC-97)**:

6) new data elements required to characterize properly the orbital operation of the non-GSO satellite systems:

a) for each range of latitudes provide:

– the maximum number of non-GSO satellites operating their downlinks co-frequency to any location; and

– the associated latitude range;

b) the minimum height of the space station above the surface of the Earth at which any satellite will be used to provide a service;

c) where the space station uses station keeping to maintain a repeating ground track, the time in seconds that it takes for the constellation to return to its starting position, i.e. such that all satellites are in the same location with respect to the Earth and each other;

d) an indicator identifying if the space station should be modelled with a specific precession rate of the ascending node of the orbit instead of the J_2 term;

e) for a space station that is to be modelled with a specific precession rate of the ascending node of the orbit instead of the J_2 term, the precession rate in degrees/day, measured counter-clockwise in the equatorial plane;

f) the longitude of the ascending node for the *j*-th orbital plane, measured counter-clockwise in the equatorial plane from Greenwich meridian to the point where the satellite makes its south-to-north crossing of the equatorial plane ($0° \leq \Omega_j < 360°$) (NOTE 1);

g) the time at which the satellite is at the location defined by Ω_j (NOTE 1);

h) the longitudinal tolerance of the longitude of the ascending node.

NOTE 1 - Currently non-GSO space stations are referenced by the "right ascension of ascending node" (A.4b5 Ωj) to the first point of Aries. However, for the evaluation of EPFD a reference to a point on the Earth is used and hence the "longitude of the ascending node" is required.

2 Section A.4b

ADD 7) new data elements required to characterize properly the performance of the non-GSO satellite systems:

a) the maximum number of non-GSO satellites receiving simultaneously [co-frequency] from the associated earth stations within a given cell;

b) the average number of associated earth stations operating co-frequency per square kilometre within a cell;

c) the average distance between co-frequency cells;

d) for the exclusion zone about the geostationary orbit provide:

– the type of zone;

– the width of the zone in degrees.

3 Section A.14

ADD **A.14 Spectrum masks**

For stations operating in a frequency band subject to the provisions of Resolution **130 (WRC-97)** or Resolution **538 (WRC-97)**:

a) for each e.i.r.p. mask used by the non-GSO space station provide:

– the type of mask;

– the mask identification code;

– the mask pattern defined in terms of the power in the reference bandwidth for a series of off-axis angles with respect to a specified reference point;

– the lowest frequency for which the mask is valid;

– the highest frequency for which the mask is valid;

b) additionally for each associated earth station e.i.r.p. mask provide:

– the minimum elevation angle at which any associated earth station can transmit to a non-GSO satellite;

– the minimum separation angle between the GSO arc and the associated earth station beam-axis at which the associated earth station can transmit towards a non-GSO satellite;

c) for each pfd mask used by the non-GSO space station provide:

– the mask identification code;

– the mask pattern of the power flux-density defined in three dimensions;

– the lowest frequency for which the mask is valid;

– the highest frequency for which the mask is valid.

4 Section C.9

ADD *d)* For stations operating in a frequency band subject to the provisions of Resolution **130 (WRC-97)** or Resolution **538 (WRC-97)**, provide:

– the type of mask;

– the mask identification code.

CHAPTER 4

Space science services and radio astronomy

(WRC-2000 agenda items 1.16, 1.17)

CONTENTS

4.1 Agenda item 1.16

"to consider allocation of frequency bands above 71 GHz to the Earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution **723 (WRC-97)**"

***Resolution** 723 (WRC-97) "Consideration by a future competent world radiocommunication conference of issues dealing with allocations to science services"*

4.1.1 Summary of technical and operational studies including consideration of Resolution 723 (WRC-97)

4.1.1.1 Services allocated in the 71-275 GHz frequency range

The frequency range under consideration includes exclusive allocations to the passive services, as well as some shared, co-primary allocations with the fixed (FS), mobile (MS), inter-satellite (ISS) and fixed-satellite (FSS) services. The passive services are also allocated by footnotes No. **S5.149** and No. **S5.340** to a number of bands and/or sub-bands that are shared with other services. The amateur (AS), amateur-satellite (ASS), radiolocation (RLS), radionavigation (RNS), radionavigation-satellite (RNSS), broadcasting (BS), broadcasting-satellite (BSS), mobile-satellite (MSS), ISS and FSS have primary allocations, and the space research (space-to-Earth), amateur, amateur-satellite and radiolocation have secondary allocations in the frequency range 71-275 GHz.

4.1.1.2 Scientific requirements for radio astronomy above 71 GHz

4.1.1.2.1 Importance of the millimetre and decimillimetre bands for radio astronomy

Radio astronomy at millimetre and decimillimetre wavelengths developed greatly during the last two decades, and is possibly the fastest growing area within radio astronomy. Growth is driven by the scientific opportunities available only in this frequency range, (e.g. in astrochemistry, physics of stellar and circumstellar envelopes, formation of stars, planets and protoplanets, chemical composition of the interstellar medium, physical conditions in the early Universe and Galaxy formation, etc.) which has been made possible by technological developments, such as, the availability of low noise receivers and the development of millimetre wave instrumentation in general. Ground-based radio telescopes in the mm-range are currently operated by administrations in all three ITU Regions, up to frequencies of 900 GHz.

Millimetre-wave observatories represent a major investment and are, therefore, required to maximize their scientific return. Consequently, great care is being taken to locate them at the best possible sites. To cover the entire sky, there is a need to have access to good observing sites in both the northern and southern hemispheres. Extremely dry locations at high elevations are preferred. Several large telescopes (interferometers and single dish telescopes), that will cover the millimetre and decimillimetre wavelength ranges are either under construction or in advanced stages of planning. The US-European Atacama Large Millimeter Array (ALMA), and the Japanese Large Millimeter and Submillimeter Array (LMSA) are to be located in Chile, and will likely be combined into one international megascience project. Other large telescopes under construction are the US Smithsonian Astrophysical Observatory's Submillimeter Array (SMA) and the Large Millimeter Telescope (LMT), a US-Mexico collaborative project, being built in Mexico. In addition to these large international facilities there are some others scattered around the world, that have a more restricted range of applications.

As an example of the new telescopes using the most up-to-date technology, the ALMA-LMSA is planned to consist of 40-60 parabolic antennas of 12-metre diameter. From just above the oxygen absorption band near 60 GHz to near 850 GHz in the decimillimetre range, there will be a series of receivers at each antenna which will cover most of the spectrum. The remoteness of the site will allow access to most of the millimetre wavelength spectrum, except that which contains emissions from satellites or aircraft.

Observations at millimetre-decimillimetre wavelengths from space also contribute significantly to several areas of radio astronomy. Sharing criteria applicable to ground-based radio astronomy are usually not applicable to radio astronomy from space.

4.1.1.2.2 Access to spectral lines of importance to radio astronomy (71-275 GHz)

Over 2 100 spectral lines of 80 chemical compounds have been identified to date, many detected lines are yet to be identified, and more species and lines are predicted. Many of the lines are astrophysically very important (see e.g. Recommendation ITU-R RA.314-8), and interest in others may be triggered by new discoveries. To facilitate sharing of the spectrum with other users, the International Astronomical Union (IAU) periodically revises the list of lines of most astrophysical interest. Radio astronomers are interested in preserving access to as many of these spectral lines as possible, because they may yield unique information about physical processes in certain celestial objects.

Astronomical discoveries of new molecular species have stimulated other scientific fields such as molecular spectroscopy and quantum chemistry, with potential practical applications. One example of a discovery directly stimulated by millimeter-wave radio astronomy is the discovery of fullerenes, first detected in the laboratory experiments designed to understand the chemistry in atmospheres of giant stars, observed to produce abundant long carbon-chain molecules, which brought about the development of an entire new branch of chemistry.

There are also many astrophysically important spectral lines at frequencies above 275 GHz (see e.g. Recommendation ITU-R RA.314-8). Many millimetre/decimillimetre observatories now operate up to 900 GHz and space-borne telescopes will soon operate above 1 000 GHz. Table 4-1 lists the frequency bands in the 71-275 GHz range, containing most spectral lines of interest to radio astronomy that are accessible from the ground.

TABLE 4-1

Frequency range (GHz)	Number of detected molecular lines	Lines listed in Recommendation ITU-R RA.314-8
71.0-86.0	326	1
86.0-92.0	224	7
92.0-94.0	21	1
94.1-105.0	322	1
105.0-116.0	194	4
136.0-170.0	208	3
200.0-209.0	9	0
215.0-217.0	49	0
217.0-231.0	321	3
231.0-265.0	450	1
265.0-275.0	15	3

4.1.1.2.3 Radio astronomy service requirements above 275 GHz

The current Table of Frequency Allocations does not extend above 275 GHz. However, there are already a number of radio astronomy observatories equipped to observe in this area of the spectrum and scientific requirements of the large international facilities now under development certainly include plans for observations up to about 900 GHz. No. **S5.565** currently notes that the bands 278-280 GHz and 343-348 GHz are identified as bands that should be protected for use by the RAS. Additionally, the bands 275-323 GHz, 327-371 GHz, 388-424 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz and 795-909 GHz have been identified as bands that are or that will be used by radio observatories in the future.

4.1.1.2.4 Radio astronomy receiver characteristics in the millimetre wavelengths

Wide frequency bandwidth coverage is required in radio astronomy, to enable sensitive observations of faint objects, such as extra-solar planetary systems, or very distant galaxies. The sensitivity of an observation increases in proportion to the square root of the bandwidth, and recent technology enables using bandwidth of up to 8 GHz in heterodyne receivers. In addition wide frequency coverage is needed to observe the highly red-shifted[1] objects that are characteristic of the early Universe. For example, highly Doppler-shifted ("red-shifted") CO lines, from about ten billion years ago, have been observed recently at about 1/5 of the rest frequency of the line. Such observations provide crucial information on the formation of galaxies, and the history of the early Universe, not obtainable by other methods. Very sensitive observations are now also possible using very wide bandwidth bolometer detectors. These require bandwidths of several tens of GHz and many involve arrays of detectors of up to a hundred individual elements. Such devices are in use at several radio astronomy observatories and need the protection provided by continuum allocations. These instruments are also leading the development of new and innovative radio technologies.

The instrumentation used at millimetre-wave observatories lies at the very forefront of radio technology. Much of this instrumentation is particularly susceptible to interference. For example, many modern systems employ SIS (Superconductor-Insulator-Superconductor) mixers, which are subject to temporary saturation or permanent burnout at very low power densities. These devices are achieving noise temperatures close to the quantum limit. Development of systems with improved rejection of out-of-band signals is an important priority for future research.

4.1.1.3 Scientific requirements for spaceborne passive sensing above 71 GHz

Within the frequency range under consideration, sensors on board satellites operating in the EESS (passive) and SRS (passive) can be collectively described as "spaceborne passive sensors".

4.1.1.3.1 Scientific requirements for spaceborne passive sensing in the 71-275 GHz range

Almost all of the current spaceborne passive sensing allocations in the range 71-275 GHz were decided by WARC-79. Many technological and scientific advances and discoveries have occurred since that time and these allocations need to be revised to reflect present and foreseeable future requirements for spaceborne passive sensing for a myriad of Earth observation applications including agriculture, climatology, meteorology and study of global change of the Earth and its

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[1] The rest frequency of a spectral line is the frequency that is observed in a rest frame, e.g. in the laboratory. Celestial objects, outside our Galaxy, recede with a velocity that is proportional to their distance from us, and consequently spectral lines that originate in these objects appear to us Doppler-shifted towards lower frequencies ("red-shifted").

environment. Increased awareness of the stress being placed on the Earth system has led the global user community, including the World Meteorological Organization, Global Climate Observing System, and World Climate Research Programme, to define satellite data requirements for atmospheric parameters including temperature and water vapour profiles, ozone concentration, and other radiatively and chemically active trace gases, which can only be met by satellite passive sensors. The frequency range 71-275 GHz is fundamental to the achievement of these important sensing capabilities.

Information on the spaceborne passive sensing spectrum requirements in the range 71-275 GHz are given in Table 4-2. General comments on the scientific applications of each of these bands is also given. It should be noted that many atmospheric constituent lines (e.g. nitrous oxide, carbon monoxide, chlorine, ozone, etc.) exist throughout this frequency range and only those lines deemed most critical have been included in the table. Furthermore, multiple lines attributed to the same atmospheric constituent are often required in order to map out the atmospheric concentrations at different altitudes.

TABLE 4-2

Bands required for spaceborne passive sensing (GHz)	**Scientific applications**
86-92	Reference window used in conjunction with the oxygen absorption band around 118.75 GHz. Band also used for clouds and precipitation measurements.
100-102	Band contains a nitrous oxide line near 101 GHz for atmospheric limb sounding.
109.8-111.8	Band contains ozone line at 110.8 GHz for microwave limb sounding.
114.25-122.25	Band is a unique natural resource for sounding the temperature of the lower troposphere from geostationary orbiting passive sensors using the oxygen absorption line at 118.75 GHz. Also, contains carbon monoxide line at 115.27 GHz for microwave limb sounding.
148.5-151.5 and 164-167	These bands are necessary to collect meteorological information at the Earth's surface as well as near the surface of the Earth and is used in conjunction with the water vapour line near the 183.31 GHz for atmospheric sounding. Additionally, these bands contain a nitrous oxide line at 150.74 GHz and a ClO line at 164.38 GHz for microwave limb sounding.
174.8-191.8	This band is a unique natural resource to provide a complete tropospheric water vapour vertical profile from LEO passive sensors and from geostationary orbiting passive sensors using the water vapour absorption line whose peak is at 183.31 GHz.
200-209	This band is the important band for microwave limb sounding of various atmospheric constituents in the stratosphere and troposphere.
226-231.5	This band is required for microwave limb sounding of various atmospheric constituents and also to provide 4 GHz reference window for water vapour sounding near 325 GHz.
235-238	This band contains two critical ozone lines for microwave limb sounding of the atmosphere at 235.71 GHz and 237.15 GHz.
250-252	This band contains a nitrous oxide line near 251 GHz for use for microwave limb sounding applications.

4.1.1.3.2 Scientific requirements for spaceborne passive sensing above 275 GHz

The current Table of Frequency Allocations does not extend above 275 GHz. However, there are already spaceborne passive sensors utilizing frequency bands in this area of the spectrum and many more are planned for other bands in the future. No. **S5.565** currently notes that the bands 275-277 GHz, 300-302 GHz, 324-326 GHz, 345-347 GHz, 363-365 GHz, and 379-381 GHz are identified as bands that should be protected for use by spaceborne passive sensors. Additionally, the bands 294-306 GHz, 316-334 GHz, 342-349 GHz, 371-389 GHz, 416-434 GHz, 442-444 GHz, 496-506 GHz, 546-568 GHz, 624-629 GHz, 634-654 GHz, 659-661 GHz, 684-692 GHz, 730-732 GHz, 851-853 GHz and 951-956 GHz have been identified as bands that will also be used for spaceborne passive sensing.

4.1.1.3.3 Passive sensing requirements not clearly identified within agenda item 1.16

Terrestrial passive sensing is performed in a number of frequency bands above 71 GHz (200-209 GHz, 235-238 GHz, 250-252 GHz which have primary allocations for Earth exploration-satellite (passive) and 265-275 GHz which has no allocation for Earth exploration-satellite (passive)). However, this activity may not fall within the definition of any ITU radiocommunication service. Instead, No. **S1.51** possibly relates it to the Earth exploration-satellite service by referring to Earth-based platforms. Therefore, the need for a definition of such a service could be reviewed by WRC-2000 under agenda item 1.16 to facilitate consideration of allocation requirements at a future competent conference.

4.1.1.4 Studies in the frequency range above 71 GHz

A number of studies have been carried out by various administrations, leading to the following existing Recommendations:

ITU-R RA.314-8, RA.611-2, RA.769-1, RA.1031-1, RA.1272, SA.515-3, SA.1028-1 and SA.1029-1.

Recommendation ITU-R SA.1416 addressing the feasibility of sharing between spaceborne passive sensors and inter-satellite links of GSO and non-GSO satellite networks near 118 and 183 GHz has been developed.

4.1.2 Analysis of the results of the studies

Sharing studies have been limited to frequencies below 275 GHz.

4.1.2.1 Sharing between the RAS and other services

4.1.2.1.1 Sharing between the RAS and terrestrial services

Active terrestrial services allocated above 71 GHz include the FS, MS, AS, RLS, RNS and BS. No sharing studies between the RAS and these services have been performed yet within the ITU, because few or no parameters are available to characterize the services with which sharing needs to be assessed in this spectral region. Sharing between terrestrial services and ground-based radio astronomy is considered feasible, however, because of the limited number of existing and planned radio astronomy stations worldwide, and their remote location (Recommendation ITU-R RA.1272), Administrations may establish coordination zones around millimetre-wave astronomical observatories. Coordination radii of the order of 100 km may be necessary. Assuming, for example an absorption coefficient of 0.5 dB/km, spreading and propagation losses over a distance of 100 km amount to about 150 dB. The power flux-density due to a 1 kW omnidirectional transmitter at a distance of 100 km is then typically -120 dB(W/m^2). Detrimental power flux-densities for continuum radio observations in astronomy bands above 71 GHz listed in Recommendation ITU-R RA.769-1, Table 1, range from -125 dB(W/m^2) at 89 GHz to -113 dB(W/m^2) at 270 GHz. For spectral line observations, Table 2 of the same Recommendation gives values ranging from -144 dB(W/m^2) at 88.6 GHz to -131 dB(W/m^2) at 265 GHz. Taking advantage of terrain shielding, already done at some operating millimetre-wave observatories, may reduce the size of the required coordination zone. Recommendation ITU-R RA.1272 notes the need for further studies of the size of the coordination zone.

Because of the relatively small area of the coordination regions required, the RAS should be able to share with terrestrial services with minimum impact, by means of geographical sharing, time-sharing, or both. Geographical and/or time-sharing should be possible between the RAS and the fixed, mobile, amateur and radiolocation services. The possible exception is the broadcasting service, with which sharing may be difficult or may require large coordination radii because of the high power levels employed by this service. Given that new allocations to the RAS are intended to be used at only a few remote locations worldwide, the RAS could accept a footnote, limiting additional allocations to be shared with terrestrial services, to coordination zones around observatories.

4.1.2.1.2 Sharing between the RAS and the MSS and FSS

Sharing between MSS and FSS uplinks and the RAS are no different from sharing with the terrestrial services, and should be manageable by geographical separation. The impact of satellite downlinks on radio astronomy at all frequencies is discussed in Recommendation ITU-R RA.611-2. It is concluded that sharing with satellite downlinks is not possible except through time-sharing or through sharing on a regional basis.

Millimetre wave radio observatories are particularly vulnerable to even very low levels of unwanted emissions. Particular care should therefore be taken in the millimetre range of the spectrum to avoid out-of-band emission problems between the RAS and satellite service downlinks that may be used globally. Therefore, it is of great interest to avoid adjacent allocations between the RAS and satellite services in the space-to-Earth direction as much as possible. To minimize adjacent allocation concerns, and to enable the passive services to have access to the widest possible bandwidth, allocations to satellite downlinks should be moved close to the edges of the atmospheric windows[2]. In doing so, care should be taken to avoid shifting satellite downlinks to spectral regions of atmospheric opacity that would render their operation difficult or impossible, when they develop plans to use the 71-275 GHz range.

4.1.2.1.3 Sharing between the RAS and the BSS

The large areas of the Earth illuminated by the BSS and the high power levels that are likely to be employed make sharing with this service particularly difficult for the radio astronomy service.

4.1.2.1.4 Sharing between the RAS and the RNSS, ASS and SRS (active)

Line-of-sight sharing between the RAS and the RNSS, the ASS and the SRS (active) is not feasible. No satellites are known to operate above 71 GHz at present in these services. When systems become operational at these frequencies, it is expected that the number of satellites will be limited, and their

[2] The atmospheric windows are spectral regions of low atmospheric opacity. In contrast to these windows, strong absorption lines centred on approximately 118 GHz and 183 GHz, render the atmosphere opaque to radio waves near these frequencies.

orbital elements will be known. With exception of the radionavigation-satellite service, time-sharing these bands may be possible, as radio astronomy stations could schedule observations at those times when no satellite is above the horizon.

4.1.2.1.5 Sharing between the RAS and the ISS

Most bands allocated to the ISS are in spectral regions of high atmospheric opacity. No sharing studies between the RAS and the ISS have been conducted to date, due to lack of parameters to characterize the ISS systems. There is a need to carry out such studies as soon as possible. Some bands allocated to the ISS contain spectral lines of interest to the RAS, and shared allocations for the RAS may be sought in these. In the absence of sharing studies no operational restrictions should be placed on the ISS as far as ground-based radio astronomy is concerned. Line-of-sight sharing between the ISS and space-based radio astronomy stations may not be possible.

4.1.2.2 Sharing between EESS (passive) and other services

4.1.2.2.1 Sharing between EESS (passive) and the terrestrial services

Considering the bands currently shared or potentially shared in the future between the above services, ITU-R studies indicates that sharing between EESS (passive) and the fixed service is generally feasible in bands of high atmospheric absorption. Sharing in many bands may require constraints on the fixed service in order to protect the spaceborne passive sensors. In bands where the interference threshold for passive sensors may not be exceeded more than 0.01% of the measurement cells in the sensor's service area as given in Recommendation ITU-R SA.1029-1, sharing may be technically feasible, but not practicable due to the necessary constraints on the fixed service, in order for them to respect the interference threshold and data availability criteria.

In particular, studies on sharing between these two services in the bands 114.25-122.25 GHz and 174.8-191.8 GHz have indicated that sharing between spaceborne passive sensors and the fixed service may only be feasible under very stringent conditions and therefore may not be practicable. One study on sharing between microwave limb sounders and the fixed service in the bands 200-275 GHz concluded that sharing was not feasible while another study indicated that sharing may be feasible given certain assumptions.

The feasibility of sharing between the EESS (passive) and the mobile and amateur services are considered similar to the feasibility of sharing between the EESS (passive) and the fixed service.

4.1.2.2.2 Sharing between EESS (passive) and the ISS

Studies have indicated that sharing in the bands 116-122.25 GHz and 174.8-190 GHz between spaceborne passive sensors of the EESS and the ISS is feasible if the ISS is limited to satellites in the geostationary orbit with suitable pfd limits as given in Recommendation ITU-R SA.1416.

4.1.2.2.3 Sharing between EESS (passive) and the MSS, FSS and BSS

Sharing between spaceborne passive sensors and the MSS, FSS and BSS operating in the Earth-to-space direction is generally not feasible due to the direct mainlobe interference that results whenever an earth station of one of these services is in view of the sensor. Sharing between the spaceborne passive sensors and these services in the space-to-Earth direction has not been studied due to the lack of information available on potential systems in these services. Additionally, the interference mode that would need to be analysed to determine if sharing is feasible involves examining reflections of satellite emissions off the surface of the Earth. There is insufficient information on modelling such reflections at these frequencies. However, experience in other bands indicates that severe data loss to the sensor can occur from this type of interference.

Determination of sharing feasibility between passive microwave limb sounders and these satellite services would require further study.

4.1.2.2.4 Sharing between EESS (passive) and RNSS and ASS

The feasibility of sharing between spaceborne passive sensors and the radionavigation-satellite and amateur-satellite services are considered similar to the feasibility of sharing between the spaceborne passive sensors and the MSS, FSS, and BSS services. The major difference is that there would potentially be a limited number of satellites in these services when systems become operational at these frequencies.

4.1.2.2.5 Sharing between EESS (passive) and radiolocation and radionavigation services

Sharing between spaceborne passive sensors and the radiolocation and radionavigation services is not feasible.

4.1.3 Methods to satisfy the agenda item and their advantages and disadvantages

In proposing to satisfy the agenda item, the following considerations should be kept in mind:

1) Passive allocations should be made in response to observational requirements determined by natural (e.g. astrophysical or atmospheric) processes.

2) Passive allocations in the range 71-275 GHz need to be revised to reflect current scientific requirements. There is a continued requirement for allocations for some exclusive passive bands in the millimetre-wave region, because:

   a) passive sensors of the EESS (passive) are operated on a global basis and coordination with other services is generally not practical;

   b) space-based radio telescopes can observe in bands of high atmospheric opacity that may not be observed from the ground;

   c) space-based radio telescopes are also used in conjunction with ground-based radio telescopes for VLBI, and some allocations are needed which are accessible to both terrestrial and space-based radio telescopes;

   d) passive sensor atmospheric measurements are also taken from Earth-based platforms in many passive bands.

3) The 71-275 GHz part of the Table of Frequency Allocations was adopted at WARC-79, as what was then thought to be a reasonable balance among the various services that are involved. While the technology for the active services has not yet been developed to a level that would permit the use of these services, it is foreseen that the technology is going to be available and that active service systems will be implemented in the future. Based on the rapidly increasing use of the frequency bands below 71 GHz by the active services, it is clear that future systems will be required to operate in the frequency bands above 71 GHz. Consequently, any changes to the frequency allocations in the 71-275 GHz range must continue to accommodate active service requirements. In particular, as much as practicable:

   a) changes regarding the spectrum allocated to other services above 71 GHz should be minimized, in particular in terms of the amount of spectrum, frequency separation between space-to-Earth and Earth-to-space allocations or in increase in slant path atmospheric attenuation at low elevation angle, e.g. 20°;

   b) any new allocation to the passive services should avoid adding further difficulties for sharing between active services;

c) in order to accommodate future wideband systems, the allocated bands for the active services should not be fragmented into narrow frequency blocks.

4.1.3.1 Method to satisfy the agenda item (radio astronomy)

4.1.3.1.1 Additional exclusive allocations for radio astronomy

No additional exclusive allocations are required for the radio astronomy service.

4.1.3.1.2 Additional radio astronomy allocations in bands shared with terrestrial services

Additional co-primary allocations should be made to the radio astronomy service in bands that are allocated to terrestrial services. Such allocations would impose constraints on terrestrial services only within a limited number of coordination zones worldwide.

Advantages

- Shared allocations with the terrestrial services would permit the radio astronomy service assured access to bands that are required for astronomical research.

Disadvantages

- Coordination with the radio astronomy service would be required at a few sites worldwide, however, the impact of co-primary allocations to the terrestrial services and the RAS above 71 GHz is expected to be limited. Coordination radii should be of the order of 100 km (60 miles), and would affect principally areas that are uninhabited or very sparsely populated.

4.1.3.1.3 Additional radio astronomy allocations in bands shared with satellite services

Radio astronomy could share with some satellite services, that are known not to make use of the bands now, and are not expected to do so for some time, such as the amateur-satellite service. Sharing may also be possible between the RAS and the ISS. Band sharing between the RAS and some satellite services may be possible through coordination.

Advantages

- Shared allocations with some satellite services would permit the radio astronomy service assured access to bands that are required for astronomical research.

Disadvantages

- There may be minor coordination requirements associated with the affected satellite services. Such coordination requirements may be limited by regulatory action, and may consist of no more than providing the orbital elements to radio astronomy stations through some pre-established mechanism.

4.1.3.1.4 Proposed realignment of services between 71 and 275 GHz for radio astronomy

To protect the passive services from unwanted emissions, there is a need to realign the spectrum between 71 and 275 GHz. Satellite downlinks could be moved towards the edges of the transparent atmospheric windows, leaving the middle portion of the windows available to be shared by terrestrial services and wideband RAS receivers. In shifting certain downlink allocations towards the higher opacity edges of the atmospheric windows care should be taken not to put undue burden on the affected services. For observations from ground-based observatories the most important scientific requirements cover bands near the centre of the atmospheric windows, approximately 71-116 GHz, 136-170 GHz and 200-275 GHz. These bands would allow radio astronomers access to many of the most important molecular lines (CO, CS, HCN, HCO^+, SiO, H_2S, etc.) and would also permit observations of wideband continuum radiation, essential for the study of some phenomena, e.g., the Big Bang.

Advantages

- Along with the proposed shared allocations between terrestrial services and radio astronomy, realignment of the spectrum by WRC-2000 would satisfy the agenda item, and would provide the needed spectrum space and protection to the radio astronomy service. In some instances relocation of satellite downlinks may result in allocation in a spectral region with lower atmospheric absorption than the currently allocated band, due to the overall increase in opacity with frequency across the whole 71-275 GHz range. Reallocation may also remove some regulatory constraints, such as No. **S5.149**, from bands allocated to satellite downlinks.

Disadvantages

- In some instances relocation of satellite downlinks may result in an allocation in a spectral region with slightly higher atmospheric absorption than the currently allocated band. It is not advisable to shift downlink allocations to spectral regions of very high opacity. Typical increases of atmospheric attenuation could be 0-2 dB, which may be modest in comparison to variations in opacity due to common changes in atmospheric conditions.

4.1.3.2 Methods to satisfy the agenda item (Passive sensors)

4.1.3.2.1 Requirements in the range 71-275 GHz

§§ a), b) and c) give a three step methodology to satisfy the spaceborne passive sensor requirements in the range 71-275 GHz as given in Table 4-2 of § 4.1.1.3.1.

a) Retention and required protection of spaceborne passive sensors in currently allocated bands in the 71-275 GHz range

Passive sensor primary allocations in the 86-92 GHz, 100-102 GHz, 109.8-111.8 GHz, 114.25-122.25 GHz, 150-151 GHz, 156-158 GHz, 164-167 GHz, 174.8-176.5 GHz, 182-185 GHz, 200-202 GHz, 226-231 GHz, 235-238 GHz, and 250-252 GHz bands are required for future use of passive sensing. The bands 86-92 GHz, 109.8-111.8 GHz, 164-167 GHz, 182-185 GHz, 226-231 GHz and 250-252 GHz are currently adequately protected. Protection of passive sensors currently allocated in the 100-102 GHz, 116-122.25 GHz, 150-151 GHz, 156-158 GHz, 174.8-176.5 GHz, 200-202 GHz and 235-238 GHz bands may require exclusive use by the passive sensors except in bands where sharing with the ISS is feasible. Further studies are necessary to assess to what extent future active services can share with EESS (passive). The 156-158 GHz band may not be required for satellite passive remote sensing after 2018 and this allocation could be removed at that time.

b) Possible removal of current spaceborne passive sensor allocations that are not required for future use

Based on all known requirements, the present passive sensor allocations in the bands 105-109.8 GHz, 111.8-114.25 GHz, 122.25-126 GHz, 167-168 GHz, 174.5-174.8 GHz and 217-226 GHz may not be needed. The band 156-158 GHz is currently planned for use by certain instruments but may not be needed after the year 2018.

c) Possible additional spaceborne passive sensor allocations in the 71-275 GHz range

Additional primary allocations could be made in the following bands in order to satisfy the spaceborne passive sensor spectrum requirements given in Table 4-2 of § 4.1.1.3.1: 148.5-150 GHz and 151-151.5 GHz; 155.5-156 GHz and 158-158.5 GHz (noting that these two bands may not be required after 2018); 176.5-182 GHz and 185-191.8 GHz; 202-209 GHz; and, 230-231.5 GHz. Introduction of passive sensors into these bands may not create favourable sharing situations for any of the affected services. Protection of passive sensors may require initial exclusive allocations in these bands, pending the conduct of sharing studies to establish the extent that future active services can share with EESS (passive).

Advantages

- Maintaining and protecting some of the current spaceborne passive sensor allocations would satisfy some of the passive sensor requirements for current and future applications.
- The additional requirements of passive sensors in the range 71-275 GHz would be satisfied in these key bands which would allow the various meteorological and global change applications to be carried out for now and the future.
- Also removing the current passive sensor allocations that may not be required will allow these bands to be used by active services.

Disadvantages

- In order to adequately protect many of the existing and additional passive sensor allocations and allow for the future growth of the other services that are currently allocated to these bands, these active services would consequentially need to be equitably accommodated in other appropriate bands.

4.1.3.2.2 Additional passive requirements above 275 GHz

Footnote No. **S5.565** of the Table of Frequency Allocations could be modified to reflect the new requirements of the passive services above 275 GHz identified as described in §§ 4.1.1.2.3 and 4.1.1.3.2.

Advantages

- This action would indicate the scientific use of passive services above 275 GHz.

Disadvantages

- There are no disadvantages to this action.

4.1.4 Regulatory and procedural considerations

Any new or relocated allocations would require an updating of the Table of Frequency Allocations contained in Article **S5** as well as a thorough review of all relevant footnotes.

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4.2 Agenda item 1.17

"to consider possible worldwide allocation for the Earth exploration-satellite (passive) and space research (passive) services in the band 18.6-18.8 GHz taking into account the results of ITU-R studies"

4.2.1 Summary of technical and operational studies

The band 18.6-18.8 GHz is allocated to the EES (passive) and SR (passive) services on a primary basis in Region 2 and on a secondary basis in Regions 1 and 3. The FS, the MS and the FSS (space-to-Earth) are allocated worldwide on a primary basis. Nos. **S5.522** and **S5.523** request administrations to limit the power of fixed-service transmitters and the pfd produced by FSS space stations as far as possible in order to reduce the risk of interference to passive sensors. Simultaneous measurements in several different frequency bands are required to isolate the values of any one surface phenomenon (such as rain or ocean wind speed). Measurements in the 18.6-18.8 GHz band are essential because the band has unique characteristics that are important to obtaining measurements of environmental conditions on the Earth's land and ocean surfaces. This band is also essential to the FSS and FS for telecommunications applications. The FS service uses this band to provide mobile network infrastructure and medium hop links for public telecommunications networks.

A number of studies have been carried out by various administrations leading to the following Recommendations:

Recommendations ITU-R SA.515-3, SA.1028-1, SA.1029-1 and F.761.

4.2.2 Analysis of the results of studies

4.2.2.1 Sharing between EESS (passive) and the GSO FSS

Previous studies have determined that passive spaceborne sensors and GSO FSS networks operating at the pfd limit in the RR would not be compatible.

4.2.2.1.1 Impact of various FSS pfd limits on EESS (passive)

Studies within ITU-R have shown that an FSS pfd limit of -112 dB(W/m^2) across the 200 MHz band 18.6-18.8 GHz would be necessary to enable passive sensors to meet their interference criterion of -155 dBW in a reference bandwidth of 100 MHz (Recommendation ITU-R SA.1029-1) without any constraints on the design of the passive sensors. However, these studies also have shown that with a pfd limit of -101 dB(W/m^2) in a reference bandwidth of 200 MHz, sensor data could be obtained when the sensor moves away from the Equator where the angle between the direction of the reflected GSO FSS signal and the sensor antenna is greatest. Further studies examined the data loss experienced by the passive sensor for a variety of GSO FSS pfd limits ranging from -101 dB(W/m^2) to -82 dB(W/m^2) in a reference bandwidth of 200 MHz. These studies determined the passive sensor data loss for a variety of GSO FSS deployment scenarios for 4, 8 and 16 GSO FSS satellites per GSO FSS coverage area. The results are given in Table 4-3.

TABLE 4-3

Coverage loss for various GSO FSS pfd values

pfd	Data loss over GSO FSS service area			Data loss over all land masses		
dB(W/m^2) 18.6-18.8 GHz	4 satellites	8 satellites	16 satellites	4 satellites	8 satellites	16 satellites
-101			2.4%			2.1%
-100		0.3%	7.8%		0.3%	6.7%
-98	0.3%	3.2%	32.1%	0.3%	2.8%	27.6%
-97	0.8%	7.9%	43.3%	0.7%	6.8%	37.2%
-96	2.0%	16.1%	50.1%	1.7%	13.8%	43.0%
-95	**4.4%**	**26.5%**	**54.5%**	**3.7%**	**22.8%**	**46.9%**
-94	8.6%	36.3%	58.3%	7.4%	31.2%	50.1%
-93	14.9%	43.6%	61.6%	12.8%	37.5%	52.9%
-92	22.9%	48.7%	64.6%	19.7%	41.8%	55.6%
-91	31.5%	52.6%	67.5%	27.0%	45.2%	58.0%
-90	38.9%	56.1%	70.3%	33.5%	48.2%	60.4%
-88	49.4%	62.2%	75.9%	42.5%	53.5%	65.3%
-86	56.7%	68.1%	82.7%	48.8%	58.5%	71.1%
-84	63.1%	74.3%	92.2%	54.2%	63.9%	79.3%
-82	69.4%	82.8%	98.0%	59.7%	71.2%	84.2%

These values were derived with the assumption that the entire world's land masses were all serviced by the same distribution of GSO FSS systems. This is clearly not the case as many areas of the world would require four or less GSO FSS satellites to service a given area while very few areas of the world would require as many as 8 to 16 GSO FSS satellites to meet their communications needs. To take into account this uneven distribution, a four satellite system's average within a given service area on a worldwide basis is considered a reasonable hypothesis. In addition, to limit the data loss by EESS (passive), it is also assumed that the passive sensor will be limited to taking data in only 50% of its orbit (i.e. while travelling towards the poles).

Based on these hypotheses, an FSS pfd limit of -95 dB(W/m^2) per 200 MHz in the 18.6-18.8 GHz band will provide a data loss below 5%, as shown in Table 4-3 (first and fourth columns). This data loss value will still allow passive sensor operations to acquire a satisfactory amount of useful data over land masses on a worldwide basis. It should be noted that this pfd limit represents a 17 dB relaxation of the passive sensor protection criteria as contained in Recommendation ITU-R SA.1029-1. It should also be noted that passive sensors that acquire data exclusively over ocean regions will experience far less data loss than the values shown in Table 4-3 and could therefore acquire data over 100% of their orbits over oceans. Therefore, this pfd limit would protect ocean sensing applications to a higher degree. A higher pfd limit for GSO FSS systems utilizing scanning spot beams may also be possible, given the non-continuous nature of the interference; however further studies are required on this point.

Studies within ITU-R have also indicated that a pfd limit of -95 dB(W/m^2) across the 18.6-18.8 GHz band applied to 12-hours highly elliptical orbit (HEO) FSS systems would also protect the EESS (passive) systems. Furthermore, studies have indicated that low-Earth orbiting (LEO) systems cause significantly greater interference into the sensor than do either GSO or HEO systems. However, these studies did not arrive at an appropriate pfd limit for LEO FSS systems that would protect sensor operations in this band. Therefore, ITU-R should perform studies to determine an appropriate pfd limit for LEO FSS systems that would protect the operation of spaceborne passive sensors and allow satisfactory operation of LEO FSS systems, before such systems are introduced into the 18.6-18.8 GHz band.

4.2.2.1.2 Impact of new pfd constraints on the FSS

The limit of -95 dB(W/m^2) across the 18.6-18.8 GHz band however constitutes a 13 dB tightening on the existing limit which will place constraints on the future development of the GSO FSS in this band. Assuming that spacecraft amplifiers in this band will reach power levels comparable to those in 4/6 GHz and 11/14 GHz bands (21 dBW), for example a spot beam with 50 dBi gain would exceed the limit by at least 3 dB (-92.2 dB(W/m^2)). Prime power and bus size limit the number of such beams that would be present on a GSO spacecraft. However, these beams would have minimal impact on the EESS (passive) as they would be few in number and have a very small footprint on the Earth. As a result, an excessively constraining pfd limit denies the ability of future GSO systems to focus energy in limited geographic areas. From the FSS perspective a viable solution would be to impose a limit of -92 dB(W/m^2) in the 18.6-18.8 GHz band, which would allow for the growth of the GSO FSS.

Table 4-4 illustrates the minimum earth station antenna size which can be used in example systems with clear-sky C/N objectives of 17 dB and 11 dB, for various system noise temperatures and pfd limits. Compared to the current RR pfd limit equivalent to -82 dB(W/m^2) per 200 MHz, a limit of -95 dB(W/m^2) in the 18.6-18.8 GHz band, would substantially restrict the ability of FSS operators to use the band for services to small-dish earth terminals, which are required increasingly today.

TABLE 4-4

Minimum earth station antenna size (metres) without adjacent satellite interference

Clear sky C/N		**11 dB**			**17 dB**		
pfd (dB(W/m^2) per 200 MHz)		**-88**	**-92**	**-95**	**-88**	**-92**	**-95**
System noise temp	300 K	0.13	0.21	0.30	0.27	0.42	0.59
	600 K	0.19	0.30	0.42	0.38	0.59	0.84
	1 000 K	0.24	0.38	0.54	0.48	0.77	1.08

Satellite spacing and interference environment must also be considered. These effects are illustrated in the results from an example analysis shown in Table 4-5 whereby the required earth station antenna size is given that will assure acceptable sharing conditions for GSO satellites at 2° orbital spacing of co-coverage satellites using the same polarization. The analysis assumes a net C/I for the intra-beam interference of 18 dB, as was the case in Annex 2 of Recommendation ITU-R S.1328(Rev.). The receiver noise temperature was conservatively assumed to be 600 K. It also assumes an identical satellite on either side of the desired satellite at 2 degree orbital spacing of co-coverage satellites using the same polarization, which is the worst case. For any desired net C/(N+I) level, the user terminal is then sized to provide the necessary isolation of the adjacent satellites to assure the desired signal quality. For the appropriate D/λ, Recommendations ITU-R S.465-5 and S.580-5 were used to model the earth terminal antenna gain envelope. The analysis was performed for pfd values of -95, -92 and -88 dB(W/m^2) per 200 MHz. Interference from the FS is not considered in this analysis.

TABLE 4-5

Minimum earth station antenna size (metres)
with adjacent satellite interference (2º orbital spacing)

C/(N+I)		**11 dB**			**17 dB**		
pfd (dB(W/m^2) per 200 MHz)		**-88**	**-92**	**-95**	**-88**	**-92**	**-95**
System noise temp	300 K	0.63	0.63	0.64	1.81	1.92	2.09
	600 K	0.63	0.64	0.67	1.89	2.09	2.40
	1 000 K	0.64	0.66	0.77	1.98	2.30	2.75

Recommendation ITU-R S.1328(Rev.) tabulates typical satellite characteristics to be considered in frequency sharing analyses. It includes descriptions for several FSS systems that provide multi-megabit services to terminals 66 cm and smaller with equivalent pfd limits of -101 to -82 dB(W/m^2) per 200 MHz. One example cited provided 92 Mbit/s service to a 66 cm earth station with an equivalent pfd of -101 dB(W/m^2) per 200 MHz. Another example had 120 Mbit/s service to a 66 cm earth station with an equivalent pfd of -98 dB(W/m^2) per 200 MHz, including 2.5 dB of rain margin.

It is therefore feasible to achieve up to 120 Mbit/s data rate into a 66 cm antenna with a pfd of -95 dB(W/m^2) per 200 MHz, assuming a static rain margin of 5.5 dB while accounting for intra-system interference of -18 dB and inter-system interference of -22 dB. Furthermore, increasing the pfd value by 13 dB to -82 dB(W/m^2) per 200 MHz has virtually no effect on either the achievable data rate or required antenna size to assure acceptable sharing in the case of 2 degree orbital spacing of similar GSO FSS systems.

There is an increasing trend today for small-dish applications, but when the total FSS downlink allocation between 17 and 21 GHz is analysed, it is found that the existing allocations to other services or other FSS applications (e.g. bidirectional FSS allocations) are incompatible with small-dish applications at many frequencies. Therefore, the 18.6-18.8 GHz allocation forms a significant part of the total FSS downlink allocation between 17 and 21 GHz, which is available in practice for small-dish earth terminals.

Many planned GSO FSS systems would be compatible with the pfd limit of -95 dB(W/m^2) in the 18.6-18.8 GHz band, but the majority of planned systems may not.

4.2.2.2 Sharing between EESS (passive) and the fixed service

Studies within ITU-R have been performed to analyse the sharing between FS and EESS (passive). Three solutions have been identified that offer a possible sharing situation:

Solution 1: The total input power to an FS antenna across the 200 MHz band 18.6-18.8 GHz is limited to 0 dBW.

Solution 2: The output power from each FS RF carrier frequency at the input of the antenna within the 18.6-18.8 GHz band is limited to -3 dBW. It should be noted that multiple FS RF carrier frequencies individually respecting the above output power limit can be transmitted from a single antenna of an FS system in the 18.6-18.8 GHz band.

Solution 3: The output power from each FS RF carrier frequency at the input of the antenna within the 18.6-18.8 GHz band is limited to 0 dBW. It should be noted that multiple FS RF carrier frequencies individually respecting the above output power limit can be transmitted from a single antenna of an FS system in the 18.6-18.8 GHz band.

Solution 3, put forward recently from the FS as an additional solution, has not been properly analysed from the point of view of EESS (passive) potential additional data losses.

4.2.3 Method to satisfy the agenda item and their advantages and disadvantages

WRC-2000 could consider establishing common worldwide primary allocations for the Earth exploration-satellite (passive) and space research (passive) services. Constraints on the characteristics of GSO FSS and FS systems as well as on the operation of the passive sensors would be required. It would be necessary to:

a) limit the power flux-density produced by a fixed-satellite system at the Earth's surface to a value of -95 dB(W/m^2) across the 18.6-18.8 GHz band, but allow a 3 dB exceedance for 5% of the time everywhere.

Advantage

- This solution permits the Earth exploration-satellite service to operate with acceptable loss of data, and permits the FSS to operate in low and medium rain areas through the use of power control when needed.

Disadvantage

- In order to operate satisfactorily in tropical areas the FSS may need to use earth station antennas up to 50% larger than would otherwise be required.

NOTE - WRC-2000 may require that, as a matter of urgency, ITU-R study the need for a variance in the value of 5% of time associated with FSS systems use of the band 18.6-18.8 GHz band in tropical areas;

b) limit the power delivered to the antenna of a fixed-service station as given in either Solution 1, Solution 2 or Solution 3 of § 4.2.2.2. Additionally FS stations should use transmitting antennas with good radiation patterns taking into account Recommendation ITU-R F.699.

Advantage

- A primary worldwide allocation for EESS would allow passive microwave sensors to obtain critical environmental measurements on a worldwide basis for meteorology and the study of global change of the Earth's environment with some data loss and at the same time it will still allow the orderly development of FS systems in the band.

Disadvantage

- For the sharing between FS and EESS (passive), the three solutions proposed represent possible compromises, but while the EESS data loss in the first two solutions has been thoroughly studied, Solution 3 presents the disadvantage of an additional unknown amount of data loss for the EESS (passive), linked to the difficult prediction of the amount and density of future FS systems in the band.

4.2.4 Regulatory and procedural considerations

If a primary allocation worldwide were to be made to EESS (passive) in the band 18.6-18.8 GHz band, appropriate limits and protection required for FSS, FS, MS and SRS systems in this band would need to be included in the RR.

CHAPTER 5

Appendices S30 and S30A

(WRC-2000 agenda items 1.19, 1.19*bis*, 1.20, 1.21)

CONTENTS

Appendices S30 and S30A

5 Introduction

The World Radiocommunication Conference 1997 (WRC-97) under its agenda item 1.10 revised the Region 1 and 3 downlink and feeder-link Plans. This revision initiated various actions to be carried out either by the Radiocommunication Bureau or by the Radiocommunication Study Groups. These tasks are referred to in the following Resolutions of WRC-97:

a) Resolution **49 (WRC-97)** "Administrative due diligence applicable to some satellite communication services"

b) Resolution **53 (WRC-97)** "Updating the "Remarks" columns in the tables of Article 9A of Appendix **S30A** and Article 11 of Appendix **S30** to the Radio Regulations"

c) Resolution **73 (WRC-97)** "Measures to solve the incompatibility between the broadcasting-satellite service in Region 1 and the fixed-satellite service in Region 3 in the frequency band 12.2-12.5 GHz"

d) Resolution **532 (WRC-97)** "Review and possible revision of the 1997 broadcasting-satellite service Plans for Region 1 and 3"

   WRC-97 in its Resolution **532 (WRC-97)** has resolved that an Inter-Conference Representative Group (IRG) be established to study the feasibility of increasing the minimum number of channels capacity for countries in Region 1 and 3 to an equivalent of around ten analogue channels in accordance with the principles set out in Annex 1 of that Resolution.

e) Resolution **533 (WRC-97)** "Implementation of the decision of the WRC-97 relating to Appendices **S30** and **S30A** to the Radio Regulations"

f) Resolution **534 (WRC-97)** "Implementation of Annex 5 to Appendix **S30** and Annex 3 to Appendix **S30A**"

g) Resolution **536 (WRC-97)** "Operation of broadcasting satellite serving other countries"

h) Resolution **538 (WRC-97)** "Use of the frequency bands covered by Appendices **S30/30** and **S30A/30A** by non-geostationary-satellite systems in the fixed-satellite service"

5.1 Agenda item 1.21

"to consider the report from the Radiocommunication Bureau on results of the analysis in accordance with Resolution **53 (WRC-97)** and take appropriate actions"

5.1.1 Updating of the "Remarks" columns in the tables of Article 9A of Appendix S30A and Article 11 of Appendix S30

Activities relating to the implementation of Resolution **53 (WRC-97)** with respect to the definitive results of the compatibility analysis between the Regions 1 & 3 revised Plans and other services having allocation in the Planned bands in all three Regions have been carried out by the Radiocommunication Bureau based on Notes 3 to 7 in Section 9A.2 of Article 9A of Appendix **S30A** and Notes 5 to 7 in Section 11.2 of Article 11 of Appendix **S30**. The results will be sent to administrations by a Circular Letter no later than early January 2000, at the latest.

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5.2 Agenda item 1.20

"to consider the issues related to the application of Nos. **S9.8, S9.9** and **S9.17** and the corresponding parts of Appendix **S5** with respect to Appendices **S30** and **S30A**, with a view to possible deletion of Articles 6 and 7 of Appendices **S30** and **S30A**, also taking into consideration Recommendation **35 (WRC-95)**"

5.2.1 Procedures for the use of the guardbands of Appendices S30 and S30A Plans to perform space operations functions

The lack of a coordination procedure and criteria relating to the use of the guardbands of the BSS and associated feeder-link Plans to perform space operation functions was pointed out during WRC-95.

It was noted that the ITU-R had developed criteria that could be used in applying the procedures of Article **S9** or Appendices **S30** and **S30A** in this context. It was concluded that a possible way to apply these procedures in this context would be to coordinate such use using the same procedures as those applicable to non-planned services in the bands covered by these Appendices, specifically:

- to coordinate this use with the assignments subject to the Plan using Article 7 of Appendix **S30** or No. **S9.8** and Article 7 of Appendix **S30A** or No. **S9.9**, as appropriate;
- to coordinate this use with the assignments in non-planned service, and vice-versa, using the provisions of Articles **S9/S11**;
- to coordinate modifications to the Plans with such use using paragraph 4.3.1.5 or 4.3.3.5, as appropriate, of Article 4 of Appendix **S30,** and using paragraph 4.2.3.x of Article 4 of Appendix **S30A** (see section 5.2.3 for details on this possible additional provision).

This approach may be implemented by the inclusion in Article 2 of Appendix **S30** or in a footnote to the titles of Articles **S9** and **S11** of the following provision:

ADD The use of the guardbands of the Plans in Appendix **S30**, as defined in section 3.9 of Annex 5 to this Appendix, to provide space operations functions in accordance with No. **S1.23** shall be coordinated with the assignments subject to these Plans using the provisions of Article 7 of this Appendix/No. **S9.8**. Coordination among assignments intended to provide these functions and services not subject to a Plan shall be effected using the provisions of No. **S9.7** and the associated provisions of Articles **S9** and **S11.** Coordination of modifications to the Plans with assignments intended to provide these functions shall be effected using paragraph 4.3.1.5 or 4.3.3.5, as appropriate, of Article 4 of Appendix **S30.**

and by the addition in Article 2 of Appendix **S30A** or in a footnote to the titles of Articles **S9** and **S11** of the following provision:

ADD The use of the guardbands of the Plans in Appendix **S30A**, as defined in sections 3.1 and 4.1 of Annex 3 to this Appendix, to provide space operations functions in accordance with No. **S1.23** shall be coordinated with the assignments subject to these Plans using the provisions of Article 7 of this Appendix/No. **S9.9**. Coordination among assignments intended to provide these functions and services not subject to a Plan shall be effected using the provisions of No. **S9.7** and the associated provisions of Articles **S9** and **S11**. Coordination of modifications to the Plans with assignments intended to provide these functions shall be effected using paragraph 4.2.3.x of Article 4 of Appendix **S30A**.

The coordination criteria applicable in the above procedures would be equally applicable to the situations involving space operations functions in the guardbands of the Plans. It was noted that the ITU-R had identified an additional criterion, specifically related to this situation, which is still being studied.

5.2.2 Method to determine the need for coordination between assignments in Appendix S30A Plan or in the Plan modification process and non-planned space and terrestrial services

ITU-R concluded that the coordination method currently in section 3 of Annex 4 of Appendix **S30A** should be replaced by Appendix **S7**, in order to provide a consistent protection of non-planned services in respect of the planned and non-planned services in the frequency bands covered by Appendices **S30A**. This would align the situation in this respect to that currently existing between Appendix **S30A** plan and terrestrial services, where the method in Appendix **S7** is already specified in the relevant procedures. This change has been assumed in the following.

5.2.3 Identification of deficiencies in the current procedures of Articles 4, 6 and 7 of Appendices S30 and S30A and Article S9 of the Radio Regulations and possible modifications to these articles to correct these deficiencies

"Some other administrations are of the opinion that Agenda item 1.20 of WRC-2000 is limited to treat Articles 6 and 7 of Appendixes **S30** and **S30A** while protecting the full integrity of the Plans and this should be the sole objective of any proposed revisions to the Radio Regulations. However, the proposed modifications under item 5.2.3, 5.2.3.1, 5.2.3.2, and 5.2.3.2.1 contradict with the above objective. Therefore, this group of administrations does not agree with those proposals as well as with the relevant examples given in this Chapter. Modifications of Articles 6 and 7 of Appendixes **S30** and **S30A** shall in no way introduce limitations to the revision of Regions 1 and 3 Plans by a WRC."

In the framework of Resolution 86 of the Plenipotentiary Conference (Minneapolis, 1998), the current situation of the relevant procedures of Article **S9** and Articles 4, 6 and 7 of Appendices **S30** and **S30A** was analysed with regard to the two following possible principles:

1) all possible cases of interference that may arise in practice between planned BSS and non-planned services (e.g. FSS or FS) should be covered by a procedure;
2) the coordination between earth stations and terrestrial stations, and between earth stations operating in opposite directions of transmission should be undertaken by and between the administrations on the territory of which these stations are located.

The following conclusions were reached. It should be noted that in the following, modifications to the Plans are not considered as part of a non-planned service.

5.2.3.1 Coordination, with unplanned services, of modifications to the BSS Plans before inclusion in the Plans

There is no possibility to include in the coordination process the assignments for which a modification to one of the BSS Plans in Appendices **S30** and **S30A** has been initiated, but not yet completed. This allows non-planned assignments to a space station, an earth station or a terrestrial station to be recorded in the Master Register after successful application of the appropriate procedures of Article **S9** and Appendices **S30/S30A**, and modifications to one of the Appendices **S30/30A** Plans to be recorded in the relevant Plan, whilst these assignments might eventually be incompatible.

As proposed at CPM-97, equitable access to the orbit/spectrum resources between non-planned and planned services would require changes in Articles 6 and 7 of Appendices **S30** and **S30A** or in Appendix **S5** in order to solve this difficulty.

Under Articles 6 and 7 of Appendices **S30/S30A**, a simple solution to this difficulty was proposed at CPM-97, and consists in replacing the terms "assignment in conformity with a Plan", wherever it appears in Articles 6 or 7 of Appendices **S30/S30A**, by the terms "assignment in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated".

No modification would be required under Nos. **S9.8**, **S9.9** or **S9.17A**, but under Appendix **S5**, a similar change would be required to include in the coordination process the assignments for which Article 4 of Appendices **S30/S30A** has been initiated.

It was however noted that such modification and coupling between FSS and BSS publications would increase the workload of the Bureau and possibly lead to a backlog since examination of new FSS publications will require treatment by the Bureau of all modifications to the appropriate BSS Plan already submitted and vice versa.

5.2.3.2 Coordination between earth stations and terrestrial stations, and between earth stations operating in opposite directions of transmission

The coordination between earth stations and terrestrial stations, and between earth stations operating in opposite directions of transmission should normally be handled between the administrations on the territory of which these stations are located. This general principle is set forth in Resolution **1 (Rev.WRC-97)**, which *resolves* that "that, unless specifically stipulated otherwise by special arrangements communicated to the Union by administrations, any notification of a frequency assignment to a station shall be made by the administration of the country on whose territory the station is located". This was probably the intention of WARC-77 and RARC-83 in that it was not foreseen that the administration with the space station, which is the one applying the procedure of modification of the Plan, might one day be different from the one with the earth station. The fact that these two administrations could be different is now creating problems of principle, including those relating to sovereign rights.

5.2.3.2.1 Coordination between BSS receive earth stations and transmit terrestrial stations

a) Current situation under Appendix S30 with respect to national territory

Protection of receive BSS earth stations associated to successful modifications of the Plan is ensured by Article 6 of Appendix **S30** and its associated method for determining the need for a coordination in Annex 3 of Appendix **S30** (i.e. pfd limit at the edge of the BSS service area).

This allows an administration to request protection for its BSS receive earth stations in all the planned BSS frequency band and anywhere in its territory. A view was expressed that this may entail inequitable access to the spectrum resources between planned and non-planned services since the future terrestrial stations located near the edge of the service area will have to protect these BSS receive earth stations irrespective of the time of their deployment and their location. Nevertheless, it is recognized that if an administration is providing BSS over its territory, it is appropriate to seek full protection for existing and future BSS receive earth stations.

Pending modifications to the Plans are not protected from terrestrial stations until they become a part of the Plans, which can be a lengthy process (see section 5.2.3.1).

No. **S9.19** provides a regulatory approach similar to that of Article 6 of Appendix **S30** in that the protection of the BSS service area is ensured by a coordination process (No. **S9.19**) triggered by a pfd limit at the edge of the service area.

No. **S9.19** may therefore be considered as a possible replacement of Article 6 of Appendix **S30**, with the inclusion in Appendix **S5** of the coordination trigger currently included in Annex 3 of Appendix **S30**.

b) Difficulties with the current procedures

Coordination under Article 6 of Appendix **S30** is currently sought with the administration which applied the procedure of modification of the Plan which may not be the administration on whose territory the receive BSS earth stations are located. Potential solutions to this difficulty are identified in section d).

In addition, the protection of receive BSS earth stations associated to a proposed modification of the Plan is not covered by the current procedures since Article 4 of Appendix **S30** does not allow the proposed modification of the Plan to seek protection from terrestrial service. This issue is addressed in section c).

c) Procedure to seek protection of modifications to the Plan from terrestrial services

The protection of receive BSS earth stations associated to a modification of the Plan - whether this modification was successfully applied or not - could be sought by the administration on the territory of which these earth stations are located through the application of No. **S9.17**, which is now possible under the Radio Regulations which provisionally entered into force on 1 January 1999. However, this approach has the consequence of the responsible administration having to coordinate and notify a potentially large number of BSS receive earth stations, which has implications for the administration and the Bureau.

In BSS, receive earth stations are deployed ubiquitously over the service area and the BSS operator or administration on which territory the BSS earth stations are located does not know the location of these ubiquitous earth stations.

Since notification of BSS receive earth stations is not possible with the current Article **S11**, a possible solution to seek the coordination of BSS receive earth stations could be to use the same criteria applying to typical mobile earth stations (i.e. to determine the coordination area which would encompass all coordination areas determined for each location in the service area within which operation of the BSS receive earth stations is proposed). Alternatively, Article 4 could be modified to include an additional provision enabling an administration proposing a modification to the Plans to seek protection for the service area from terrestrial services.

d) Case of service areas exceeding national territory

The coordination between transmit terrestrial stations and receive BSS earth stations (in planned bands or unplanned bands) is a bilateral matter between the administrations concerned. In the case of the BSS service area covering territory other than that of the space station administration, the notifying administration of the space station is not involved. In the eventual case of harmful interference, it is also a matter for the administrations concerned. Another approach to this issue would be to recognize in the RR the bilateral nature of this matter and delete Article 6 of Appendix **S30** or change it to cover the multinational aspect of this issue.

It was noted that section 1.1 of Annex 5 of Appendix **S30** provided the following definition of the service area: "the area on the surface of the Earth in which the administration responsible for the service has the right to demand that the agreed protection conditions be provided". It was also noted that in the case of a BSS covering the territory of administrations other than that of the administration responsible for the BSS space station, this definition causes some problems.

It was also noted that the Rule of Procedure on No. **S23.13** stated that in case of agreement under No. **S23.13**, it is understood that there is no objection to the inclusion of the territory in the planned service area.

A possible solution to protect the complete service area could be as follows:

1) the notifying administration or BR list by the country symbol those territories to be included in the proposed service area (the agreement should be sought in accordance with paragraph 2.1 of the existing Rules of Procedure concerning No. **S23.13**);
2) any administration that does not object to being in the service area within a period of four months is considered to be in the service area in order to be protected from transmitting terrestrial stations;
3) in order to protect this service area from future transmitting terrestrial stations, Article 6 of Appendix **S30** with the appropriate amendments would be used with respect to this service area and this would be applied by the administration of the terrestrial stations and the concerned administration for the protected service area.

e) Possible options to resolve the difficulties identified

Based on these considerations, five options were identified to cover the coordination between receive BSS earth stations and transmit terrestrial stations:

- Option A - under this option, protection of a modification to the Plan would be ensured over the entire service area as soon as the modification is entered in the Plan, using the criterion of Annex 3 of Appendix **S30** and the procedure of Article 6 of Appendix **S30**/No. **S9.19**.
- Option B - this option would be the same as option A, but protection would be extended from the date of receipt of the request for modification by the BR.
- Option C - this option would be the same as option A, but Article 6 of Appendix **S30** would be deleted and this coordination would be left to the administrations on the territories of which the BSS earth stations and terrestrial stations are located.
- Option D - under this option, protection would have to be sought through the application of No. **S9.17**, using the criterion of Annex 3 or Appendix **S7,** from the date of entry in the Plan of the modification.
- Option E - this option would be the same as option D, but protection would be extended from the date of receipt of the request for modification by the BR.

It was noted that the implications of options D and E could result in the requirement to coordinate and notify a very large number of BSS receive earth stations.

Annexes 1 and 2 provide example regulatory text reflecting options A and B.

Some administrations are of the view that they are obliged to coordinate their terrestrial stations in respect to BSS earth stations only when the country concerned has a BSS assignment appearing in the Plan or in the MIFR on its behalf.

5.2.3.2.2 Coordination between BSS receive earth stations and FSS transmit earth stations operating in opposite directions of transmission

The protection of receive BSS earth stations associated to a proposed modification to the Plan from FSS transmit earth stations operating in opposite directions of transmission (e.g. in the frequency band 12.5-12.7 GHz which is allocated to planned BSS in Region 2 and to FSS Earth-to-space in Region 1) could be sought by the administration on the territory of which these earth stations are located, through the application of No. **S9.17A**, which is now possible under the Radio Regulations which provisionally entered into force on 1 January 1999.

Another solution would be to retain Article 6 of Appendix **S30** with the necessary modifications.

In this case, as stated in Appendix **S5**, coordination will be required when the coordination area of the FSS transmit earth station will cover the territory of the administration within which the receive BSS earth stations are located.

The five options discussed in the previous section also apply in this situation.

5.2.3.2.3 Coordination between planned transmit BSS feeder-link earth stations and receive terrestrial stations

Coordination of transmit BSS feeder-link earth stations associated to a modification of the Plan with receive terrestrial stations (i.e. in the bands 14.5-14.8 GHz and 17.7-18.1 GHz in Regions 1 and 3, and in the band 17.7-17.8 GHz in Region 2) is currently sought by the administration which applied the procedure of modification of the Plan and which may not be the administration on whose territory these earth stations will be operated. In addition, the current procedure requires a global service area coordination (i.e. with typical BSS feeder-link earth stations) which is generally impossible to achieve.

In order to conform with Resolution **1 (Rev.WRC-97)**, such coordination could be limited to a case-by-case coordination undertaken by the appropriate administrations with the specific transmit BSS feeder-link earth stations located on their own territory, which has proven its efficiency throughout the years in the case of coordination between FSS earth stations and terrestrial stations.

A solution could consist in replacing paragraphs 4.2.1.3 and 4.2.3.3 of Article 4 of Appendix **S30A** by No. **S9.17** and by suppressing Article 6 of Appendix **S30A**. Another solution would be to retain Article 6 with the necessary modifications.

5.2.3.2.4 Coordination between planned transmit BSS feeder-link earth stations and FSS receive earth stations operating in opposite directions of transmission

As for the interference cases described in the previous sections, this type of coordination should normally be handled between the administrations on the territory of which these earth stations are located. In the same way as identified in section 5.2.3.2.3, procedures under 4.2.1.2/4.2.3.2 of Article 4 of Appendix **S30A** and section 7.2 of Article 7 of Appendix **S30A** could be replaced by No. **S9.17A**. Another solution would be to retain Article 7 with the necessary modifications.

5.2.3.2.5 Coordination of typical BSS or BSS feeder-link earth stations with terrestrial stations or earth stations operating in the opposite direction of transmission

It was noted that the current procedures of Appendices **S30** and **S30A** considered, for the coordination of BSS or BSS feeder-link earth stations with terrestrial stations or earth stations operating in the opposite direction of transmission, under Articles 4, 6 and 7 of these appendices, the whole BSS or BSS feeder-link service area:

- under Article 6 of Appendix **S30**, the criterion used in Annex 3 of Appendix **S30** is intended to protect the whole BSS service area from interference caused by terrestrial stations;
- under Articles 4 and 6 of Appendix **S30A** and under Sections 7.2 to 7.7 of Article 7 of Appendix **S30A**, the BSS feeder-link administration seeks and is entitled to protect any point of the service area from constraints relating to sharing with terrestrial stations or earth stations operating in the opposite direction of transmission.

It was noted that this situation allowed a modification to a Plan to benefit from protection rights vis-à-vis terrestrial services and earth stations operating in the opposite direction of transmission, without having acquired these rights through the application of a procedure.

The replacement of the provisions by **S9.17**, **S9.17A** and **S9.18** may lead to a more equitably balanced situation between the services involved in such a sharing situation, since the latter provisions are applicable only to specific earth stations. The possibility of extending these provisions to typical earth stations using modifications of the Plans, whilst ensuring equitable access to spectrum by all the services involved, requires further studies. It should be noted that five options have been identified to address this situation (see section 5.2.3.2.1).

It should be noted that possible solutions to this problem are likely to differ for Appendices **S30** and **S30A**, since the location of feeder-link earth stations is generally known in advance.

5.2.3.3 Interference situations not covered in the current regulations

5.2.3.3.1 Protection of Appendix S30 Region 2 Plan from non-planned BSS in Region 3

The coordination of planned BSS with non-planned BSS (i.e. in the frequency band 12.5-12.7 GHz, where BSS is planned in Region 2 and non-planned in Region 3) is covered in Article 4 of Appendix **S30** (4.3.3.6), but the reciprocal case is not covered in Article 7 of Appendix **S30** or in Article **S9**. This allows non-planned BSS assignments to be recorded in the Master Register after successful application of No. **S9.7** and Resolution **33 (Rev.WRC-97)**, whilst these assignments could affect BSS assignments in the Appendix **S30** Region 2 Plan or in the Plan modification process.

A regulatory solution to this difficulty was proposed at CPM-97, and included in the CPM Report to WRC-97. It consists in replacing the terms "fixed-satellite service" by "fixed-satellite service or broadcasting-satellite service where these services are not subject to a Plan", in Article 7 of Appendix **S30** or in No. **S9.8** and Appendix **S5**. Criteria of Annex 4 of Appendix **S30** could be used to determine if the coordination is required.

5.2.3.3.2 Coordination between non-planned BSS feeder links and modifications to BSS feeder-link Plan in the 17.8-18.1 GHz band

The current procedures do not provide for any coordination process between the BSS feeder-link assignments in Appendix **S30A** or their modifications and the non-planned FSS (Earth-to-space), i.e. non-planned BSS feeder links in Region 2 in the frequency band 17.8-18.1 GHz. This allows non-planned BSS feeder-link assignments in Region 2 to be recorded in the Master Register after successful application of No. **S9.7**, whilst these assignments could affect, or be affected by BSS feeder-link assignments in Appendix **S30A** in Regions 1 and 3, or in the Plan modification process. Symmetrically, this allows modifications to the feeder-link Plan in Region 1 and 3 to be included in this Plan without any coordination with non-planned Region 2 BSS feeder links, whilst the latter might be affected or might affect the former.

A solution to this difficulty was proposed at CPM-97 and included in the CPM Report to WRC-97. It involves:

- under Article 4 of Appendix **S30A**, the inclusion of an additional paragraph in order to protect Region 2 non-planned FSS (Earth-to-space) from modifications to the Region 1 and 3 feeder-link Plan;
- in Article 7 of Appendix **S30A**, the replacement of "FSS (space-to-Earth)" by "FSS" in order to protect Regions 1 and 3 feeder-link Plan from non-planned BSS in Region 2;
- in No. **S9.9**, the suppression of the term "space", before "station in the FSS", in such a way that the procedure would cover the interference caused by either an FSS space station or an FSS earth station, and the need to exclude **S9.17A** from the scope of **S9.9** (as currently done under **S9.7**).

In both cases, the criteria to determine if the coordination is required could be the same as between the feeder-link Plans, i.e. the criteria of section 5 of Annex 1 to Appendix **S30A**. However this requires further study.

5.2.3.3.3 Protection of planned BSS receive space stations from non-planned Region 2 BSS transmit space stations in the band 17.3 to 17.8 GHz

Non-planned BSS transmit space stations in the frequency band 17.3-17.8 GHz may apply section 7.1 of Article 7 of Appendix **S30A**, but No. **S9.9** currently does not cover this possibility. This could be done simply by replacing the words "station in the FSS" in No. **S9.9** by "station in the FSS or in the BSS".

5.2.3.3.4 Protection of non-planned BSS receive earth stations in Region 2 from modifications to BSS feeder-link Plan in the band 17.3 to 17.8 GHz

The protection of non-planned BSS receive earth stations in Region 2 in the band 17.3-17.8 GHz from modifications to one of the Plans in Appendix **S30A** is not covered by Article 4 of Appendix **S30A**, and the reciprocal situation is not covered either under section 7.2 of Article 7 of Appendix **S30A**, or under No. **S9.17A**. This could be solved simply by replacing in these provisions (either section 7.2 of Article 7 or No. **S9.17A**) the word "FSS" by "FSS or unplanned BSS".

The same difficulty identified under section 5.2.3.2.1 with respect to the coordination of typical BSS receive earth stations, i.e. the criteria to be used for seeking the coordination, is also applied to non-planned BSS receive earth stations.

5.2.3.3.5 Scope of footnotes S5.487 and S5.490

Footnotes **S5.487** for Regions 1 and 3, and **S5.490** for Region 2, appear to provide a super-primary status to the broadcasting-satellite service over the other primary services sharing the same band (FSS, BS, FS), in that they require the latter services not to cause harmful interference to broadcasting-satellite stations operating in accordance with the provisions of Appendix **S30**. These footnotes are also the subject of a Rule of Procedure, which concludes that, if, despite the application of the procedures of Appendix **S30**, harmful interference is actually caused to a broadcasting-satellite station, the station in the other service shall cease this interference.

It is understood by some administrations that these footnotes were adopted in order to ensure the protection of the assignments that were foreseen to be included in Appendix **S30** Plans by WARC -7 and RARC-83/WARC-Orb-85 against interference caused by assignments in other services which existed prior to the entry into force of these Plans, i.e. to avoid restrictions on the elaboration of the original Plans, as shown in the initial versions of these footnotes, adopted respectively by WARC-71 and WARC-79. One view was expressed that these restrictions apply only to the original Plans; another view considered that they apply to the Plans as they may be modified.

No. S5.43 states that where it is indicated in these Regulations that a service may operate in a specific frequency band subject to not causing harmful interference, this means also that this service cannot claim protection from harmful interference caused by other services to which the band is allocated under Chapter **SII** of these Regulations. It appears that this provision should not apply in the context of sharing between the primary services allocated in the frequency band covered by Appendix **S30**.

One view noted was that since assignments in other services received by the Bureau after the establishment of the Plans have to apply the procedures of Appendix **S30** to protect the Plans, the intent of No. **S5.487** and No. **S5.490** may be understood as covered by these procedures. For these reasons one conclusion which could be drawn is that modifications to the Plans cannot be considered as benefiting from the protection of **S5.487** and **S.5.490.**

Another view noted was that sections 4.3.17 of Appendix **S30** and 4.2.18 of Appendix **S30A** indicate that frequency assignments that enter the Plans through the modification procedure shall enjoy the same status as those appearing in the appropriate Regional Plan and will be considered as a frequency assignment in conformity with the Plan. Thus, application of footnotes **S5.487** and **S5.490** may be understood as applying to modifications successfully entered into the Plans.

Therefore, the application of footnotes **S5.487** and **S5.490** to modifications to the Plans which are in conformity with these plans may need further clarification.

5.2.3.4 Example of additions/modifications to the Radio Regulations to resolve identified difficulties/inconsistencies

In order to facilitate the understanding of these proposals, attached Figures 5.1 to 5.4 provide a summary of the current procedures and an example of possible additions/modifications.

In these figures, the arrows indicate that the coordination is requested to the party in the direction of which the arrow is pointing. A code is used to identify coordination provisions taking place between the administrations with the space stations (thick boxes), between an administration with a space station and an administration with terrestrial stations (thin boxes) or between administrations with terrestrial or earth stations (dotted boxes). In the two first cases, coordination follows a publication by the Bureau. In the latter case, it is to be undertaken directly by the administrations on the territory of which the stations are located, without publication by the Bureau.

Annex 1 contains possible examples of modifications to the current provisions in Article **S9**, Appendices **S30** and **S30A** that might reflect the various options identified above in the case where Articles 6 and 7 of Appendix **S30** and **S30A** would be retained and the currently suspended provision Nos. **S9.8** and **S9.9** would be suppressed (Approach A).

Annex 2 contains possible examples of modifications to the current provisions in Article **S9**, Appendices **S30** and **S30A** that might reflect the various options identified above in the case where Articles 6 and 7 of Appendix **S30** would be suppressed and replaced by provision Nos. **S9.8** and

S9.18 and Articles 6 and 7 of Appendix **S30A** would be suppressed and replaced by provision Nos. **S9.9**, **S9.17A** and **S9.18** (Approach B).

A third Approach (Approach C) was identified based on separating the modifications to the Plans from the original Plans. This Approach may avoid most of these deficiencies since they appear to arise from the fact that a modification to a Plan is proposed by the space station administration (which may be different from the administration on the territory of which the BSS receive earth stations are located) and, once a modification is included in the Plan, it benefits from the same rights as any assignment included in the Plan by a conference (with the exception of the time-limit to bring the assignment in service) whilst these rights may not have been coordinated with the services and administrations involved. This Approach requires further study.

5.2.3.5 Protection of the terrestrial service from modifications to the Appendix S30 BSS Plans

Annex 1 to Appendix **S30** of the Radio Regulations specifies limits for determining whether a service is affected by a proposed modification to the Plan and therefore it is necessary to seek the agreement of any other administration. Section 5 of Annex 1 specifies limits to the change in the power flux-density to protect the terrestrial services from modifications to the Region 2 BSS Plans. In addition, section 8 a) applies parts of section 5 to modifications to the Regions 1 and 3 BSS Plans.

ITU-R studied possible modification to the pfd limits in sections 5 b) and 5 c) of Annex 1. Section 5 c) specifies limits for determining whether terrestrial services of administrations in Region 1 east of longitude 30°E. in the 12.2-12.7 GHz band may be affected by modifications to the Region 2 BSS Plan.

Relaxation of the pfd limits in section 5 c) would facilitate BSS to certain geographical areas in Region 2. BSS transmit power to certain portions of Region 2 immediately adjacent to portions of Region 1 must be significantly reduced in order to meet the specified levels in the section 5c) pfd limit. These lower power levels necessitate the use of much larger BSS receive antennas than other Region 2 areas.

The pfd limits in section 5 b) determine if terrestrial services in Region 1 west of 30º E. and all of Region 3 may be affected by modifications to the Region 2 BSS Plan, or determine if terrestrial services in Regions 1 and 3 may be affected by modifications to the Regions 1 and 3 BSS Plan (see section 8 a) of Annex 1 to Appendix **S30**).

After reviewing various proposals, ITU-R found that the following proposal represented a good compromise package to replace the current pfd limits in both sections 5 b) and 5 c) of Annex 1:

-148 dB(W/m^2/4 kHz)	for	$0^\circ \leq \gamma < 5^\circ$
$-148 + 0.5(\gamma - 5)$ dB(W/m^2/4 kHz)	for	$5^\circ \leq \gamma < 25^\circ$
-138 dB(W/m^2/4 kHz)	for	$25^\circ \leq \gamma < 90^\circ$

These pfd limits are currently contained in Table **S21-4** of Article **S21** for the protection of the FS from the FSS in the 12 GHz bands. These limits are more relaxed than the current limits in sections 5 b) and 5 c) at low arrival angles and thus meet the expressed concerns of the BSS community. On the other hand, they are more stringent at higher arrival angles than section 5 c) thus providing greater protection to the terrestrial services. Therefore these limits represent a compromise between the various requirements in the band. Furthermore the Article **S21** limits have been successfully applied for a long time to protect terrestrial services from the FSS.

Additionally, modification to these pfd limits may facilitate the revision of the Regions 1 and 3 Plans (under WRC-2000 agenda item 1.19 and Resolution **532 (WRC-97)**).

Administrations are encouraged to review all of the pfd limits in sections 4, 5 and 8 of Annex 1, which provide limits to determine if terrestrial services in the various regions may be affected by modifications to the BSS Plans, for possible modification or consolidation, with a view to establishing an equitable balance of constraints between the three Regions.

FIGURE 5.1

Procedures for the coordination of modifications to Appendix S30 Plans with other services
(Article 4 of Appendix S30, Article S9)

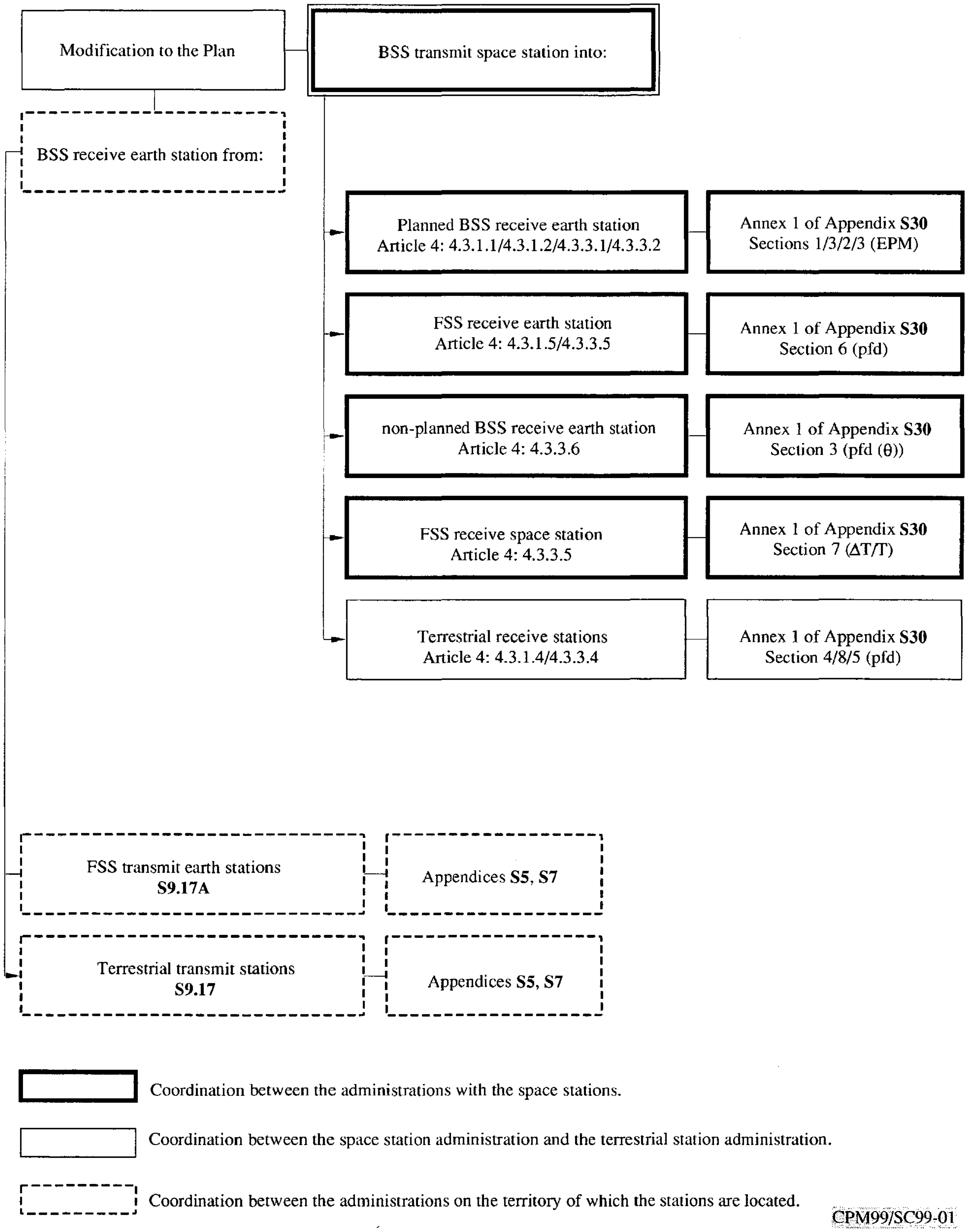
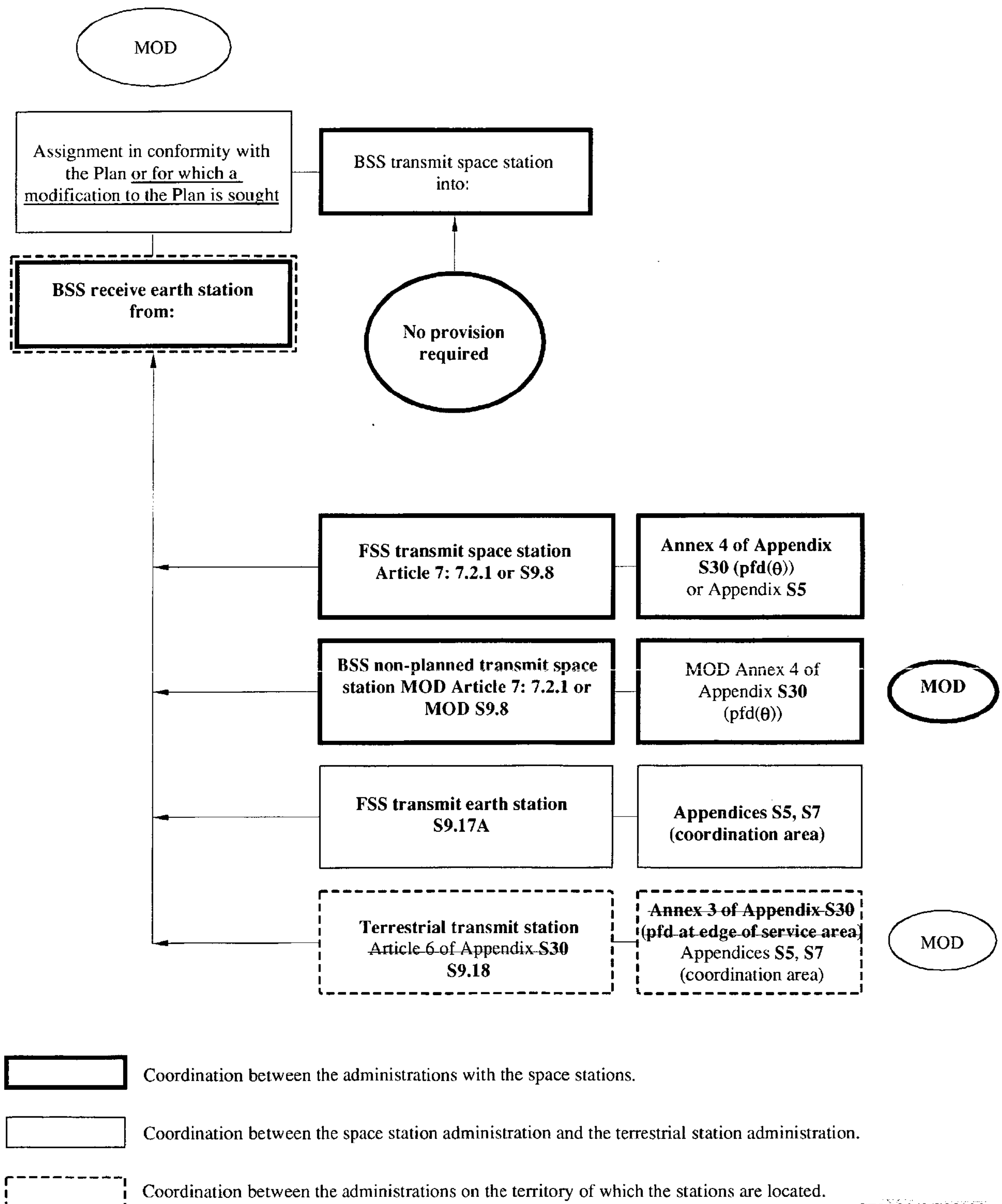


FIGURE 5-2

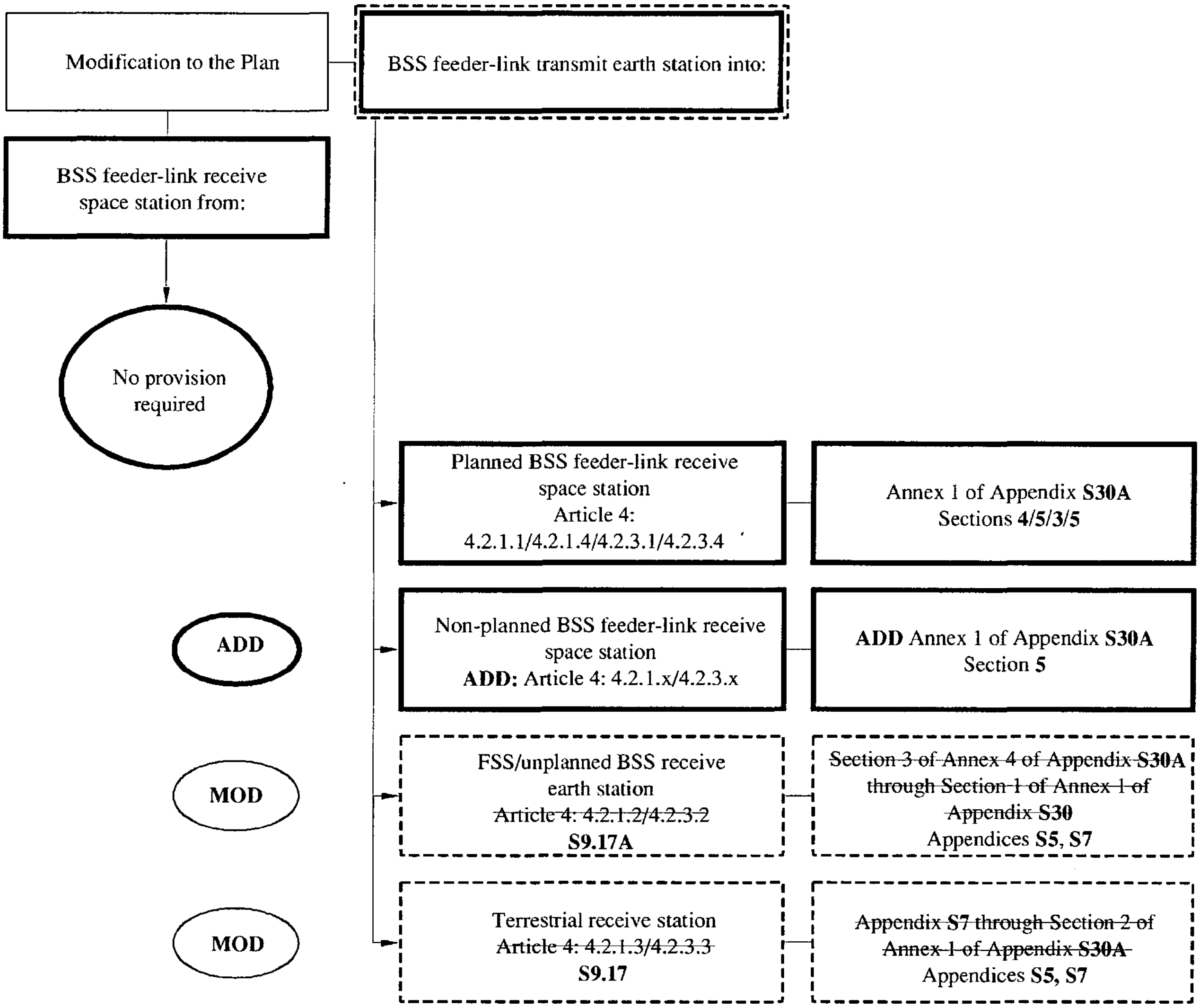
Procedures for the coordination of non-planned services with assignments subject to Appendix S30 plans (Articles 6 and 7 of Appendix S30, Article S9)



CPM99/SC99-02

FIGURE 5.3

Procedures for the coordination of modifications to Appendix S30A Plans with other services (Article 4 of Appendix S30A, Article S9)



Coordination between the administrations with the space stations.

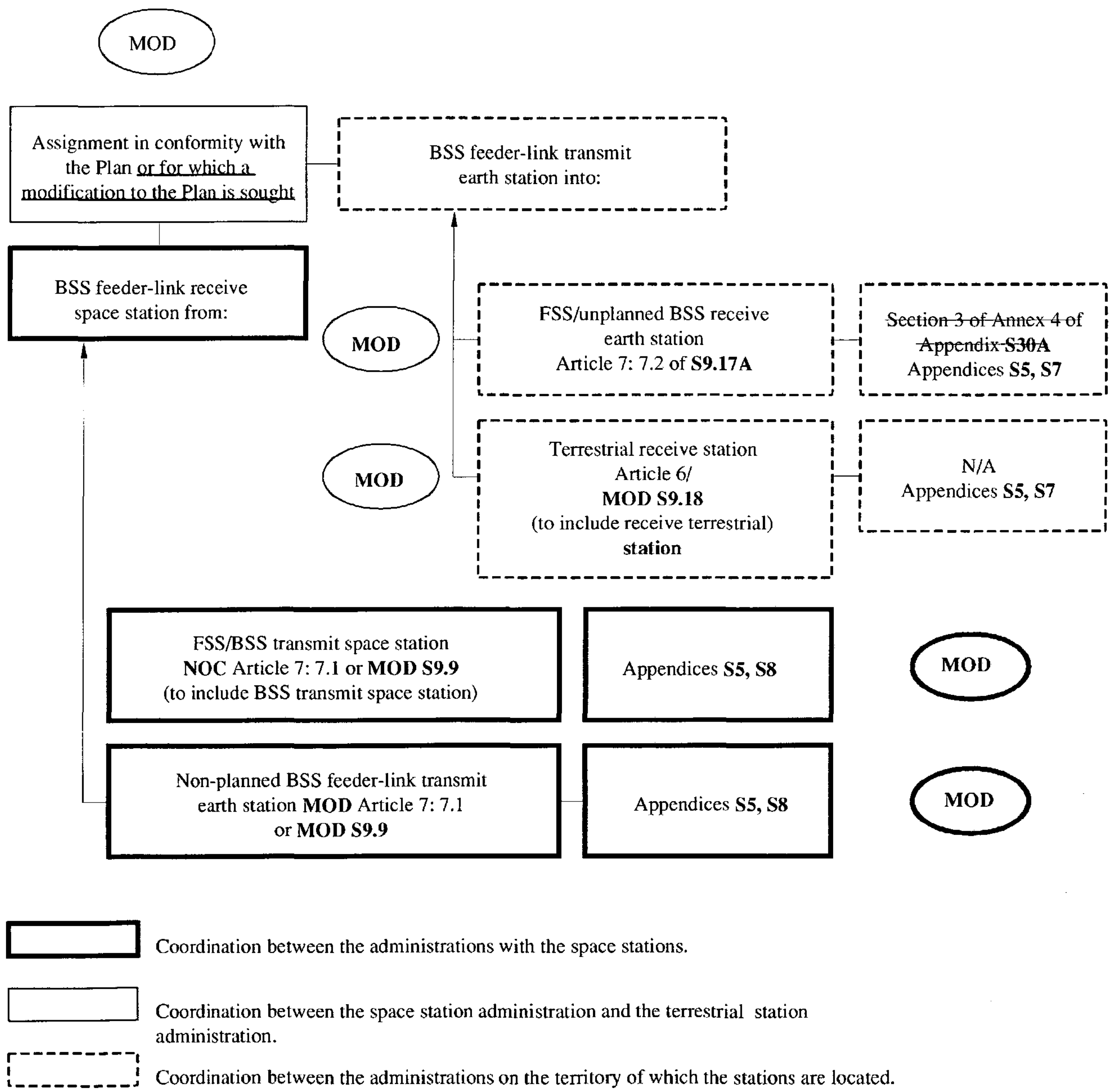
Coordination between the space station administration and the terrestrial station administration.

Coordination between the administrations on the territory of which the stations are located.

CPM99/SC99-03

FIGURE 5.4

Procedures for the coordination of non-planned services with assignments subject to Appendix S30A plans (Articles 6 and 7 of Appendix S30A, Article S9)



CPM99/SC99-04

ANNEX 1 TO CHAPTER 5

Example of possible modifications to Articles S9, Appendix S5 and Articles 4, 6 and 7 of Appendices S30 and S30A to update these appendices in relation to non-planned services under the assumption that Articles 6 and 7 of these appendices are retained in these appendices

("APPROACH A")

Sub-Section IIA – Requirement and request for coordination

Some administrations expressed the view that modifications to the Plans should be protected from the date of receipt of the modification request at BR. This would be achieved by replacing the words "assignment in conformity with a Plan" in Articles 6 and 7 of Appendices **S30** and **S30A** by "assignment in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated".

Other administrations expressed the view that such a change is not covered by agenda item 1.20, that these provisions were originally drafted to protect the Plans from modifications and from other services, and therefore that such a change would be inappropriate and should not be considered as a deficiency.

To highlight this issue, the phrase assignments "in conformity with appropriate Regional Plan" has been placed in square brackets throughout this Annex.

NOC S9.6 to S9.7

SUP S9.8

SUP S9.9

NOC S9.10 to S9.16

MOD **S9.17** *f)*~~[13]~~ for any specific earth station or typical mobile earth station in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services, in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**, Article 4 of Appendix **S30A** and BSS receive earth stations associated with assignments subject to the Appendix **S30** Plans;

MOD **S9.17A** *g)* for any specific earth station, in respect of other earth stations operating in the opposite direction of transmission, in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission and where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of another earth station, with the exception of the ~~frequency bands subject to the~~coordination under Article 6 of Appendix **S30**, Article 7 of Appendix **S30A** ~~Plans~~and **S9.19**;

MOD **S9.18** *h)* for any [transmitting station] of a terrestrial service in the bands referred to in No. **S9.17** within the coordination area of an earth station, in respect of this earth station, with the exception of the coordination under Nos. **S9.16**, ~~and~~ **S9.19** and Article 6 of Appendix **S30**;

MOD **S9.19** *i)* for any transmitting station of a terrestrial service or a transmitting earth station in the fixed-satellite service (Earth-to-space) in a frequency band shared on an equal primary basis with the broadcasting-satellite service, with respect to an earth station of the broadcasting-satellite service, except where this service is subject to the Appendix **S30** Plans;

NOC **S9.20 to S9.31**

MOD **S9.32** If the responsible administration concludes that coordination is not required under No~~s~~. **S9.7** ~~to **S9.9**~~, it shall send the relevant information pursuant to Appendix **S4** to the Bureau for action under No. **S9.34**.

NOC **S9.32A to S9.40A**

~~[13] **S9.17.1** Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending a decision of WRC-99 on the revision of these two Appendices.~~

MOD S9.41 Following receipt of the Weekly Circular referring to requests for coordination under No~~s~~. **S9.7** ~~to **S9.9**~~, an administration believing that it should have been included in the request shall, within four months of the date of the relevant Weekly Circular, inform the initiating administration and the Bureau, giving its technical reasons for doing so, and shall request that its name be included.

NOC S9.42 to S9.44

Sub-Section IIB – Acknowledgement of receipt of a request for coordination

NOC S9.45 to S9.49

Sub-Section IIC – Action upon a request for coordination

MOD S9.51 Following its action under No. **S9.50**, the administration with which coordination was sought under No~~s~~. **S9.7** ~~to **S9.9**~~ shall, within four months of the date of publication of the Weekly Circular under No. **S9.38**, either inform the requesting administration and the Bureau of its agreement or act under No. **S9.52**.

NOC S9.51A to S9.59

Sub-Section IID – Action in the event of no reply, no decision or disagreement on a request for coordination

MOD S9.60 If, within the same four-month period specified in Nos. **S9.51** or **S9.51A**, an administration with which coordination is sought under No~~s~~. **S9.7** ~~to **S9.9**~~ and **S9.15** to **S9.19** fails to reply or to give a decision under Nos. **S9.51** or **S9.51A** or, following its disagreement under No. **S9.52**, fails to provide information concerning its own assignments on which its disagreement is based, the requesting administration may seek the assistance of the Bureau.

NOC S9.61 to S9.65

Example modifications to Appendix S5

MOD

TABLE S5-1

Technical conditions for coordination
(see Article **S9**)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
SUP No. **S9.8** GSO/GSO					
SUP. No. **S9.9** GSO/GSO					

TABLE S5-1 *(continued)*

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.17** GSO, non-GSO/ terrestrial	A specific earth station or a typical mobile earth station in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**, Article 4 of Appendix **S30A** and BSS receive earth stations associated with assignments subject to the Appendix **S30** Plans	Any frequency band allocated to a space service~~,~~ ~~except those mentioned in the Plans in Appendix S30A~~	The coordination area of the earth station covers the territory of another administration	Appendix **S7** (for earth stations in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz, 2 483.5-2 500 MHz and 2 500-2 516.5 MHz, see Remarks column) 1) The coordination area of aircraft earth stations is determined by increasing the service area by 1 000 km with respect to the aeronautical mobile service (terrestrial) or 500 km with respect to terrestrial services other than the aeronautical mobile service	NOTE – For RDSS earth stations, a uniform coordination distance of 400 km corresponding to an airborne earth station shall be used. In cases where the earth stations are all ground-based, a coordination distance of 100 km shall be used

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.17** GSO, non-GSO/ terrestrial (*cont.*)				2) For receiving earth stations in the meteorological-satellite service in frequency bands shared with the meteorological aids service, the coordination distance is considered to be the visibility distance as a function of the earth station horizon elevation angle for a radiosonde at an altitude of 20 km above mean sea level, assuming 4/3 Earth radius	~~Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices.~~

MOD

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.17A** GSO, non-GSO/ GSO, non-GSO	A specific earth station in respect of other earth stations operating in the opposite direction of transmission in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission, where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of a coordinated earth station, with the exception of the ~~frequency bands subject to the Plans in~~coordination under Article 6 of Appendix **S30** and Articles 4 and 7 of Appendix **S30A**	Any frequency band allocated to a space service	The coordination area of the earth station covers the territory of another administration or the earth station is located within the coordination area of an earth station	i) For bands in Table **S5-2**, see § 2 of Annex 1 of this Appendix ii) See Recommendations ITU-R IS.847, ITU-R IS.848 and ITU-R IS.849	

MOD

TABLE S5-1 *(continued)*

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.18** Terrestrial/ GSO, non-GSO	Any transmitting station of a terrestrial service in the bands referred to in No. **S9.17** within the coordination area of an earth station, in respect of this earth station, with the exception of the coordination under Nos. **S9.16** ~~and~~, **S9.19** and Article 6 Appendix **S30**	Any frequency band allocated to a space service.	Transmitting terrestrial station is situated within the coordination area of a receiving earth station	See Remarks column	The coordination area of the affected earth station has already been determined using the calculation method of No. **S9.17**
No. **S9.19** Terrestrial/ GSO	A transmitting station in a terrestrial service or a transmitting earth station in the fixed-satellite service (Earth-to-space) in a frequency band shared on an equal primary basis with the BSS, with respect to an earth station of the broadcasting-satellite service, except where the service is subject to the Plans in Appendix **S30**	Bands listed in No. **S9.11**.	i) Necessary bandwidths overlap; and ii) the pfd of the terrestrial station at the edge of the BSS service area exceeds the permissible level	Check by using the assigned frequencies and bandwidths	

APPENDIX S30

NOC

ARTICLE 4

Procedure for modifications to the Plans

NOC

ARTICLE 5

Notification, examination and recording in the Master International Frequency Register of frequency assignments to space stations in the broadcasting-satellite service

MOD

ARTICLE 6

Coordination, notification and recording in the Master International Frequency Register of frequency assignments to terrestrial stations or to earth stations in the fixed-satellite service (Earth-to-space) affecting broadcasting-satellite frequency assignments in the frequency bands 11.7-12.2 GHz (in Region 3), 11.7-12.5 GHz (in Region 1) and 12.2-12.7 GHz (in Region 2)[5]

Section I – Coordination procedure to be applied

MOD 6.1.1 Before notifying to the Bureau a frequency assignment to a terrestrial transmitting station or to a transmitting earth station in the fixed-satellite service, an administration shall initiate coordination with any other administration having a frequency assignment to a broadcasting-satellite station in [conformity with the appropriate Regional Plan] if:

– the necessary bandwidths of the two transmissions overlap; *and*

– the power flux-density which would be produced by the proposed terrestrial transmitting station or by the transmitting earth station in the fixed-satellite service exceeds the value derived in accordance with Annex 3 at one or more points on the edge of the service area which is within the coverage area of the broadcasting-satellite station of that administration.

MOD **6.1.2** For the purpose of effecting coordination, the administration responsible for the terrestrial station or for the earth station in the fixed-satellite service shall send to the administrations concerned, by the fastest possible means, a diagram drawn to an appropriate scale indicating the location of the terrestrial station or the earth station in the fixed-satellite service and all other data of the proposed frequency assignment and the approximate date on which it is planned to bring the station into use.

NOC **6.1.3 to 6.1.9**

MOD **6.1.10** Where an administration fails to reply within one month of dispatch of the Bureau's telegram sent under § 6.1.7 requesting an acknowledgement or fails to give a decision on the matter within two months of dispatch of the Bureau's telegram of request sent under § 6.1.8, the administration with which coordination was sought shall be considered to have undertaken that no complaint will be made in respect of any harmful interference which may be caused by the terrestrial station or by the earth station in the fixed-satellite service being coordinated to the service rendered or to be rendered by its satellite-broadcasting station.

NOC **6.1.11 to 6.1.12**

Section II – Notification procedure for frequency assignments

MOD **6.2.1** Any frequency assignment to a fixed, land or broadcasting station or to an earth station in the fixed-satellite service shall be notified to the Bureau if the use of the frequency concerned is capable of causing harmful interference to the service rendered or to be rendered by a broadcasting-satellite station of any other administration, or if it is desired to obtain international recognition of the use of the frequency[7].

MOD **6.2.2** For this notification, an individual notice for each frequency assignment shall be drawn up as prescribed in Appendix **S4**, Annexes 1A and 1B, or Annexes 2A and 2B, as appropriate, which specifies the basic characteristics to be furnished as required. It is recommended that the notifying administration should also supply the additional data called for in that Appendix, together with such further data as it may consider appropriate.

NOC **6.2.3 to 6.2.4**

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[7] The attention of administrations is specifically drawn to the provisions of Section I of this Article.

Section III – Procedure for the examination of notices and the recording of frequency assignments in the Master Register

MOD 6.3.1 Whatever the means of communication, including telegram, by which a notice is transmitted to the Bureau, it shall be considered complete if it contains at least the appropriate basic characteristics specified in Appendix **S4**, Annexes 1A and 1B or Annexes 2A and 2B, as appropriate.

NOC 6.3.2 to 6.3.32

6.3.33 Change in the basic characteristics of assignments already recorded in the Master Register

MOD 6.3.34 Any notice of a change in the basic characteristics of an assignment already recorded in the Master Register, as specified in Appendix **S4**, Annexes 1A and 1B or Annexes 2A and 2B, as appropriate (except those entered in Columns 2c, 3 and 4a of the Master Register), shall be examined by the Bureau in accordance with the provisions of § 6.3.8 and 6.3.9 and, where appropriate, § 6.3.10 and the provisions of § 6.3.12 to 6.3.32 inclusive shall be applied. Where the change should be recorded, the original assignment shall be amended according to the notice.

NOC 6.3.35 to 6.3.41

ARTICLE 7

MOD

Procedures for coordination, notification and recording in the Master International Frequency Register of frequency assignments to stations in the fixed-satellite service (space-to-Earth) in the frequency bands 11.7-12.2 GHz (in Region 2), 12.2-12.7 GHz (in Region 3) and 12.5-12.7 GHz (in Region 1), and to stations in the broadcasting-satellite service in the frequency band 12.5-12.7 GHz (in Region 3) when frequency assignments to broadcasting-satellite stations [in conformity with the Regions 1 and 3 Plan, or the Region 2 Plan] are involved[8]

MOD **Section I – Procedure for the advance publication of information on planned fixed-satellite (space-to-Earth) or broadcasting-satellite~~fixed-satellite~~ systems**

Publication of information

MOD 7.1.1 An administration which intends to establish a ~~fixed~~ fixed satellite or broadcasting-satellite system not subject to a Plan shall, prior to the procedure described in § 7.2.1, where applicable, send to the Bureau, not earlier than five years and preferably not later than two years before the date of bringing into service each satellite network of the planned system, the information listed in Appendix **S4**, Annexes 2A and 2B.

NOC 7.1.2 to 7.1.3.1

Comments on published information

MOD 7.1.4 If, after studying the information published under § 7.1.3, any administration is of the opinion that interference which may be unacceptable may be caused to its frequency assignments in [conformity with the appropriate Regional Plan], it shall, within ~~three~~ four months after the date of the Weekly Circular publishing the information listed in Appendix **S4**, Annexes 2A and 2B, send its comments to the administration concerned. A copy of these comments shall also be sent to the Bureau. If no such comments are received from an administration within the period mentioned above, it may be assumed that that administration has no basic objections to the planned fixed-satellite or broadcasting-satellite~~fixed-satellite~~ network(s) of that system of which details have been published.

Resolution of difficulties

NOC 7.1.5 to 7.1.6

Results of advance publication

NOC 7.1.7

Commencement of coordination or notification procedure

MOD 7.1.8 In complying with the provisions of § 7.1.5 and 7.1.6, an administration responsible for a planned fixed-satellite system in the fixed-satellite service, or in the broadcasting-satellite service not subject to a Plan shall, if necessary, defer its commencement of the coordination procedure of § 7.2.1 or, where this is not applicable, the sending of its notices to the Bureau until six ~~five~~ months after the date of the Weekly Circular containing the information listed in Appendix **S4**, Annexes 2A and 2B on the relevant satellite network. However, in respect of those administrations with which difficulties have been resolved or which have responded favourably, the coordination procedure, where applicable, may be commenced prior to the expiry of the ~~five~~ six-months mentioned above.

Section II – Coordination procedures to be applied in appropriate cases

MOD 7.2.1 Before an administration notifies to the Bureau or brings into use any frequency assignment to a space station in the fixed-satellite service (space-to-Earth), or in the broadcasting-satellite service-not subject to a Plan, it shall seek the agreement of any other administration having a frequency assignment [in conformity with the appropriate Regional Plan], if:

a) any portion of the necessary bandwidth proposed for the space station in the fixed-satellite or broadcasting-satellite~~fixed-satellite~~ service falls within the necessary bandwidth associated with the frequency assignment to the broadcasting-satellite station; *and*

b) the power flux-density which would be produced by the proposed fixed-satellite or broadcasting-satellite~~fixed-satellite~~ assignment exceeds the value specified in Annex 4.

For this purpose, the administration seeking agreement shall send to any other such administration the information listed in Appendix **S4**, Annexes 2A and 2B.

NOTE - The last paragraph of section 7.2.1 should be reviewed in order to align this Article with the current practice for non-planned services, where this information is only sent to the Bureau.

NOC 7.2.2

MOD 7.2.3 An administration seeking coordination under § 7.2.1 shall at the same time send to the Bureau a copy of the request for coordination together with the information listed in Appendix **S4**, Annexes 2A and 2B and the name(s) of the administration(s) whose agreement is sought. The Bureau shall determine on the basis of Annex 4 which frequency assignments [in conformity with the appropriate Regional Plan] are considered to be affected. The Bureau shall include the names of those administrations with the information received from the administration seeking coordination and shall publish this information in a special section of its Weekly Circular, together with a reference to the Weekly Circular in which details of the satellite system were published in accordance with Section I of this Article. When the Weekly Circular contains such information, the Bureau shall so inform all administrations by circular telegram.

NOTE - This paragraph should be reviewed in order to align this Article with the current practice for non-planned services, where this information is only sent to the Bureau.

NOC 7.2.4 to 7.2.13

Section III – Notification of frequency assignments

MOD 7.3.1 Any frequency assignment to a space station in the fixed-satellite or in the broadcasting-satellite~~fixed-satellite~~ service not subject to a Plan shall be notified to the Bureau:

a) if the use of the frequency concerned is capable of causing harmful interference to a frequency assignment of another administration which is [in conformity with the appropriate Regional Plan][10]; *or*

b) if it is desired to obtain international recognition of the use of the frequency.

NOC 7.3.2 to 7.3.5

Section IV – Procedure for the examination of notices and the recording of frequency assignments in the Master Register

NOC 7.4.1 to 7.4.5.1

MOD 7.4.5.2 where appropriate, with respect to its conformity with the provisions of § 7.2.1, relating to the coordination of the use of the frequency assignment with the other administrations concerned having a frequency assignment [in conformity with the appropriate Regional Plan];

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[10] The attention of administrations is specifically drawn to the application of § 7.2.1 above.

MOD 7.4.5.3 where appropriate, with respect to the probability of harmful interference to the service rendered or to be rendered by a broadcasting-satellite station whose frequency assignment is [in conformity with the appropriate Regional Plan].

NOC 7.4.6 to 7.4.9

MOD 7.4.9.1 Where the Bureau finds that the coordination procedures mentioned in § 7.4.5.2 have been successfully completed with all administrations whose frequency assignments [in conformity with the appropriate Regional Plan] may be affected, the frequency assignment shall be recorded in the Master Register. The date of receipt by the Bureau of the notice shall be entered in Column 2d.

NOC 7.4.9.2 to 7.4.9.3

MOD 7.4.9.4 Where the notifying administration resubmits the notice and the Bureau finds that the coordination procedure mentioned in § 7.4.5.2 has been successfully completed with all administrations whose frequency assignments [in conformity with the appropriate Regional Plan] may be affected, the frequency assignment shall be recorded in the Master Register. The date of receipt of the original notice by the Bureau shall be entered in Column 2d. The date of receipt by the Bureau of the resubmitted notice shall be entered in the Remarks Column.

NOC 7.4.9.5 to 7.4.12

MOD 7.4.12.1 A notice of a change in the basic characteristics of an assignment in the fixed-satellite or broadcasting-satellite not subject to a Plan~~fixed-satellite~~ service already recorded, as specified in Appendix **S4**, Annexes 2A and 2B (except the name of the station or the name of the locality in which it is situated or the date of bringing into use), shall be examined by the Bureau in conformity with § 7.4.5.1 and, where appropriate, § 7.4.5.2 and 7.4.5.3, and the provisions of § 7.4.7 to 7.4.11.3 inclusive shall apply. Where the change should be recorded, the original assignment shall be amended accordingly.

NOC 7.4.12.2 to 7.4.12.4

MOD 7.4.13 Recording of frequency assignments in the fixed-satellite or broadcasting-satellite not subject to a Plan~~fixed-satellite~~ service notified before being brought into use

NOC 7.4.13.1 to 7.4.13.3

Section V – Recording of findings in the Master Register

NOC 7.5

Section VI – Categories of frequency assignments

NOC 7.6.1 to 7.6.3

Section VII – Review of findings

NOC 7.7.1 to 7.7.4

Section VIII – Modification, cancellation and review of entries in the Master Register

NOC 7.8

MOD 7.8.1 Where the use of a recorded assignment to a station in the fixed-satellite or broadcasting-satellite service not subject to a Plan~~fixed-satellite service~~ is suspended for a period of eighteen months, the notifying administration shall, within this eighteen-month period, inform the Bureau of the date on which such use was suspended and of the date on which the assignment is to be brought back into regular use.

MOD 7.8.2 Whenever it appears to the Bureau, whether or not as a result of action under § 7.8.1, that a recorded assignment to a space station in the fixed-satellite or broadcasting-satellite service not subject to a Plan~~fixed-satellite service~~ has not been in regular use for more than eighteen months, the Bureau shall inquire of the notifying administration as to when the assignment is to be brought back into regular use.

MOD 7.8.3 If no reply is received within six months of action by the Bureau under § 7.8.2, or if the reply does not confirm that the assignment to a space station in the fixed-satellite or broadcasting-satellite service not subject to a Plan~~fixed-satellite service~~ is to be brought back into regular use within this six-month limit, a mark should be entered against the entry in the Master Register.

NOTE - This section should be reviewed in order to be aligned with the current practice as contained in **S11.49**.

NOC 7.8.4 to 7.8.6

ANNEX 4

MOD

Need for coordination of a transmitting space station in the fixed-satellite service or in the broadcasting-satellite service where this service is not subject to a Plan: in Region 2 (11.7-12.2 GHz) with respect to the Regions 1 and 3 Plan, in Region 1 (12.5-12.7 GHz) and in Region 3 (12.2-12.7 GHz) with respect to the Region 2 Plan

(See Article 7)

NOC

With respect to § 7.2.1 of Article 7, coordination of a space station in the fixed-satellite service of Region 2 is required when, under assumed free-space propagation conditions, the power flux-density on the territory of an administration in Region 1 or Region 3 exceeds the value derived from the expressions given below.

MOD

With respect to § 7.2.1 of Article 7, coordination of a space station in the fixed-satellite service (space-to-Earth) in Region 1 or 3 or broadcasting-satellite service not subject to a Plan in Region 3 is required when, under assumed free-space propagation conditions, the power flux-density on the territory of an administration in Region 2 exceeds the value derived from the same expressions:

-147 dB(W/m^2/27 MHz)	for	$0° \leq \theta < 0.44°$;
$-138 + 25 \log \theta$ dB(W/m^2/27 MHz)	for	$0.44° \leq \theta < 19.1°$;
-106 dB(W/m^2/27 MHz)	for	$\theta \geq 19.1°$;

MOD

where θ is:

– the difference in degrees between the longitude of the interfering fixed-satellite space station in Region 2 and the longitude of the affected broadcasting-satellite space station in Regions 1 and 3, *or*

– the difference in degrees between the longitude of the interfering fixed-satellite space station in Region 1 or 3 or the interfering broadcasting-satellite space station in Region 3 and the longitude of the affected broadcasting-satellite space station in Region 2.

APPENDIX S30A

ARTICLE 4

Procedure for modifications to the Plans

NOC 4.1 to 4.2.1.1

NOC 4.2 **Proposed modifications to a frequency assignment in conformity with one of the Regional Plans or proposed inclusion in that Plan of a new frequency assignment**

For Regions 1 and 3

NOC 4.2.1 An administration proposing a modification to the characteristics of a frequency assignment in conformity with the Regions 1 and 3 Plan or the inclusion of a new frequency assignment in that Plan shall seek the agreement of those administrations:

NOC 4.2.1.1

SUP 4.2.1.2 ~~having a frequency assignment in the band 17.7-18.1 GHz to an earth station in the fixed-satellite service (space-to-Earth), which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **S9.7** and which is located within the coordination area of the feeder-link fixed-satellite earth station; *or*~~

ADD 4.2.1.2 of Region 2 having a feeder-link frequency assignment in the fixed-satellite service (Earth-to-space) in the band 17.8-18.1 GHz in the same channel or an adjacent channel, which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **S9.7** and the associated provisions under Articles **S9** and **S11** or paragraph 7.1 of Article 7 of Appendix **S30A**; *or*

SUP 4.2.1.3

NOC 4.2.1.4

NOC 4.2.1.5

NOC 4.2.1.6

NOC 4.2.2

For Region 2

NOC 4.2.3

NOC 4.2.3.1

SUP 4.2.3.2

SUP 4.2.3.3

NOC 4.2.3.4 to 4.42

NOTE - Other approaches enabling to keep the above provisions may be possible, but require further studies in order to enable them to be applied by the administration on the territory of which the feeder-link earth station is located. The view was expressed that the above modifications may limit the flexibility of administrations to deploy feeder-link earth stations.

ANNEX 1

Limits for determining whether a service of an administration is considered to be affected by a proposed modification to one of the regional Plans or when it is necessary under this Appendix to seek the agreement of any other administration

SUP 1

SUP 2

NOC 3 to 5

NOTE - The view was expressed that the above modifications may limit the flexibility of administrations to deploy feeder-link earth stations.

ADD 6 Limits applicable to protect a frequency assignment in the bands 17.8-18.1 GHz (Region 2) to a receiving space station in the fixed-satellite service (Earth-to-space)

An administration in Region 2 shall be considered affected by a proposed modification in Region 1 and 3 when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder-link station would cause an increase in the noise temperature of the feeder-link space station which exceeds the threshold value of $\Delta T/T$ corresponding to [3%], where $\Delta T/T$ is calculated in accordance with the method given in Appendix **S8**, except that the maximum power densities per hertz averaged over the worst 1 MHz are replaced by power densities per hertz averaged over the total RF bandwidth of the feeder-link carriers.

Reasons: Protect non-planned BSS feeder links in Region 2 from modifications to the feeder-link Plan in Regions 1 and 3.

NOTE - The applicability of 3% ΔT/T criterion for the protection of unplanned feeder links requires further study.

ARTICLE 5

Coordination, notification, examination and recording in the Master International Frequency Register of frequency assignments to feeder-link transmitting earth stations and receiving space stations in the fixed-satellite service

NOC 5.1 to 5.1.3

ADD 5.1.3A Before an administration notifies to the Bureau or brings into use any frequency assignment to a transmitting feeder-link earth station located on its territory in the bands 14.5-14.8 GHz and 17.3-18.1 GHz which has been included in the relevant Plan after successful application of the procedure of Article 4 of this Appendix, it shall effect coordination of this assignment under the provisions of Nos. **S9.17, S9.17A** and **S9.19** with the other administrations whose terrestrial stations or earth stations operating in the opposite direction of transmission, as appropriate, might be affected by this assignment.

NOC 5.1.4 to 5.3.2

NOTE - Other approaches which would enable the avoidance of applying other provisions outside of this Appendix may be possible, but require further studies in order to enable them to be applied by the administration on the territory of which the feeder-link earth station is located. The view was expressed that the above modifications may limit the flexibility of administrations to deploy feeder-link earth stations.

NOC ARTICLE 6

MOD

ARTICLE 7

Procedure concerning coordination, notification and recording in the Master International Frequency Register of frequency assignments to stations~~-~~in the fixed-satellite service (space-to-Eearth) in Regions 1~~,~~ 2 and 3 in the band 17.7-18.1 GHz~~ and in Region 2 in the band 17.7-17.8 GHz~~, to stations~~-~~in the fixed-satellite service (Earth-to-space) in Region 2 in the band 17.8-18.1 GHz and to stations in the broadcasting-satellite service in Region 2 in the band 17.3-17.8 GHz, when frequency assignments to feeder links for broadcasting-satellite stations ~~appearing~~ subject to ~~in~~ the Regions 1 and 3 Plan or the Region 2 Plan are involved

MOD 7.1 The provisions of No. **S9.7** and the associated provisions under Articles **S9** and **S11** and Appendi~~x~~ces **S5** and **S8** are applicable to transmitting space stations in the fixed-satellite service in the band 17.7-18.1 GHz, to transmitting earth stations in the fixed-satellite service in Region 2 in the band 17.8-18.1 GHz and the provisions of Resolution 33 **(Rev.WRC-97)** are applicable to transmitting space stations in the broadcasting-satellite service in Region 2 in the band 17.3-17.8 GHz together with the provisions of Annex 4, except that in relation to feeder-link stations, the relevant criteria mentioned in Appendix **S8** are replaced by those given in Section 1 of Annex 4.

MOD 7.2 The provisions of No. **S9.17A** and the associated provisions under Articles **S9** and **S11** and Appendices **S5** and **S7** are applicable to receiving earth stations in the fixed-satellite service and in the broadcasting-satellite service that might be affected by assignments in one of the Plans in Appendix **S30A** or for which the corresponding Plan modification process has been initiated, from the date of receipt of the complete information under paragraph 4.2.5 of Article 4 of this Appendix[5].~~Administrations planning to implement assignments for receiving earth stations in Regions 1 and 3 in the 17.7-18.1 GHz band and in Region 2 in the 17.7-17.8 GHz band in the fixed-satellite service (space-to-Earth) should evaluate the level of interference, assessed on the basis of coordination contours calculated in accordance with Section 3 of Annex 4, which might be caused by the closest feeder-link earth station which could be located on the border of the territory of another administration. Should the administration planning receiving earth stations find that interference may be caused by such a feeder-link earth station, it may request the administration responsible for the feeder-link earth stations to indicate the geographical coordinates, the antenna characteristics and the elevation angle of the horizon around its actual and planned feeder-link earth stations.~~

MOD 7.3 In the case of Region 2, when the entry in the Plan contains information on specific earth stations this shall be used in the interference calculations relating to the application of No. **S9.17A** or **S9.19** as appropriate mentioned in § 7.2 above. When such information is not contained in the Plan an administration which receives a request under **S9.29**~~§ 7.2~~ shall, within a period of ~~three~~four months, communicate the details of the feeder-link earth stations to the administration planning the receiving earth station, and to the Bureau in order to update the Plan.

SUP 7.4

SUP 7.5

SUP 7.6

SUP 7.7

NOTE - The implication of the suppression of the provisions of this section requires further study.

ANNEX 4

Criteria for sharing between services

NOC Section 1

ADD **2 Threshold values for determining when coordination is required between transmitting feeder link earth stations in the fixed-satellite service in Region 2 and a receiving space station in the feeder-link Plans in the frequency bands 17.8-18.1 GHz**

With respect to § 7.1, Article 7 of this Appendix, coordination of a transmitting feeder-link earth station in the fixed-satellite service with a receiving space station in a broadcasting-satellite feeder link in the Regions 1 and 3 Plan or the Region 2 Plan is required, when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder-link station of another administration would cause an increase in the noise temperature of the feeder-link space station which exceeds a threshold value of $\Delta T/T$ corresponding to 3%, where $\Delta T/T$ is calculated in accordance with the method given in Appendix **S8**.

ANNEX 2 TO CHAPTER 5

Example of possible modifications to Article S9 and Appendix S5 to resolve the deficiencies in Articles [4], 6 and 7 of Appendices S30 and S30A in relation to non-planned services under the assumption that Articles 6 and 7 of these appendices are suppressed

("APPROACH B")

On the basis of the potential solutions described in section 5.3.3 above to correct the deficiencies identified in the current procedures of Article **S9** and Appendices **S30** and **S30A** in relation to the coordination between planned and non-planned services, this Annex contains examples of possible regulatory text that would reflect these solutions by modifications or additions to the current provisions of Article **S9** and Appendix **S5**, and in Appendices **S30** and **S30A**. It assumes that Articles 6 and 7 of Appendices **S30** and **S30A** are suppressed ("Approach B").

EXAMPLE MODIFICATIONS TO ARTICLE S9

Sub-Section IIA – Requirement and request for coordination

NOC S9.6 to S9.7

MOD S9.8 *b)*~~[12]~~ for a transmitting space station ~~of the fixed-satellite service~~ using the geostationary-satellite orbit, in the fixed-satellite service or in the broadcasting-satellite service, in a frequency band and in a Region where this service is not subject to a plan, ~~shared on an equal primary basis with the broadcasting-satellite service,~~ in respect of stations in the broadcasting-satellite service ~~of the latter service~~ which are subject to the Appendix **S30** Plans;

Reasons: Cover the case of non-planned BSS interfering into the Plan or its modifications. This provision would replace Article 7 of Appendix **S30.**

MOD S9.9 *c)*~~[12]~~ for a transmitting ~~space~~ station ~~of~~ in the fixed-satellite service or in the broadcasting-satellite service using the geostationary-satellite orbit in a frequency band and in a Region where this service is not subject to a Plan, ~~shared on an equal primary basis with~~ in respect of a receiving feeder-link space station for ~~the feeder links of~~ the broadcasting-satellite service which is ~~are~~ subject to the Appendix **S30A** Plans;

Reasons: Cover the case of interference into Appendix **S30A** Plan from non-planned BSS in Region 2 (17.3-17.8 GHz) and from feeder links in Region 2 (17.8-18.1 GHz). This provision would replace section 7.1 of Article 7 of Appendix **S30A.**

~~[12] **S9.8.1** and **S9.9.1** Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending a decision of WRC-99 on the revision of these two Appendices.~~

NOC **S9.10 to S9.16** Not used.

MOD **S9.17** *f)*[13] for any specific earth station or typical mobile earth station in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services, in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**;

MOD **S9.17A** *g)* for any specific earth station, in respect of other earth stations operating in the opposite direction of transmission, in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission and where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of another earth station~~, with the exception of the frequency bands subject to the Appendix S30A Plans~~ with the exception of coordination under **S9.19**;

Reasons: This coordination must be undertaken by the administration on the territory of which the earth station is located, which is not the case in Article 4 or in Article 7 of Appendix **S30A**. The words deleted were introduced by WRC-97 in order to avoid any unintended consequences. Their suppression would allow to replace both Nos. 4.2.1.2/4.2.3.2 of Article 4 of Appendix **S30A** and section 7.2 of Article 7 of Appendix **S30A**.

NOC **S9.18**

MOD **S9.19** *i)* for any transmitting station of a terrestrial service or a transmitting earth station in the fixed-satellite service (Earth-to-space) in a frequency band shared on an equal primary basis with the broadcasting-satellite service, with respect to an earth station of the broadcasting-satellite service.~~, except where this service is subject to the Appendix S30 Plans;~~

EXAMPLE MODIFICATIONS TO APPENDIX S5

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article S9

NOC **1*a)* to 1*e)***

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[13] ~~**S9.17.1** Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending a decision of WRC-99 on the revision of these two Appendices.~~

MOD 1*f)* where appropriate, in conformity with a world or regional allotment or assignment plan and the associated provisions and whose characteristics appear in the relevant Plan as adopted by a world or regional radiocommunication conference; or

ADD 1*f)bis* for which the procedure of Article 4 of Appendix **S30** or Article 4 of Appendix **S30A** has been [initiated or] successfully completed, with effect from the date of receipt by the Bureau of the complete relevant information as specified in Appendix **S4**/Annex 2 or

Some administrations expressed the view that modifications to the Plans should be protected from the date of receipt of the modification request at BR. This would be achieved by removing the square brackets around "initiated or" in ADD 1*f)bis* above.

Other administrations expressed the view that such a change is not covered by agenda item 1.20, that these provisions were originally drafted to protect the Plans from modifications and from other services, and therefore that such a change would be inappropriate and should not be considered as a deficiency.

To highlight this issue, the phrase "initiated or" has been placed in square brackets.

Reasons: Protect modifications of the Plan by a reciprocal coordination from the date the Plan modification process is initiated and, where applicable, from the date the **S9.17** or **S9.17A** procedure has been initiated

NOC **1*g)* to 6**

MOD

TABLE S5-1

Technical conditions for coordination
(see Article **S9**)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service ~~for which coordination is sought~~requesting coordination**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.8** GSO/GSO	~~A transmitting space station in the fixed-satellite service (FSS) using the GSO in a frequency band shared with the broadcasting-satellite service (BSS) on an equal primary basis, in respect of space stations in the latter service which are subject to the Plans in Appendix **S30**~~ For a transmitting space station using the geostationary-satellite orbit, in the fixed-satellite service or in the broadcasting-satellite service, in a frequency band and in a Region where this service is not subject to a Plan, in respect of stations in the broadcasting- satellite service which are subject to the Appendix **S30** Plans; **Reasons:** Align text with proposed **S9.8**.	11.7-12.2 GHz (Region 2) 12.2-12.7 GHz (Region 3) 12.5-12.7 GHz (Region 1)	i) There is an overlap in the necessary bandwidths of the interfering and wanted ~~FSS and BSS~~ space stations; and ii) the power flux-density (pfd) of the ~~FSS~~ interfering space station, under assumed free-space propagation conditions, exceeds the following values ~~given in Annex 4 of Appendix **S30**~~ on the territory of another administration located in another Region; -147 dB(W/m^2/27 MHz) for $0° \leq \theta < 0.44°$; $-138 + 25 \log \theta$ dB(W/m^2/27 MHz) for $0.44° \leq \theta < 19.1°$; -106 dB(W/m^2/27 MHz) for $\theta \geq 19.1°$; where θ is the difference in degrees between the longitude of the interfering space station and the longitude of the affected broadcasting-satellite space station. **Source:** Annex 4 of AP**S30**	Check by using the assigned frequencies and bandwidths;	~~See also Article 7 of Appendix **S30**.~~ ~~Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices.~~

MOD

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service ~~for which coordination is sought~~requesting coordination	Threshold/condition	Calculation method	Remarks
No. **S9.9** GSO/GSO	~~A station of the FSS in a frequency band shared on an equal primary basis with the feeder links of the BSS, which are subject to the Plans in Appendix **S30A**~~ A transmitting space station in the fixed-satellite service or in the broadcasting-satellite service using the geostationary-satellite orbit in a frequency band and in a Region where this service is not subject to a Plan, in respect of a receiving feeder-link space station for the broadcasting-satellite service which is subject to the Appendix **S30A** Plans; **Reasons:** Align text with proposed **S9.9**.	17.7-18.1 GHz (Region 1) 17.7-18.1 GHz (Region 3) ~~17.7-17.8 GHz~~ 17.3-18.1 GHz (Region 2)	i) Value of $\Delta T_s/T_s$ exceeds [4%] ~~(see Section 1 of Annex 4 of Appendix **S30A**)~~; and ii) geocentric inter-satellite angular separation is less than 3° or greater than 150°	[~~i) Case II of~~ Appendix **S8** ~~ii) Annex 1 of Appendix **S8**~~]*	[The threshold/ conditions do not apply when the geocentric angular separation, between an FSS transmitting space station and a receiving space station in the feeder-link plan, exceeds 150° of arc and the free-space pfd of the FSS transmitting space station does not exceed a value of -137 dB(W/m²/MHz) on the surface of the Earth at the equatorial limb. Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-2000 on the revision of these two Appendices.]*

MOD

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service ~~for which coordination is sought~~requesting coordination	Threshold/condition	Calculation method	Remarks
No. **S9.17** GSO, non-GSO/ terrestrial	A specific earth station or a typical mobile earth station in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**	Any frequency band allocated to a space service~~, except those mentioned in the Plans in Appendix S30A~~	The coordination area of the earth station covers the territory of another administration	Appendix **S7** (for earth stations in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz, 2 483.5-2 500 MHz and 2 500-2 516.5 MHz, see Remarks column) 1) The coordination area of aircraft earth stations is determined by increasing the service area by 1 000 km with respect to the aeronautical mobile service (terrestrial) or 500 km with respect to terrestrial services other than the aeronautical mobile service	NOTE – For RDSS earth stations, a uniform coordination distance of 400 km corresponding to an airborne earth station shall be used. In cases where the earth stations are all ground-based, a coordination distance of 100 km shall be used

MOD

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service ~~for which coordination is sought~~requesting coordination**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.17** GSO, non-GSO/ terrestrial (*cont.*)				2) For receiving earth stations in the meteorological-satellite service in frequency bands shared with the meteorological aids service, the coordination distance is considered to be the visibility distance as a function of the earth station horizon elevation angle for a radiosonde at an altitude of 20 km above mean sea level, assuming 4/3 Earth radius	~~Application of this provision with respect to Articles 6 and 7 of Appendices S30 and S30A is suspended pending the decision of WRC-99 on the revision of these two Appendices~~

MOD

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service ~~for which coordination is sought~~requesting coordination**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.17A** GSO, non-GSO/ GSO, non-GSO	A specific earth station in respect of other earth stations operating in the opposite direction of transmission in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission, where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of a coordinated earth station~~, with the exception of the frequency bands subject to the Plans in Appendix S30A~~ with the exception of coordination under **S9.19**	Any frequency band allocated to a space service	The coordination area of the earth station covers the territory of another administration or the earth station is located within the coordination area of an earth station	i) For bands in Table **S5-2**, see § 2 of Annex 1 of this Appendix ii) See ~~Recommendations ITU-R IS.847, ITU-R IS.848 and ITU-R IS.849~~Appendix S7	

NOC **S9.18**

MOD

TABLE S5-1 *(continued)*

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.19** Terrestrial/ GSO	A transmitting station in a terrestrial service or a transmitting earth station in the fixed-station in the fixed-satellite service (Earth-to-space) in a frequency band shared on an equal primary basis with the broadcasting-satellite service, with respect to an earth station of the broadcasting-satellite service~~BSS, except where the service is subject to the Plans in Appendix **S30**~~	Bands listed in No. **S9.11** and 11.7-12.5 GHz in Region 1 11.7-12.2 GHz in Region 3 and 12.2-12.7 GHz in Region 2	i) Necessary bandwidths overlap; and ii) the pfd of the terrestrial station at the edge of the BSS service area exceeds the permissible level	Check by using the assigned frequencies and bandwidths	

EXAMPLE MODIFICATIONS TO APPENDIX S30

SUP

ANNEX 3

Method for determining the limiting interfering power flux-density at the edge of a broadcasting-satellite service area in the frequency bands 11.7-12.2 GHz (in Region 3), 11.7-12.5 GHz (in Region 1) and 12.2-12.7 GHz (in Region 2) and for calculating the power flux-density produced there by a terrestrial station

Reasons: Consequential to the suppression of Article 6 of Appendix **S30**, which would be superseded by No. **S9.18**, with the coordination method of Appendix S7.

SUP

ANNEX 4

Need for coordination of a space station in the fixed-satellite service: in Region 2 (11.7-12.2 GHz) with respect to the Regions 1 and 3 Plan, in Region 1 (12.5-12.7 GHz) and in Region 3 (12.2-12.7 GHz) with respect to the Region 2 Plan

(See Article 7)

Reasons: Consequential to the suppression of Article 7 of Appendix **S30**, which would be superseded by No. **S9.8**, with the coordination thresholds described in Appendix **S5**, unchanged from the current levels in Annex 4 of Appendix **S30**.

EXAMPLE MODIFICATIONS TO APPENDIX **S30A**

ARTICLE 4

Procedure for modifications to the Plans

4.2 **Proposed modifications to a frequency assignment in conformity with one of the Regional Plans or proposed inclusion in that Plan of a new frequency assignment**

For Regions 1 and 3

NOC 4.2.1 to 4.2.1.1

SUP 4.2.1.2

Reasons: This coordination should be undertaken by the administration on the territory of which the feeder-link transmit earth station is located, not by the administration intending to modify the Plan, which is the administration with the feeder-link space station. The appropriate provision in this case is No. **S9.17A**.

ADD 4.2.1.2A of Region 2 having a feeder-link frequency assignment in the fixed-satellite service (Earth-to-space) in the band 17.8-18.1 GHz in the same channel or an adjacent channel, which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **S9.7**; *or*

SUP 4.2.1.3

Reasons: This coordination should be undertaken by the administration on the territory of which the feeder-link transmit earth station is located, not by the administration intending to modify the Plan, which is the administration with the feeder-link space station. The appropriate provision in this case is No. **S9.17**. Consequential is the deletion of Article 6 of Appendix **S30A**, since the protection of receive terrestrial stations from transmit feeder-link earth stations is taken into account when applying No. **S9.17**.

NOC 4.2.1.4 to 4.2.2

For Region 2

NOC 4.2.3 to 4.2.3.1

SUP 4.2.3.2

Reasons: This coordination should be undertaken by the administration on the territory of which the feeder-link transmit earth station is located, not by the administration intending to modify the Plan, which is the administration with the feeder-link space station. The appropriate provision in this case is No. **S9.17A**.

SUP 4.2.3.3

Reasons: This coordination should be undertaken by the administration on the territory of which the feeder-link transmit earth station is located, not by the administration intending to modify the Plan, which is the administration with the feeder-link space station. The appropriate provision in this case is

No. **S9.17**. Consequential is the deletion of Article 6 of Appendix **S30A**, since the protection of receive terrestrial stations from transmit feeder-link earth stations is taken into account when applying No. **S9.17**.

NOC **4.2.3.4 to 4.2.4**

ANNEX 1

Limits for determining whether a service of an administration is considered to be affected by a proposed modification to one of the regional Plans or when it is necessary under this Appendix to seek the agreement of any other administration

SUP **1**

Reasons: Consequential to the suppression of the corresponding provisions in Article 4.

SUP **2**

Reasons: Consequential to the suppression of the corresponding provisions in Article 4.

ADD 6

Limits applicable to protect a frequency assignment in the bands 17.8-18.1 GHz (Region 2) to a receiving space station in the fixed-satellite service (Earth-to-space)

An administration in Region 2 shall be considered affected by a proposed modification in Region 1 and 3 when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder-link station would cause an increase in the noise temperature of the feeder-link space station which exceeds the threshold value of $\Delta T/T$ corresponding to [3%], where $\Delta T/T$ is calculated in accordance with the method given in Appendix **S8**, except that the maximum power densities per hertz averaged over the worst 1 MHz are replaced by power densities per hertz averaged over the total RF bandwidth of the feeder-link carriers.

Reasons: Protect non-planned BSS feeder links in Region 2 from modifications to the feeder-link Plan in Regions 1 and 3.

SUP

ARTICLE 6

Procedure concerning coordination, notification and recording in the Master International Frequency Register of frequency assignments to receiving terrestrial stations in Regions 1 and 3 in the bands 14.5-14.8 GHz and 17.7-18.1 GHz, and in Region 2 in the band 17.7-17.8 GHz, when frequency assignments to feeder-link transmitting earth stations for the broadcasting-satellite service in conformity with the Regions 1 and 3 Plan or the Region 2 Plan are involved

Reasons: No longer required since the protection of FS stations is taken into account in the application of No. **S9.17**.

SUP

ARTICLE 7

Procedure concerning coordination, notification and recording in the Master International Frequency Register of frequency assignments to stations in the fixed-satellite service (space-to-earth) in Regions 1 and 3 in the band 17.7-18.1 GHz and in Region 2 in the band 17.7-17.8 GHz, and to stations in the broadcasting-satellite service in Region 2 in the band 17.3-17.8 GHz when frequency assignments to feeder-links for broadcasting-satellite stations appearing in the Regions 1 and 3 Plan or the Region 2 Plan are involved

Reasons: Section 7.1 replaced by No. **S9.9**, section 7.2 replaced by No. **S9.17A**.

SUP

ANNEX 4

Criteria for sharing between services

SUP 1

SUP 2 Not used.

SUP 3

Reasons: Consequential to the suppression of Article 7 of Appendix **S30A** and the reciprocal provisions in Article 4 of Appendix **S30A**. Provisions superseded by Appendix **S8** and Appendix **S7** respectively.

5.3 Agenda item 1.19

"to consider the report of the inter-conference representative group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system"

5.3.1 Progress report on ITU-R studies requested by the IRG

Activities relating to the implementation of Resolution **532** (**WRC-97**) have been carried out by IRG and the Group of Technical Experts. The results of the studies will be submitted by the Director Radiocommunication Bureau to WRC-2000.

5.3.1.1 Appropriate technical criteria for compatibility analysis between BSS carriers

5.3.1.1.1 Interference protection masks

ITU-R has developed a draft revision of Recommendation ITU-R BO.1293 concerning protection masks and associated calculation methods for interference into broadcast-satellite systems involving digital emissions.

Following the GTE request to investigate, as a matter of urgency, to give more precise indications on the application of the general default values to be used for the implementation of the draft revised Recommendation ITU-R BO.1293. ITU-R reconfirmed that the general default values, as currently contained in Appendix 1 to Annex 1 of the draft revised Recommendation ITU-R BO.1293, can be applied to all Regions and communicated to the IRG. However, the IRG has not yet dealt with this matter. Moreover, the ITU-R confirmed the appropriateness of the application of the worse case approach to deal with interference from analogue assignments of the Plans into both analogue and digital assignments.

5.3.1.1.2 Interference protection ratio

ITU-R confirmed the protection ratio adopted by WRC-97 for the protection between analogue assignments of the plans, as well as for the protection of digital assignments against interference from analogue assignments, and proposed a new overall co-channel protection ratio value of 20 dB (i.e. 21 dB and 27 dB for downlink and feeder link respectively for "planned digital assignments"). However, further studies are still required to reduce the WRC-97 protection ratios in the case of the protection of digital assignments against interference from analogue assignments.

5.3.1.2 Applicability of Annex 7 limitations

5.3.1.2.1 8 dB e.i.r.p. reduction

ITU-R concluded that the 8 dB reduction in Annex 7 of Appendix **S30** is no longer necessary with respect to terrestrial service.

5.3.1.2.2 Scope of Annex 7 orbital limitation for review

ITU-R will conduct technical studies on the orbital limitations of paragraph A3 of Annex 7, which apply to proposed new BSS assignments in the orbital arc from 37° W to 10° E and adopted a set of preliminary guidelines for conducting studies with respect to these limitations. ITU-R has prepared further studies on this issue which have been sent to the IRG.

5.3.1.3 Channel configuration

ITU-R concluded that the technical implication of a channel configuration (spacing and bandwidth) mostly pertain to the availability of protection criteria and interference calculation methods (draft revision of Recommendation ITU-R BO.1293) that would apply for the new channel configuration.

ITU-R concluded that the draft revised Recommendation ITU-R BO.1293 facilitates the analyses of interference involving channel bandwidths larger than the reference bandwidth of 27 MHz. This has been communicated to the IRG.

5.3.1.4 Sharing criteria to be used for inter-service and interregional compatibility analysis

For its examination of the compatibility between BSS plan assignments and other services, ITU-R has been requested to review the existing sharing criteria of Annex 1, 4 and 6 of Appendix **S30** and Annex 1 and 4 of Appendix **S30A** in terms of their applicability to digital BSS carriers which are going to be used for the planning studies. ITU-R has carried out further studies the results of which have been sent to the IRG.

5.3.1.5 Fast roll-off antennas for BSS space stations

A draft new Recommendation ITU-R BO.[Doc. 11/116] contains (in its Annex 1) new fast roll-off antenna patterns to be used if necessary for the transmitting satellite antenna. This Recommendation presents updated co- and cross-polarization patterns for 12 GHz BSS satellite transmit antennas with fast roll-off characteristics. The new patterns reflect the technical progress and assure that any angle from the centre of the beam, the performance of the fast roll-off antenna exceeds or at least equals that of the "normal" satellite transmit antenna, which is not the case for the patterns currently content in Annex 1 of Appendix **S30**, § 3.1.3.3.

Draft new Recommendation ITU-R BO.[Doc. 11/116], on improved fast roll-off patterns for the space station transmitting antenna, gives cross-polarization performances which are considered feasible and adequate for elliptical beams.

However, composite beams are likely to be implemented by shaped beam techniques, which may only achieve such cross-polarization performances if not combined with fast roll-off co-polar patterns.

Consequently, ITU-R can not, at least for the time being, recommend to apply the draft new Recommendation ITU-R BO.[Doc. 11/116] in case of composite beams. This has been communicated to the IRG.

5.3.1.6 Coordination between co-located BSS and FSS satellites

ITU-R studies indicated that when conducting planning studies in relation to Appendix **S30A**, the criteria of Annex 4 of Appendix **S30A** could be used in order to ensure that existing and planed systems in the FSS and in the BSS are not aversely impacted by modifications in the orbital positions of Appendix **S30A** Plan. Moreover it was suggested that consideration might be given to a

$\Delta T/T$ of 6% in lieu of the 4% level currently appearing in Annex 4 of Appendix **S30A** together with the revised receiver system noise temperature of 600 K instead of 900 K.

5.3.1.7 Sharing with space operation functions in the guardbands of Appendices S30/S30A Plans

In the case where different channel spacings or bandwidths are used in the planning studies, there is a need to study the sharing situation between assignments of Appendices **S30/S30A** Plans and space operation service for BSS space stations only operating in the guardbands of these Plans. ITU-R is developing a Recommendation on coordination procedure for assignments of space operation service in the guardbands of Appendices **S30** and **S30A** Plans.

It was also noted that in accordance with No. 3.9.2 of Annex 5 of Appendix **S30**, the guardbands were intended to protect the services in the adjacent frequency bands.

5.4 Agenda item 1.19*bis*

"in accordance with Article **S14**, to consider objections expressed by administrations with respect to the Radio Regulations Board's Rule of Procedure relating to the application of No. **S23.13/2674** in order for the Bureau to modify its findings in accordance with the conclusions of the conference"

No. **S23.13/2674** states:

"§ 4 In devising the characteristics of a space station in the broadcasting-satellite service, all technical means available shall be used to reduce, to the maximum, the radiation over the territory of other countries unless an agreement has been previously reached with such countries."

In response to Resolution **531 (WRC-95)**, the RRB established a Rule of Procedure in 1996 which was later modified in 1998. If the service area of a BSS system exceeds the territory of the notifying administration, the Rule of Procedure requires that a separate agreement from the one required under Article 4 of Appendix **S30** or Resolution **33 (Rev.WRC-97)** be sought either directly from the administrations concerned or through the publication required under Resolution **33 (Rev. WRC-97)** or the plan modification procedure.

Some administrations consider that this Rule of Procedure should be applied retroactively to systems received by the BR for the application of Article 4 of Appendix **S30** before 18 November 1995. Other administrations consider that such a retroactive application of the Rule would not be appropriate.

5.5 Direct-to-home transmission/broadcasting-satellite service

The IRG requested the ITU-R to provide relevant advice (if any) on the proposal made by several countries at WRC-97 and which was deferred to it by WRC-97, i.e. to include in WRC-01 agenda the "review of the possibility of combining the direct-to-home transmission services by satellite and satellite-broadcasting services in the planned and non-planned bands and its implication on the relevant Articles of the Radio Regulations".

Although no contributions were received on this issue by the time of CPM99-2 (Geneva, 15-26 November 1999), the concerns expressed by some administrations on this issue were noted, however IRG has the prime responsibility for this issue.

CHAPTER 6

Fixed and fixed-satellite services

(WRC-2000 agenda items 1.4, 1.5, 1.8, 1.12 and 1.14)

CONTENTS

Fixed and fixed-satellite services

6.1 Agenda item 1.4

"to consider issues concerning allocations and regulatory aspects related to Resolutions **126 (WRC-97)**, **128 (WRC-97)**, **129 (WRC-97)**, **133 (WRC-97)**, **134 (WRC-97)** and **726 (WRC-97)**"

The texts below are organized according to frequency ranges and topics rather than in the order of appearance of the Resolution numbers in the agenda item.

6.1.1 Resolution 126 (WRC-97) "Use of the frequency band 31.8-33.4 GHz for high-density systems in the fixed service"

The entire band 31.8-33.4 GHz is allocated on a primary basis to the RNS, the 31.8-32.3 GHz band to the SRS (deep space, space-to-Earth) and the 32-33 GHz band to the ISS. The date, as detailed in Resolution **126(WRC-97)**, of the provisional application of the allocation 31.8-33.4 GHz to the FS is 1 January 2001. No. **S5.547** identifies the band as available for High-Density applications in the FS (HDFS).

ITU-R is requested to conduct the appropriate studies to determine what criteria would be necessary for sharing between stations in the FS and stations in the other services to which all or parts of the frequency band 31.8-33.4 GHz are allocated.

6.1.1.1 Summary of technical and operational studies, including a list of relevant ITU-R Recommendations

6.1.1.1.1 High-density applications in the fixed service (HDFS)

The terme "High-Density applications in the Fixed Service (HDFS)" describes a significant level of deployment of point-to-point (P-P) and/or point-to-multipoint (P-MP) systems within a given area. In the bands above 30 GHz, propagation conditions, availability of small, light-weight components and a high degree of frequency reuse are key factors in enabling the deployment of a large population of FS systems.

a) General characteristics of HDFS

High-Density applications are generally characterized as follows:

- operate on a point-to-point or point-to-multipoint basis, or a combination of both;
- flexible, rapid deployment;
- high frequency reuse
- decreased antenna and terminal size with increased frequency;
- should not to be subject to major cost implications due to the need to include mitigation techniques to solve inter-service sharing problems;
- ubiquitous deployment of HDFS stations;
- a wider range of antenna elevation angles than is found at lower bands.

The term HDFS does not refer to a particular application, subservice or band in the fixed service, but does describe the use of maximized density and frequency reuse in the fixed service that are realized through concentrated deployments. Often these deployment density, spectrum reuse and spectral efficiency factors become more pronounced in the higher bands due to correspondingly more favourable conditions for a high deployment of FS stations.

Existing and future HDFS systems include some applications that are deployed without requiring individual frequency assignment for each system. These cases can be summarized under two main headings:

– Area licensing

  Where an operator is assigned a discrete channel or frequency block within a given area within which the operator has full flexibility to deploy systems.

– "Licence exempt"

  Where an administration has identified a band for "licence exempt" use, where systems may use any channel within the band without requiring an individual licence.

Known current high-density systems and usage in the FS include narrow-band wireless access and broadband applications ranging in bands up to 66 GHz. It is likely that HDFS applications will also become operational above 66 GHz.

Competitive access network stations in urban and industrial areas are placed in exposed locations, such as on top of high rise buildings in many cases, which reduces the use of natural or man-made shielding, impacting inter- and intra-service interference in these areas. The use of sectoral or omnidirectional antennas in the hub stations of P-MP systems can be more restrictive to inter- and intra-service coordination, by reducing the benefits of angle discrimination, as compared to point-to-point antennas.

b) New FS technologies for systems above 30 GHz

A number of technologies are in existence or emerging for use in bands above 30 GHz. Recent developments, such as Monolithic Microwave Integrated Circuits (MMIC), have made bands above 20 GHz, particularly in the range 20 to 60 GHz, suitable for these FS applications. Commercial components and devices are available in the market for mass production of affordable equipment.

To further increase spectral efficiency and service flexibility, advanced HDFS systems are likely to employ various techniques that may include different duplex technologies (e.g. FDD and TDD) and dynamic allocation of bit rate, modulation, and antenna beamwidth.

Some HDFS systems will have the functional capability of variable or flexible channelization. This differs from the historical approach in microwave radio systems where fixed channel separation and pre-assigned radio channel centre frequencies have been used. Variable channelization will permit transmission of variable data rates, making it possible to provide a variety of symmetrical or asymmetrical services, based on the needs, an important factor in the growth of wireless services.

c) Planned applications of HDFS

The bands above 30 GHz provide for a high level frequency reuse due to the propagation conditions. Accordingly, high population of FS systems can be achieved in these frequency bands. Consequently the systems in these bands are well suited to increase infrastructure in concentrated population areas. Service bit rates up to 310 Mbit/s are anticipated. Main applications include:

- deployment of mobile network infrastructure for existing and new systems;
- fixed wireless access;
  - accommodate new telecommunication operators in competitive markets;
  - provide alternate technologies for upgrade of existing telephone infrastructure;
  - provide greater access and service choices for residential and commercial users for telephony, data and multimedia services;

- applications requiring no individual frequency assignments possibly in the bands around 60 GHz.

Considering the above applications, potential sharing conditions in the various bands need to be taken into account.

d) Type of systems and system characteristics

The 31.8-33.4 GHz band could accommodate the application of P-P and/or P-MP systems. It offers propagation advantages when considering FS systems in bands above 30 GHz. As a result it will be possible to achieve longer hop lengths which can assist an economical deployment in more dispersed market areas and also to employ high capacity trunk links in dense areas. These characteristics are more pronounced in tropical regions of the world, with high rain precipitation rates, like ITU-R rain zones N and P. In such high rain precipitation regions, HDFS systems operating above 40 GHz will have severe limitations on allowable hop lengths, making difficult its deployment in many applications envisaged. In addition this band provides 1 600 MHz of contiguous spectrum which is ideal for the delivery of broadband services through P-P and P-MP systems. System characteristics for HDFS systems using the frequency band 31.8-33.4 GHz are available in Recommendation ITU-R F.758-1 for P-P and P-MP systems.

Rain outage events are the primary cause of unavailability in this band. Applications typically have to meet availability demands of 99.99% to 99.999% per year. The criteria will be defined individually depending on the importance of the transmitted traffic, respective service, by each operator and the classification within the reference path according to the relevant ITU-T and ITU-R recommendations.

Hop lengths up to about 14 km for P-P systems and for P-MP systems up to 7 km depending on availability criteria, rain zone and transmission capacity are possible.

The following Recommendations have been considered in the studies:

Recommendations ITU-R F.697, F.755, F.758, F.1189, F.1102, F.1400, and ITU-T Recommendations G.821, G.826 and G.827.

6.1.1.1.2 Sharing between the HDFS and other services

A number of preliminary studies have been carried out by various administrations. These studies were based on aggregating the emissions of many HDFS transmitting stations over a large population centre into a single equivalent transmitting station. This simplifying method further assumes that the propagation conditions from stations dispersed over an area to a distant earth station are comparable to the conditions from a single equivalent point to the earth station. Further study is required by ITU-R to validate the above assumptions and to provide guidance on how to account for anomalous propagation conditions for small percentages of time between a population of HDFS transmitting stations and a distant earth station.

The latest versions of Recommendations ITU-R F.758, F.699, F.1245, F.1336, F.1097, F.1333, SA.1157, SA.509, SA.609, IS.847, P.452, P.618, P.620, P.676, RA.769 and SA.1029 are relevant to these studies.

a) HDFS/inter-satellite service (ISS)

Currently no ISS systems are implemented in the 32-33 GHz band. The sharing between FS/ISS, including GSO-GSO, non-GSO-non-GSO, as well as GSO-non-GSO-links, is analysed with respect to the interference to point-to-point systems. However, the studies indicate that the results are applicable to P-MP systems.

b) HDFS/radionavigation service (RNS)

The sharing studies have, in accordance with Resolution **126 (WRC-97)**, been conducted in order to determine the necessary criteria in order to ensure the sharing between the FS and the RNS.

The term "radionavigation" throughout the text is referring to an airborne radar system operating in the 31.8-33.4 GHz band. One administration has reported worldwide use of this band for the radionavigation service in terms of a limited number of airborne radar systems. These radar systems are aboard aircraft used to provide humanitarian assistance to administrations worldwide in time of national emergency or natural disaster. The actual radar system is used for ground-mapping, weather avoidance and navigation, as well as airport approach and landing where land-based radars for that purpose may be unavailable or insufficient. Radar operations at millimetre wavelengths provide greater positioning and identification accuracy for navigational updates than at lower frequencies, and can provide the aircrew with visual quality radar images even under conditions of inclement weather or other airfield obscuration. Two radar systems are implemented: one system using fixed frequency (25-30 aircraft) and one system (50 aircraft) using frequency agility (selected pairs out of nine channels across the band 32.2-33 GHz). The sharing studies assumed that the mobile radar systems operate worldwide with a required protection ratio of I/N = -6 dB not to be exceeded for more than 0.1% of the operational flight time.

In the conducted sharing studies (radionavigation into HDFS), calculation of separation distance is based on a probabilistic approach as well as on a deterministic approach (worst case). The studies show that if the required minimum separation distance between systems in the two services to preclude interference cannot be assured, then appropriate mitigation techniques, including frequency coordination, and/or restrictions may be needed to facilitate frequency band sharing. Operational restrictions, if applied to airborne radars in the radionavigation service, may have some impact on the performance of these radars, and should be further studied.

The studies indicate that the concept of geographical coordination may be difficult to apply for the mobile radar system.

Required criteria, in terms of required separation distances (between HDFS and radionavigation), mitigation techniques and operational conditions, are determined in the conducted sharing studies. Propagation models used include Recommendations ITU-R P.452-8 and ITU-R P.676-3. The antenna radiation patterns are modelled by Recommendations ITU-R F.699-4, ITU-R F.1245 and ITU-R F.1336.

The studies have shown that below certain altitudes and down-tilt angles of its antenna, airborne radars operating in the RNS may cause interference to HDFS. It is possible that these particular modes of the radar represent a small per cent of time of its overall operation, or that operational agreements between the services can be reached on a local basis to minimize the amount of time that these modes are used. In either of these cases, the potential for interference can be greatly minimized. Furthermore, it has been identified that the frequency of radionavigation systems are either selectable or use discrete channel frequencies. The frequency agility of these radars could be a mitigation technique to reduce the interference, but further studies are needed. It appears that altitude restriction and antenna down-tilt limitation may not be able to be met by the radionavigation systems.

Both of the above possibilities will require further examination and cooperation between the radio services in the future.

Technical characteristics for the considered P-P and P-MP systems in the FS are based on inputs from Recommendation ITU-R F.758-1 (MOD) [Doc. 9/1022].

6.1.1.2 Analysis of the results of studies

For the applications described above the frequency band 31.8-33.4 GHz is suitable to satisfy the HDFS characteristics, including the availability and performance requirements.

6.1.1.2.1 Sharing between HDFS and space research service (SRS)

Sharing between the FS and the SRS in the 31.8-32.3 GHz portion of the band was analysed with respect to P-P systems, noting that there are currently no more than four large earth stations in the world to consider. So far, there is only one station (Goldstone, California) in operation and two stations (Canberra, Australia and Madrid, Spain) are planned for operation by 2002. Additionally, one station is planned (Perth, Australia), and future use is indicated for roughly ten additional stations.

Concerning protection criteria to the SRS earth stations in the 31.8-32.3 GHz band, Recommendation ITU-R SA.1157 is applicable. This corresponds to an interference level of -216 dB(W/Hz) not to be exceeded for more than 0.001% of time.

Studies of co-frequency sharing between typical HDFS and SRS systems (deep space, space-to-Earth) in the 31.8-32.3 GHz band have been conducted. Worst-case coordination distances between a receiving earth station and an urban area (18 million people with a fully-implemented network of three simultaneously-transmitting point-to-point links per square kilometre) would be in the 216 km to 259 km range. The distance depends on the particular HDFS system considered, however, a number of factors would tend to significantly reduce those distances. These include both natural and intentional shielding, distribution of the HDFS transmitters throughout the urban area, and the probability that one or more HDFS transmitters are pointing towards the earth station.

Taking these factors into account, the required separation distance is expected to be significantly less than the coordination distances. These separation distances indicate that the sharing of spectrum is feasible between the two services.

In the frequency band 31.8-32.3 GHz, the expected interference levels from transmitting space research space stations (deep-space) into receiving HDFS stations is considered to be acceptable at the current operating emission levels from the space research systems when in deep space. It would be appropriate to adopt a suitable free-space spectral pfd limit at the surface of the Earth in order to provide adequate protection to HDFS systems from SRS satellites in a temporary near-Earth orbit phase. Since only limited studies based on a few specific systems have been performed, it may be appropriate to adopt pfd limits found to be suitable for protecting the HDFS in neighbouring bands, such as 37-38 GHz.

The 31.3-31.8 GHz band is extensively used by the radio astronomy service for continuum observations at many locations worldwide as well as from space. It is also used by the EESS (passive) for meteorological observations. In implementing HDFS systems in the 31.8-32.3 GHz band, account should be taken to adequately protect those sensitive services. The harmful interference threshold levels for the RAS and EESS (passive) are listed in Recommendations ITU-R RA.769 and SA.1029, respectively.

6.1.1.2.2 Sharing between HDFS and inter-satellite service

No ISS systems have so far been implemented in the 32-33 GHz band. However, by applying a realistic pfd mask (-135/-115 dB(W/(m^2•MHz)) (see § 6.1.1.3.3) and typical ISS-link configurations, simulations show that the FS long-term and short-term criteria are met.

6.1.1.2.3 Sharing between HDFS and radionavigation service (RNS)

a) RNS into HDFS

The pulsed nature of the interfering radar signal allows for shorter separation distances compared to a non-pulsed interfering source. This has been taken into account in the relevant sharing studies as well as the impact of short duration pulsed, extremely high-power interference of the airborne radar system into the HDFS-receiver.

The studies indicate that severe interference events may occur during exceptional main beam coupling between the antennas of the radar system and the fixed system.

Various combinations of aircraft altitudes, radar tilt angle and fixed system antenna elevation angle can generate such events. However, the probability of occurrence of such events is expected to be low. Furthermore, the events will be short in duration due to the narrow radar antenna beam and the antenna rotation. Further studies are required in order to assess the overall effects of high power radar interference into HDFS receivers.

The studies outline necessary criteria, in terms of required mitigation techniques (see § 6.1.1.1.2b) for the HDFS and limitations on radar operational altitude and/or tilt angle in particular over urban areas. The studies indicate that the HDFS elevation angle and the radar tilt angle are crucial.

In cases where suitable mitigation techniques for the HDFS and/or restrictions on operational conditions for the RNS are not applicable, appropriate and agreed operational procedures should be applied.

b) HDFS into RNS

Since the airborne radar is operated throughout all phases of aircraft flight, it is not apparent that interference, without countermeasures, can be avoided in all cases.

Conducted sharing studies considering P-P systems show that required unavailability criterion (0.1%) of the airborne radar system will be met, assuming worst-case scenarios and operational altitudes above approximately 4 000 metres and limitations on the tilt angle.

Considering high-density P-MP applications, assuming densities of 1 000 terminal stations/km^2 and 0.3 central stations/km^2, respectively, the sharing studies, using practical assumptions, show that the performance of the airborne radionavigation radar will be acceptable over urban areas. This conclusion assumes that the aircraft operates at altitudes above 6 000 metres and with antenna down tilt angles between -20 to -30°. In addition, the antenna elevation angles of HDFS stations, oriented toward the aircraft, must not exceed approximately 5°.

HDFS systems may occasionally require higher elevation angles than 5° in dense urban areas. For these cases appropriate mitigation techniques should be taken into account in order to reduce the interference to the airborne radar system.

Mitigation techniques such as shielding effects, improved antennas, Automatic Transmitter Power Control (ATPC), etc. implemented in future P-MP applications may ensure that the availability criteria of the airborne radar system will be met. Concerning mitigation techniques for the radar system, further information is required regarding interference mitigation techniques that are in use or planned to be used in future radionavigation equipment in the 31.8-33.4 GHz band.

6.1.1.3 Methods to satisfy the agenda item and their advantages and disadvantages

In order to satisfy the agenda item, the FS systems in this band should be accommodated for HDFS usage, recognising the needs of other services already allocated to these bands.

6.1.1.3.1 Sharing between HDFS and SRS

Sharing between the SRS and the FS is feasible in the band 31.8-32.3 GHz if a suitable free-space spectral pfd limit at the surface of the Earth is adopted for the space research service. An appropriate pfd limit could be determined by applying the following method:

Adopt a provisional pfd limit as established for non-GSO SRS satellites in the band 37-38 GHz and conduct, if necessary, further studies in order to allow for precise determination of a suitable pfd limit to protect HDFS while not unduly constraining the SRS.

6.1.1.3.2 Sharing between HDFS and RNS

The sharing studies show that the band 31.8-33.4 GHz could be used by the FS and the RNS if certain technical and operational measures are taken by both services.

Enhancements to future FS systems in terms of robust Forward Error Correcting (FEC) coding are easy and relatively inexpensive to implement. In particular, in combination with bit interleaving (draft revision of Recommendation ITU-R F.1097 (MOD) (Doc. 9/1020)), FEC has shown to be efficient with respect to burst errors. In order to further improve the sharing possibilities, certain access/modulation techniques less susceptible to pulsed energy and robust synchronization schemes are available to the FS. In addition, improved antennas combined with modest limitations on elevation angle will increase the protection of both systems. However, too stringent limitations on antenna elevation angle may tend to limit the architecture of P-P and P-MP systems to be deployed in the 31.8-33.4 GHz band.

Concerning the airborne radar system, possible measures include consideration of operational altitude and antenna down-tilt angle, priority channel schemes and pulse coding.

Mitigation techniques in terms of pulse coding for the RNS mean that the radar transmits a coded sequence in each burst (a "signature" for the radar station equivalent to the principle of spread spectrum systems). The processing gain achieved thereby has the effect of increasing the signal-to-noise ratio in the radar receiver, which improves the radar performance in an interference environment.

Similar RNS applications in other bands have implemented pulse coding as an efficient mitigation technique.

Retrofitting existing radionavigation equipment with pulse coding circuitry would not be feasible but the requirement for future equipment is possible.

However, in order to provide some measures of protection for the FS, in particular in urban areas, the RNS may be able to take certain operational measures, such as channel selection, to reduce interference and limitations on operational altitude and/or tilt angle. The specifics and effects of these restrictions should be further studied in ITU-R.

In particular, the frequency agile mode of the RNS system will improve the sharing possibilities. This should be viewed in the light that operational limitations on the RNS may in some cases be difficult to implement due to the high mobility of the service and the demands of the service to use the full capability of the system when sufficiently removed from the urban environment.

Band segmentation would reduce the efficiency of spectrum use providing less bandwidth needed for the frequency hopping systems in the RNS and possibly insufficient bandwidth for channel plans and separation requirements for forward and return links in the FS. Consequently, band segmentation has the disadvantage of less efficient use of the resource in terms of available spectrum and thus should not, if possible, be implemented.

6.1.1.3.3 Sharing between HDFS and ISS

The studies show that the 31.8-33.4 GHz band could also be shared by the FS and ISS (no ISS system implemented so far in the 32-33 GHz ISS band). In the absence of any actual data, a LEO SAT 1 type constellation has been simulated with 288 satellites, each communicating to its four nearest neighbours.

The system uses power control to achieve a C/N of 25 dB on each link. The ISS beam is assumed to conform to Recommendation ITU-R S.672-3, with a 3 dB beamwidth of 0.7º and a peak gain of 48 dBi.

Used short-term and long-term criteria for the FS are +1.5 dB and -13.5 dB not to be exceeded for more than 0.1% and 20% of time, respectively.

The conducted sharing studies indicate, so far, that FS will be protected by the following pfd mask for future non-GSO ISS system:

-135	dB(W/(m^2•MHz) for $0° \leq \delta < 5°$
-135 + (δ-5)	dB(W/(m^2•MHz) for $5° \leq \delta < 25°$
-115	dB(W/(m^2•MHz) for $25° \leq \delta < 90°$

where δ is the angle of arrival (degrees).

6.1.1.3.4 Summary

The studies show that the 31.8-33.4 GHz band could be used by high-density systems in the fixed service and the other services in the band, with some limitations on all services. This conclusion should be viewed in the light that the 31.8-33.4 GHz band, with high potential for wideband HDFS applications, is not shared with FSS. Bearing in mind the increasing sharing problems between HD applications for FS and FSS in shared bands, this potential should be utilized.

In addition, the band is sparsely implemented by the other services. RNS, operated worldwide, is implemented by one administration; ISS is not implemented so far.

6.1.1.4 Regulatory and procedural considerations

Concerning the sharing between the FS and the RNS in the 31.8-33.4 GHz band, appropriate ITU-R Recommendations could be developed rather than modify the RR.

Concerning the sharing between the FS and the ISS in the 32-33 GHz band, Article **S21** may need to be revised by the WRC, taking into account the proposed pfd mask described in § 6.1.1.3.3.

Concerning the sharing between the FS and the SRS in the 31.8-32.3 GHz band, it may be appropriate to adopt the same pfd limit for SRS in Article **S21** as proposed for the non-GSO SRS in the band 37-38 GHz band. Taking into account the proposed methods to satisfy agenda item 1.4, it may be appropriate to suppress Resolution **126 (WRC-97)** and to delete No. **S5.547A**.

6.1.2 Resolution 133 (WRC-97) "Sharing between the fixed service and other services in the band 37-40 GHz"

6.1.2.1 Summary of technical and operational studies, including a list of relevant ITU-R Recommendations

There is a strong interest worldwide from both the fixed-satellite service (FSS) and the fixed service (FS) communities for access to spectrum in the 37.5-42.5 GHz range. Sharing between the two services has been shown to be technically feasible, particularly where the FS and/or the FSS would not rely on the ubiquitous deployment of terminals.

The appropriate power flux density limits to protect the FS from the FSS strongly depend on the technical parameters of both the FS and FSS and the type of deployment of the FS stations. At the same time, the FSS may be limited in its ability to reduce power flux densities to the levels intended to protect the FS. Adopting power flux-density limits on FSS satellites in the band 37.5-40.0 GHz that are adequate to protect all applications in the FS would constrain non-GSO and GSO FSS systems, and constrain their ability to serve earth terminals with small receive antennas. Conversely, adopting power flux-density limits that would enable FSS systems to serve earth terminals with small receive antennas would constrain the performance of some applications in the FS. However, pfd limits could also be developed, which would provide an equitable balance of constraints on both services.

Point-to-point FS systems are already deployed on a large scale and their use is growing in the 37-40 GHz range which is allocated to the FS on a primary basis. The initial large-scale deployment of P-P systems in this band was in mobile and competitive market networks with a concentration mainly in and around urban and industrial areas. A more recent large-scale FS application of this band represents a new variety of FWA using P-P and P-MP systems that terminate directly on subscriber premises. While the current major use of the 38 GHz band is the application of P-P systems with smaller capacities, there is an accelerating trend toward higher capacities up to *n* x 155 Mbit/s, using higher level modulation methods (e.g. 256-QAM). Deployment levels and further details can be found in draft new Recommendation ITU-R F.[Doc. 9/1015].

In a study addressing the band 37.5-40.5 GHz, the coordination distances between HDFS system transmitters and FSS earth station receivers is relatively small, in the 20 km to 44 km range in the case of point-to-point FS systems, and from 3 km to 15 km in the case of point-to-multipoint systems. Separation distances should be shorter than the reported coordination distances. Because of the expected HDFS systems in areas of high population or concentrated commercial activity (i.e. urban areas), and possibly a similarly high density of receiving FSS earth stations in parts of the same areas, the required separation distances between the two system types would make co-frequency operation of one or the other type of system difficult within all or some of an affected area. However, mitigation techniques could facilitate sharing. This matter requires further study. It should be noted, however, that because of the short separation distances involved, administrations may wish to make the spectrum management decision of whether to use one or the other or both of these types of systems on a national basis. Because of the short separation distances involved, international coordination is not expected to be difficult, except perhaps in border regions.

The band 37-38 GHz is allocated to the FS, MS, SRS and FSS (37.5-38 GHz) on a co-primary basis. The SRS and FSS allocations are in the space-to-Earth direction.

Preliminary studies to determine the coordination area of SRS and FSS earth stations in the band 37.5-38 GHz have not yet been carried out.

A number of preliminary studies have been carried out by various administrations for sharing between HDFS and FSS. These studies were based on aggregating the emissions of many HDFS transmitting stations over a large population centre into a single equivalent transmitting station. This simplifying method further assumes that the propagation conditions from stations dispersed over an area to a distant earth station are comparable to the conditions from a single equivalent point to the earth station. Further study is required by ITU-R to validate the above assumptions and to provide guidance on how to account for anomalous propagation conditions for small percentages of time between a population of HDFS transmitting stations and a distant earth station.

The following Recommendations have been considered in the studies: ITU-R IS.847, SA.1157, F.758, SA.1344, draft new Recommendations SA.[Doc. 7/18(Rev.1)] and F.[Doc. 9/1015], SA.609, SA.1015, M.1316, P.452 and P.620.

6.1.2.2 Analysis of the results of studies

6.1.2.2.1 Sharing between FS and FSS

Coordination of FSS earth stations with FS stations is the most critical sharing aspect in the frequency band 37-40 GHz to be considered under item 2 of Resolution **133 (WRC-97)**. This is due to such factors as propagation conditions and the rapidly progressing HDFS deployment in urban, suburban and industrial areas.

In general, coordination between FS stations and FSS earth stations can be exemplified by the following scenarios:

– Areas without FS deployment

  The geographical areas in which the FSS will not need to coordinate with the fixed service will be larger in the 37-40 GHz band in comparison with the currently shared lower frequency bands (e.g. below 30 GHz) where the fixed service deployment is spread out over much larger geographical areas.

– Areas with sparse FS deployment

  In intermediate cases, where the fixed service is sparsely deployed, station-to-station coordination is feasible.

– Areas with dense FS deployment

  In service deployment areas where there is dense deployment of fixed service stations, coordination with and by FSS earth stations should be carried out on a basis other than a station-to-station basis. CPM-97 reported in § 7.5.3.2, paragraph 1, that because HDFS intra-service station distances are substantially smaller than inter-service separation distances, coordination with and by other services should be carried out for HDFS service areas instead of individual HDFS stations.

The feasibility of coexistence between the FS and FSS within the same deployment areas depends on:

i) the actual parameters of both systems;

ii) minimum operational elevation angles of the non-GSO systems;

iii) off-axis antenna gain of both systems;

iv) the terrain topography;

v) type of FS system (P-P or P-MP); and,

vi) FS and/or FSS deployment density.

The results of studies conducted in the ITU-R of known and proposed non-GSO FSS systems, and of known and proposed P-P and P-MP FS systems, indicate that maximum allowable values of power flux-density of -120/-105 dB(W/(m^2·MHz)) at the surface of the Earth would be adequate to protect terrestrial services from non-GSO FSS networks in the frequency band 37.5-40.5 GHz. Studies supporting this conclusion are summarized in Annex 1 of draft new Recommendation ITU-R SF.[Doc. 4-9/1008]. The studies were based on the point-to-multipoint and point-to-point FS system characteristics considered at the time to be the most representative. Systems with higher elevation angles and lower fade margins could be more sensitive.

Previous studies within the ITU-R had not allowed conclusions to be drawn as to the adequacy of the current power flux-density limits for the band 37.5-40 GHz to protect terrestrial services from GSO FSS satellites. For a single GSO satellite operating at the current Article **S21** power flux-density limits, the in-line interference level (I/N) at an FS receiver with a 44 dBi antenna is -4.4 dB when the FS receiver is at a 0° elevation angle, and 11 dB when the FS receiver is at a 10° elevation angle. In order to meet the long-term interference criterion, I/N = -10 dB, the separation angle between the FS receiver and the GSO arc should be no less than 1.7°. In any FS system deployment, a small percentage of links may point at the GSO arc. For those point-to-point FS systems that do not implement any orbital avoidance, the FS receiver could experience interference above the long-term interference criterion when the separation angle from the GSO arc is less than 1.7°. Arc avoidance is not generally applied to most FS applications in this band, but this and other potential mitigation approaches have not been fully studied.

Some administrations have concluded that current ITU-R power flux-density limits of -115/-105 dB(W/(m^2·MHz)), as currently specified in Article **S21** for FSS systems in the band 37.5-40.5 GHz, are adequate to protect the FS from GSO FSS networks in the band 37.5-40.5 GHz.

On the basis of studies carried out by one administration, some administrations had concluded that in the case of interference from a fully populated arc of GSO satellites, the aggregate interference into the FS receiver at 10° elevation angle exceeds the long-term interference criterion for a large range of azimuths. Furthermore, these administrations had also concluded that in the band 37.5-40.5 GHz, for an FS receiver at 10° elevation, a power flux-density level of -140/-105 dB(W/(m^2•MHz)) would ensure that the long-term criterion would be met for all azimuths. In this case it was concluded that this could preclude operation of GSO FSS systems.

Further details can be found in draft new Recommendations ITU-R F.[Doc. 9/1015] and SF.[4-9/1008] (submitted to RA-2000).

On the subject of power flux-density limits for GSO FSS satellites to protect fixed service systems in the 37.5-40 GHz band, some administrations provided results of recent studies directly to CPM-99-2. Based on these studies, some administrations proposed the following power flux density mask (see Table 6-1), as a compromise intended to adequately protect the fixed service without unduly constraining the FSS in this band:

TABLE 6-1

pfd limits for GSO FSS in the band 37.5-40 GHz

Power flux-density limit in dB(W/(m^2•MHz))	Angle of arrival δ above the horizontal plane
-125	$0° \le \delta < 5°$
-125 + (δ - 5)	$5° \le \delta < 25°$
-105	$25° \le \delta$

6.1.2.2.2 Sharing between FS and SRS

Studies conducted in ITU-R have indicated the following sharing possibilities between space research systems and HDFS systems. The findings are summarized as follows:

a) Sharing of spectrum in the 37-38 GHz band is feasible between HDFS systems and deep-space space-to-Earth links such as the planned Mars-to-Earth links. Interference levels into HDFS receivers are 25 to 30 dB below thermal noise levels. Coordination distances between a receiving earth station and a full-implemented HDFS system in a large urban area may be up to 260 km, but actual required separation distances between the earth station and the urban area are expected to be significantly less than the coordination distance.

b) Sharing between HDFS systems and Moon-to-Earth space-research systems is feasible with some constraints. Coordination distances between an earth station of Moon-to-Earth links are typically in the 120 km range, but again the actual required separation distances are expected to be significantly smaller that that limit. Transient interference levels at HDFS receivers from Moon transmissions have a pfd around -129 dB(W/(m^2•MHz)). This pfd level is considered to be close to the interference limit of HDFS receivers, but mitigation measures such as higher G/T and a lower e.i.r.p. in the Moon-to-Earth link and a designed-for higher I/N ratio in HDFS links operating at high elevation angles are available to permit sharing to take place.

   Statistical analysis for conjunction of the Moon within the 10 dB beamwidth of an HDFS receiver antenna has shown that the probability is dependent on the gain of the antenna and the pointing direction. Simulations have shown that the probability of conjunction is between 0.0033% for a 47 dBi gain antenna and 0.097% for a 40 dBi gain antenna. The average duration ranges between five minutes and ten minutes depending on the gain of the HDFS receiver.

c) Sharing between HDFS systems and space-to-Earth space very-long-baseline interferometers (S-VLBI) has similar characteristics as that between HDFS systems and Moon-to-Earth links. Transient interference levels at HDFS receivers are marginal, but easier mitigated against in the S-VLBI case because the interference duration is only about eight seconds. Peak interference levels are not greater than 7 dB below the HDFS thermal noise level. Coordination distances between a full complement of HDFS transmitters in a large urban area and an earth-station receiver is about 67 km to protect wideband data, but up to 265 km to protect narrow-band (2-3 MHz) timing signals.

6.1.2.2.3 Impact of the FS-FSS sharing scenario on SRS

In consideration of Resolution **133 (WRC-97)** pfd limits either included in Article **S21** or derived for the FSS to protect FS systems may not adequately protect the SRS systems. Preliminary results of studies of sharing between the SRS and the FSS in the bands 37.5-38 GHz and 40-40.5 GHz indicate that sharing may be feasible for certain types of FSS systems. These studies further show that power flux-density limits more stringent than the current limits of –115/-105 dB(W/(m^2•MHz)), and the acceptance of certain operational constraints by the SRS, may be needed to facilitate satisfactory SRS and FSS operations in the 37.5-38 GHz band.

6.1.2.3 Methods to satisfy the agenda item and their advantages and disadvantages

In order to satisfy the agenda item the FS systems in this band should be accommodated for HDFS usage.

6.1.2.3.1 Space research service

The technical and operational studies that have been carried out have concluded that sharing between the fixed and the space research services in the 37-38 GHz band is feasible.

Some operational constraints on the SRS are necessary to facilitate sharing, depending on the type of space mission (i.e. deep space or Moon-to-Earth) and the density and geographical location of terrestrial FS systems.

Although some space research systems are operating with a pfd of -129 dB(W/(m^2•MHz)), there is a concern that future SRS satellite systems may be implemented with higher power-flux densities on the surface of the Earth. Article **S21** permits pfd of -115 dB(W/(m^2•MHz) at low angles of elevation, and -105 dB(W/(m^2•MHz) at high angles of elevation, under free-space propagation conditions. These regulations were drafted several years ago, however, primarily for the sharing of more conventional fixed systems with satellite systems in the GSO orbit. With current technology of many satellite systems in non-GSO orbits and HDFS fixed systems operating at high elevation angles, lower power-flux density levels are required in the band 37-38 GHz.

In addition, the requirements of the radio link used to synchronize the operation of space-very-long baseline interferometry (S-VLBI) need to be considered. A narrow band (i.e. 2-3 MHz) to protect the very high C/N requirement of the timing circuit could be identified in the 37-38 GHz band. This 2-3 MHz could be at the lower band edge so that the deployment of HDFS is not unduly restricted.

A free-space power flux-density limit at the surface of the Earth in Table **S21-4** revised for FSS under Resolution **133 (WRC-97)** has an impact on protection of some SRS earth stations. The FSS power flux-density limit may not be adequate to protect some SRS earth stations. Mitigation techniques and other technical methods to facilitate coordination between the SRS and the FSS in the band 37.5-38 GHz continue to be studied and, if required, the results shall be brought to the attention of a competent conference.

On the basis of studies conducted in the ITU-R of known and proposed non-GSO FSS and FS systems, it is concluded that the same power flux-density limits of -120/-105 dB(W/(m^2•MHz)) in the band 37.5-40.5 GHz may be adequate to protect terrestrial services from emissions of non-GSO SRS satellites in the band 37-38 GHz. A similar approach may be considered for GSO SRS satellites, that is to use the GSO FSS pfd limit, as long as the low pfd limit is not significantly less than the value agreed for the non-GSO SRS.

Appropriate pfd limits could be determined by applying the following methods:

For non-GSO SRS satellites, WRC-2000 could adopt the pfd limits proposed for non-GSO FSS satellites in the band 37.5-38 GHz, i.e. -120/-105 dB(W/(m^2•MHz)).

For GSO SRS satellites, WRC-2000 could adopt the limits proposed for GSO FSS satellites, as long as the lower pfd limit is not significantly less than -120 dB(W/(m^2•MHz)). The currently identified lower value of -125 dB(W/(m^2•MHz)) may be acceptable to the SRS.

Conduct, if necessary, further studies in order to allow for precise determination of a suitable pfd limit to protect HDFS networks from a relatively small number of SRS satellites without unduly constraining the SRS.

6.1.2.3.2 Fixed-satellite service

The ITU-R concluded, on the basis of studies of certain known and proposed non-GSO FSS and FS systems, that power flux-density limits of -120/-105 dB(W/(m^2•MHz)) in the band 37.5-40.5 GHz would be adequate to protect terrestrial services from non-GSO FSS networks.

Two methods to satisfy the agenda item were identified:

Method A

Method A is to adopt the agreed power flux-density limits in draft new Recommendation ITU-R SF.[Doc. 4-9/1008] for non-GSO FSS (as mentioned above), and is to adopt the following pfd limits (see Table 6-2) developed at CPM99-2 for GSO FSS in the band 37.5-40 GHz:

TABLE 6-2

pfd limits for GSO FSS in the band 37.5-40 GHz

Power flux-density limit in $dB(W/(m^2 \cdot MHz))$	Angle of arrival δ above the horizontal plane
-125	$0° \leq \delta < 5°$
$-125 + (\delta - 5)$	$5° \leq \delta < 25°$
-105	$25° \leq \delta$

Advantages

- The tightening of the existing pfd limits will facilitate the deployment of high density applications in the fixed service.
- These pfd limits allow access to the band for both services without undue constraints on either service, and provides the consequential benefit of more efficient use of spectrum.
- No further studies are required and a decision could be made at WRC-2000.

Disadvantage

- Some GSO FSS applications may not be able to implement certain services to small antenna earth station terminals.

Method B

Since the sharing issues between the FS and the FSS in the 37.5-40 GHz range have not been fully resolved, solutions could take the form of power flux-density limits that vary among band segments. Method B would build upon the conclusions reached with regard to non-GSO FSS power flux-density limits, and support the development of a comprehensive sharing approach for the 37.5-42.5 GHz band that includes provision for FS systems and both non-GSO FSS and GSO FSS systems. This method connects the 37.5-40 GHz band with the 40.5-42.5 GHz band (see § 6.1.5.2) and envisions a solution that would encompass the entire 37.5-42.5 GHz range. Under this approach, the conclusions reached with regard to non-GSO FSS power flux-density limits are not sufficient to resolve in full the sharing situation between the FSS and the FS in this band.

Advantages

- The result of such different limits would encourage the development of ubiquitous, high-density FS and FSS applications in different portions of the band, and would require only minor modifications to the existing FSS allocations to obtain global co-primary FS and FSS allocations in the 37.5-42.5 GHz band.

- Depending on frequency bands and pfd limits proposed under this method, a decision on the pfd limits in particular frequency bands may be taken at WRC-2000.
- Provides a global sharing approach that is equitable and allows for future growth of both services.

Disadvantage

- May have some impact on the fixed service in administrations that have made FS assignments in this frequency range.

6.1.2.4 Regulatory and procedural considerations

6.1.2.4.1 Space research service

Any sharing solution would be based on the concept of coordination. In terms of administration for Member States and the ITU-R there may be a small extra overhead required in maintaining a database of the location of SRS earth stations in various regions of the world.

Any change to the frequency allocation would require changes to Article **S5** and any changes to pfd limits would need to be reflected in changes to Article **S21**. Also any changes in coordination may need to be reflected in Appendix S7.

A narrow band of 2-3 MHz could be identified to satisfy the S-VLBI timing requirements for synchronization operation in the 37-38 GHz space-to-Earth band. The location of this band could be at the lower end of the 37-38 GHz band in order to facilitate coordination with FS stations.

6.1.2.4.2 Fixed-satellite service

Regulatory and procedural means to resolve the sharing situation between FS and FSS terminals in the 37.5-40 GHz range may take a number of forms, including possible modifications to Table **S21-4** and associated notes.

6.1.3 Resolution 726 (WRC-97) "Frequency bands above 30 GHz available for high-density applications in the fixed service"

The frequency bands 31.8-33.4 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz relate to this Resolution.

General information on the high-density applications in the fixed service (HDFS) above 30 GHz and on sharing between HDFS and other services in the frequency band 31.8-33.4 GHz are contained in § 6.1.1.

6.1.3.1 Summary of technical and operational studies, including a list of relevant ITU-R Recommendations

WRC-97 reviewed the frequency allocations in the range 50-70 GHz based on comprehensive technical studies (as detailed in the CPM-97 Report) in order to protect EESS (passive) systems within this frequency range.

The band 51.4-52.6 GHz is allocated to the fixed and mobile services on a primary basis with the radio astronomy service allocated by No. **S5.556**. Furthermore, the RAS shares the band 58.2-59 GHz with the FS, the MS, the EESS (passive) and the SRS (passive) and the band 64-65 GHz with the FS, the MS and the ISS by No. **S5.556**. In addition, the band 55.78-59 GHz is shared on a primary basis among the FS, MS, ISS, EESS (passive) and SRS (passive), while the FS, MS, ISS, EESS and SRS share the band 65-66 GHz on a primary basis. No. **S5.547** provides for the introduction of high-density FS applications into these bands.

ITU-R has developed the following relevant Recommendations:

ITU-R SA.1259, SA.515, SA.1029, RA.769, F.758 and draft new Recommendations ITU-R F.[Doc. 9/1013] and F.[Doc. 9/1014] (submitted to RA-2000).

Potentially, these bands could accommodate the application of P-P and/or P-MP HDFS systems. System characteristics for HDFS systems using the frequency band 51.4-52.6 GHz are available in Recommendation ITU-R F.758 for P-P and P-MP systems, for the frequency bands 55.78-59 GHz and 64-66 GHz only for P-P systems. For P-MP systems in the bands around 60 GHz no system characteristics have been developed. Provisionally the defined system characteristics of P-MP systems in the band 51.4-52.6 GHz can be used for sharing studies.

Rain outage events are the primary cause of unavailability. In the band 55.78-59 GHz the possible hop length for point-to-point hops will be reduced furthermore by high O_2 absorption losses. Applications typically have to meet availability demands of 99.99% to 99.999% per year. Hop lengths to range from about 7 km down to about less than 1 km for point-to-point systems are possible in the considered frequency bands, depending on frequency, availability criteria, rain zone and transmission capacity.

For point-to-multipoint systems, hop lengths up to about 1 km are achievable at 51.4-52.6 GHz. This would give reasonable coverage ranges for access systems in dense urban areas. High propagation and precipitation losses in the bands around 60 GHz and the low antenna gain at the central station of a P-MP system might restrict the use of such systems. Nevertheless taking into account inter- and intra-system interference, there are also opportunities for these bands for the use in dense urban areas.

6.1.3.2 Analysis of the results of studies

For the applications described above the frequency bands 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are suitable to satisfy the system characteristics, including the availability and performance requirements. Results of sharing studies for the bands mentioned in Resolution **726(WRC-97)** are described below (see § 6.1.1 of the CPM Report for the band 31.8-33.4 GHz).

6.1.3.2.1 Radio astronomy service

The RAS shares the 51.4-52.6 GHz, the 58.2-59 GHz and the 64-65 GHz bands with other services by national arrangement. There is currently no known usage of these bands by the radio astronomy service community (potentially due to atmospheric absorption) and no studies on potential sharing have been done to date. Even if some radio astronomical use developed, there should not be any problems with radio astronomy stations sharing this band with HDFS since use of these bands by the radio astronomy service must already be coordinated with the FS within individual administrations. Therefore, sharing between HDFS and RAS is a domestic issue.

6.1.3.2.2 Space research service (passive)

The SRS (passive) is covered under Recommendation ITU-R SA.1259. There is currently no plan for the space research service allocations within the 55.78-59 GHz or the 65-66 GHz bands.

6.1.3.2.3 Earth exploration-satellite service (passive)

Even though the EESS does not use the 51.4-52.6 GHz band, it does rely on the 50.2-50.4 GHz band for critical atmospheric measurements. These measurements are very sensitive to interference.

Therefore to avoid exceeding the protection criteria of EESS within the 50.2-50.4 GHz band, as provided within Recommendation ITU-R SA.1029-1, high-density FS applications must adhere to the spurious emission limits shown in Tables I and II of Appendix **S3**.

Pre-WRC-97 studies showed that, based on technical parameters for the FS given in Recommendation ITU-R SA.1259, the sharing between the FS and EESS is feasible in the 55.78-59 GHz band. The technical parameters assumed for the studies are worst-case values for the FS, and the currently known parameters of planned FS systems in the band 55.78-57 GHz are not significantly different from those assumed in Recommendation ITU-R SA.1259. Additional studies are ongoing within ITU-R for the sub-band 55.78-56.26 GHz.

However, if new FS systems use different technical parameters or deployment scenario from those assumed in Recommendation ITU-R SA.1259, further studies might be needed to determine the impact on the interference to EESS, using a different methodology if needed.

In order to minimize the possibilities of unacceptable interference to passive sensor in the band 55.78-56.26 GHz, and since the results of sharing studies between the FS and EESS were the most sensitive to the variation of FS parameters in this sub-band, FS parameters could be limited in this sub-band to those which are consistent with Recommendation ITU-R SA.1259. Such a limitation could be included in a footnote and would avoid further studies.

However, these limits might not be necessary as the current parameters of planned FS systems in the band 55.78-57 GHz are not significantly different from those assumed prior to WRC-97.

There is currently no planned usage for the EESS allocation within the 65-66 GHz band and no studies on potential sharing have been done to date.

6.1.3.3 Methods to satisfy the agenda item and their advantages and disadvantages

In order to satisfy the agenda item the FS systems in these bands should be accommodated for HDFS usage.

The following methods can be considered:

Method 1

WRC-2000 could choose to impose some limitations to the FS parameters in the band 55.78-56.26 GHz consistent with the assumptions made in Recommendation ITU-R SA.1259. Such limitations could be one of the following:

a) The insertion of the footnote "In the band 55.78-56.26 GHz, the output power density of stations in the FS shall be limited to -21.5 dB(W/MHz), and the far side-lobe antenna gain above 40° from the main beam shall comply with the following mask:

- for $40° < \theta < 65°$ G = -(3/25) x θ -11/5 (dBi)
- for $\theta > 65°$ G = -10 dBi

where θ is the off-axis angle."

b) The insertion of the footnote "In the band 55.78-56.26 GHz, the e.i.r.p. density of stations in the FS shall comply with the following mask (in dB(W/MHz)):

- for $\theta < 40°$ no limitation
- for $40° < \theta < 65°$ e.i.r.p. density = -(3/25) x θ - 118.5/5 (dBi)
- for $\theta > 65°$ e.i.r.p. density = -31.5 dBi

where θ is the off-axis angle."

c) The consideration of an output power density limit such as -28.5 dB(W/MHz) in the sub-band 55.78-56.26 GHz.

Further studies could be carried out if new FS parameters exceeding these limitations or using different deployment scenario are envisaged in the sub-band 55.78-56.26 GHz.

Advantages

- HDFS systems can be implemented in the whole 55.78-57 GHz band without undue constraints, while protecting the EESS.

Disadvantages

- Possible uncertainty for the FS if further studies are conducted.

Method 2

WRC-2000 could choose to decide that no further limits are necessary in the band 55.78-56.26 GHz.

Advantages

- HDFS systems could be implemented without additional limitations.

Disadvantages

- If in the future, the FS parameters exceed those assumed in Recommendation ITU-R SA.1259, it could cause the potential loss of data that could lead to serious degradation of the usefulness of a unique frequency band that is important to accurate weather prediction and a permanent limiting of fundamental weather prediction capabilities.

6.1.3.4 Regulatory and procedural considerations

Depending on the solution chosen at WRC-2000 for the band 55.78-59 GHz, either a footnote with text to be decided during the Conference or no action are possible regulatory solutions. Additionally, Resolution **726 (WRC-97)** may have to be modified or deleted as appropriate.

6.1.4 Resolution 128(WRC-97) "Allocation to the fixed-satellite (space-to-Earth) service in the 41.5-42.5 GHz band and protection of the radio astronomy service in the 42.5-43.5 GHz band"

6.1.4.1 Summary of technical and operational studies

6.1.4.1.1 Radio astronomy stations operating in the 42.5-43.5 GHz band

The RAS shares the 42.5-43.5 GHz band on a primary basis with the FS, FSS (Earth-to-space) and MS, except aeronautical mobile service. The band is used for sensitive observations of the extended continuum emission of radio sources. The increasing numbers of RAS stations operating in this band are an indication of the band's importance to the science of radio astronomy. Because of its 1 GHz width and its location in the spectrum (at approximately twice the frequency of the 23.6-24.0 GHz continuum band), it provides an effective point for the sampling of continuum emission at octave or better frequency intervals. A prominent component of the continuum emission observed in the band is due to free-free emission from ionized gas around newly born stars. This band is the optimum frequency to provide critical information on the physical state of the interstellar medium associated with star-forming regions.

The 42.5-43.5 GHz band also contains several molecular spectral lines, e.g. those associated with the silicon monoxide (SiO) molecule which is listed among the radio-frequency lines of greatest importance to radio astronomy in Recommendation ITU-R RA.314-8. SiO transitions have rest frequencies of 42.821, 43.122 and 43.443 GHz. All of these have been detected in interstellar molecular clouds, in the atmospheres of evolved stars, and in external galaxies. The first two lines, observed in the atmospheres of several hundred evolved stars and massive star-forming regions, are extremely important for studies of the birth and death of stars. The SiO maser emission lines are used to determine antenna pointing accuracy for a wide range of radio astronomy observations.

6.1.4.1.2 Relevant ITU-R Recommendations

Studies have resulted in the following Recommendations which deal directly with, or may be relevant to, the protection of radio astronomy stations that may be observing in the 42.5-43.5 GHz band, from out-of-band emissions radiated by space stations in the fixed-satellite service (space-to-Earth) that may operate in the 41.5-42.5 GHz band:

Recommendations ITU-R RA.769-1, RA.517-2, RA.611-2, RA.1237, RA.314-8, SA.509-2 and SM.329-7(Rev.).

6.1.4.2 Analysis of the results of studies

6.1.4.2.1 Protection criteria for the radio astronomy service in the 42.5-43.5 GHz band

Recommendation ITU-R RA.769-1 Tables 1, 2 and 4 list the threshold levels of interference detrimental to radio astronomy observations in the 42.5-43.5 GHz band. The Recommendation assumes 25K antenna and 100K receiver noise temperatures, respectively, an integration time of 2 000 seconds, and a radio astronomy antenna side-lobe gain of 0 dBi toward the source of the interfering signal. All RAS stations operating in this band are used to measure both continuum and spectral line radiation.

The threshold levels of interference in this Recommendation were developed without taking into account the dynamic aspect of a non-GSO constellation. A statistical approach taking account of this dynamic aspect could be achieved via two different approaches:

- The pfd levels of Recommendation ITU-R RA.769-1 not to be exceeded for more than x% of the observing time. A provisional value of x=2 is under study within ITU-R.
- The concept of equivalent power flux-density (EPFD) not to be exceeded for a certain percentage of time. This is similar to that already applied to non-GSO FSS systems in co-frequency situations in lower frequency bands. Interference analysis using this concept should be based on statistical calculations taking into account the characteristics of the RAS stations and the required technical characteristics of non-GSO FSS systems. Further studies are needed to determine the applicability of this approach.

a) Single dish telescopes

Recommendation ITU-R RA.769-1 Table 1, lists the threshold level of detrimental interference for single dish telescopes operating in the 42.5-43.5 GHz band as -227 dB(W/(m^2•Hz)) or -137 dB(W/(m^2•GHz)) for continuum observing, and as -210 dB(W/(m^2•Hz)) or -153 dB(W/(m^2•500 kHz)) for spectral line observations.

b) Very Long Baseline Interferometry (VLBI)

Interferometric arrays with widely separated antennas are less sensitive to interference than single antennas. Telescopes used for VLBI include the U.S. NRAO Very Long Baseline Array (VLBA) stations (Region 2), the antennas used by the European VLBI Network (EVN) (Region 1) and J-NET in Japan (Region 3). Table 4 of Recommendation ITU-R RA.769-1 lists the threshold level of detrimental interference for VLBI stations operating in the 42.5-43.5 GHz band as -173 dB(W/(m^2•Hz)). It should be kept in mind, however, that interference originating from a satellite that is visible simultaneously by two or more VLBI antennas may be received coherently, and if so, this could result in more stringent threshold levels of detrimental interference.

c) Satellites in geostationary orbits

The detrimental threshold levels given in the tables of Recommendation ITU-R RA.769-1 assume that the radio astronomy antenna side-lobe gain towards the interfering source is 0 dBi. As stated in footnote 3 to Table 1 and footnote 2 to Table 2 of Recommendation ITU-R RA.769-1, for transmitters in the GSO orbit, in contrast to those in non-GSO orbit, the detrimental interference levels are 15 dB more stringent. Some administrations feel that the need for this additional 15 dB should be carefully evaluated.

d) Aggregate interference from multiple satellites

The aggregate level of spurious emissions within the RAS band from all FSS satellites above the visible horizon of each RAS station should not exceed the detrimental levels. Several FSS stations in GSO could be within the 10º cone of telescope side-lobe gain >15 dBi for a significant fraction of observing time. Also several satellites from one or more non-GSO constellations could be found within the 38° cone of telescope side-lobe gain >0 dBi for a significant fraction of observing time. Each FSS space station having spurious emissions within the RAS band and at the detrimental levels of Recommendation ITU-R RA.769-1 would exceed the detrimental levels when positioned within these side-lobe cones. Thus each RAS antenna operating in the 42.5-43.5 GHz band would look through an ever-changing grid of emitters which would reduce the area of accessible sky. Further studies are needed to determine the apportionment of the aggregate interference among multiple satellite systems that may be operating in the 41.5-42.5 GHz band.

Many of the proposed non-GSO and GSO FSS systems that plan to operate in the 41.5-42.5 GHz band, may use high gain, narrow beam antennas, with a typical 3 dB beam diameter of less than 250 km. In addition, the propagation impairments are severe in the 41.5-42.5 GHz band. Consequently, proposed FSS systems, operating in this band would operate at high elevation angles, typically 20° or greater. Proposed FSS systems may typically only be able to serve less than 4% of satellite field-of-view at any instant.

e) Suggested elements for future study

As studies progress within ITU-R, the following are among the items that could also be envisaged to ensure protection to the radio astronomy service:

– specifying a maximum pfd level in the band 42.5-43.5 GHz from GSO satellites operating in the band 41.5-42.5 GHz ;
– reducing the implemented allocation with a suitable guardband below 42.5 GHz, with a width to be determined on practical aspects;
– a requirement for coordination between FSS operators and the RAS to limit unwanted emissions in the 42.5-43.5 GHz band at RAS stations which operate in the band; and
– specifying a limit in the band 42.5-43.5 GHz from non-GSO satellites operating the band 41.5-42.5 GHz. This limit could either be a pfd limit not to be exceeded for x% of the time (provisionally 2%), or an EPFD level for a certain percentage of the time.

6.1.4.2.2 Limits for unwanted emissions from space stations

Radio Regulations (RR) Appendix **S3** defines general limits for spurious emissions. Unwanted emissions consist of out-of-band emissions and spurious emissions, where out-of-band emissions extend outward from the centre of the necessary bandwidth B_n to a boundary at $2.5B_n$, while unwanted emissions beyond $2.5B_n$ are classified as spurious emissions. The RR do not set limits on out-of-band emissions. Therefore, wideband FSS systems having necessary bandwidths of order 300 MHz would have an out-of-band boundary separated by 750 MHz from the centre of the necessary bandwidth. Such a FSS system, if operating with a necessary bandwidth edge at the allocated band edge of 42.5 GHz, could have out-of-band emissions extending up to 43.1 GHz, which is 600 MHz within the RAS band, and more than half of its width.

RR Appendix **S3** sets limits on spurious emissions which for space stations is defined in a 4 kHz reference bandwidth and in terms of attenuation (dBc) below the mean power P (in Watts) supplied to the antenna transmission line. Appendix **S3** specifies that for technical or operational reasons more stringent levels than those specified as general limits may be applied to protect specific services, such as safety and passive services, in certain frequency bands.

6.1.4.2.3 Detrimental interference to a RAS station operating in the 42.5-43.5 GHz band from unwanted emissions of FSS (space-to-Earth) space stations operating in the 41.5-42.5 GHz band

An FSS system which just meets the pfd limit of -105 dB(W/(m²•MHz)) (for angles of arrival above 25º) defined in No. **S21.16** for the band 37-40.5 GHz is assumed in the remainder of this section for each FSS satellite operating in the 41.5-42.5 GHz band. In order to reach the detrimental interference thresholds for RAS stations operating in the 42.5-43.5 GHz band, the attenuation required for a single FSS satellite at elevation angles above 25° operating in the 41.5-42.5 GHz band, is shown in Table 6-3. These values are given relative to the assumed FSS maximum allowed spectral power flux density (spfd) within the necessary bandwidth at the Earth's surface for a single satellite above a 25° elevation angle.

TABLE 6-3

Calculation of the attenuation required for a single satellite to satisfy the detrimental interference thresholds to the RAS in the 42.5-43.5 GHz band

	Continuum	Spectral Line	VLBI
Assumed pfd Limit (arrival>25°) in FSS band	-105 dB(W/(m²•MHz))	-105 dB(W/(m²•MHz))	-105 dB(W/(m²•MHz))
Assumed pfd Limit in FSS band converted to RAS bandwidth	-75 dB(W/(m²•GHz))[1]	-108 dB(W/(m²•500 kHz))[2]	-165 dB(W/(m²•Hz))[3]
Detrimental threshold level in RAS band	-137 dB(W/(m²•GHz))[1] (Table 1 of Rec. ITU-R RA.769-1)	-153 dB(W/(m²•500 kHz))[2] (Table 2 of Rec. ITU-R RA.769-1)	-173 dB(W/(m²•Hz)) (Table 4 of Rec. ITU-R RA.769-1)
Required Attenuation	62 dB	45 dB	8 dB

[1] Average over the 1 GHz bandwidth used for RAS continuum observations (see Table 1, columns 2 and 8, Recommendation ITU-R RA.769-1).

[2] Average over the 500 kHz bandwidth used for RAS spectral line observations (see Table 2, columns 2 and 8, Recommendation ITU-R RA.769-1).

[3] 1 Hz bandwidth used for RAS VLBI observations (see Table 4, Recommendation ITU-R RA.769-1).

For a GSO satellite, the detrimental level in the table should be more stringent by 15 dB and the required attenuation in the table should be increased by 15 dB. Some administrations feel that the need for this additional 15 dB should be carefully evaluated.

Aggregate interference for a constellation of satellites may be limited to the level specified in Recommendation ITU-R SA.769-1 to protect RAS stations. A statistical approach which takes into account the dynamic aspect of non-GSO satellites could be more appropriate to protect the RAS (see § 6.1.4.2.1). Further studies are required.

If the fixed-satellite service in the band 41.5-42.5 GHz (or some portion thereof) were to be constrained to limit their unwanted emissions in the adjacent 42.5-43.5 GHz band to the levels of attenuation contained in Table 6-3 such constraints would have a significant impact on the development of the FSS systems in this band. The effects of fast moving non-geostationary FSS satellites and multiple-satellite systems considered in conjunction with some assumptions used to derive the values contained in Table 6-1 require further studies within ITU-R.

6.1.4.3 Methods to satisfy the agenda item and their advantages and disadvantages

6.1.4.3.1 Technical and operational measures that may be applied to space stations

The following technical and operational measures may be considered for the fixed-satellite service (space-to-Earth) systems to reduce unwanted emissions (In some instances, constraints that may affect the implementability of these measures are noted.):

a) The use of efficient modulation techniques in combination with spectral shaping provides the lowest unwanted spectral sidebands. Also, it is noted that intermodulation products can be avoided when transponders use a single carrier.

b) Minimize spectral sideband growth from modulator defects, non-linear effects, intermodulation, and frequency conversions.

c) The use of low noise broadband power amplifiers will minimize broadband noise generation in transmitter power amplifiers. This technique is also being currently employed to minimize intra-system interference.

d) The increased use of specific filters, such as those which have very sharp cut-off at the edge of allocation band. The use of such filters may have detrimental effects on the group delay problem for wideband carriers and contribute to spacecraft payload weight.

e) The channelization plan for an FSS system can be done in such a way as to increase the guardband near the top of the allocated band.

f) Spot beam antennas can be used to protect geographic areas where radio astronomy observatories are located. However, studies of this concept within ITU-R are required.

Advantages

- These measures could reduce detrimental interference at RAS stations.

Disadvantages

- The main problem with these measures is that they may be rather costly, in terms of financial costs, additional weight and operational efficiency. This problem will be alleviated somewhat if these features are taken into account in the original design of the FSS system.
- Limits on spurious emissions of future FSS transmitters can be expressed in terms of a spurious spectral pfd at the Earth only if certain parameters are known, i.e. the transmitter power P into the transmission line to the satellite antenna, the gain of the satellite antenna, and the spreading loss to the RAS antenna on Earth. Without knowledge of these satellite parameters, only spurious attenuation levels relative to the maximum pfd at the Earth can be expressed for protection of RAS observations. Thus limits specified as an attenuation relative to the transmitter output on both out-of-band and spurious emissions are inflexible; and if applied alone, are inadequate to protect RAS operations in the 42.5-43.5 GHz band from detrimental interference.
- In the case of a constellation of non-GSO satellites or in the case of GSO satellites which are separated by 10° or less, where the interference configurations vary with time, the aggregate pfd at the RAS antenna could be assessed for some acceptable loss of observing time, provided the specific times of loss could be determined by the RAS system for excision of interference from the observational data.

6.1.4.3.2 Operational and geographical separation measures that may be applied to space stations and to RAS stations

If geographical separation of the FSS footprints and a RAS station, is too restrictive for FSS operations, it could be combined with time-sharing on a scale of several hours, provided FSS channels close or adjacent to the 42.5 GHz band edge may be blanked in footprints on or near a RAS station conducting observations in the 42.5-43.5 GHz band. This method requires the directional radiation pattern of the transmitting satellite antenna, and therefore the unwanted spectral pfd at Earth to be known. In this case, RAS stations could notify FSS operators about observing periods in the 42.5-43.5 GHz band in advance, so that unwanted emissions in appropriate footprints could be suppressed below the detrimental level. It should be noted that the number of RAS stations around the world operating in the 42.5-43.5 GHz band is small.

Time-sharing with the FSS on time-scales ranging from milliseconds to hours may be feasible for some types of radio astronomy observations at some radio astronomy stations, but would not be generally applicable. Frequent observations of SiO maser lines to obtain pointing accuracy may prevent time-sharing at some RAS stations. In cases of time-sharing, the aggregate level of unwanted emissions from space stations should not exceed the Recommendation ITU-R RA.769-1 detrimental thresholds for more than some acceptable percentage of the observing time.

Advantage

- These measures could reduce detrimental interference at the RAS stations.

Disadvantage

- Restricted scheduling of RAS observations results in highly inefficient uses of radio telescopes and sacrifices science. Levels of unwanted emission in the side lobes of satellite transmitters which illuminates a radio astronomy antenna outside the intended footprint can be predicted for high gain reflector antennas, but not necessarily for a phased array satellite antenna, which may produce additional unwanted emissions by intermodulation. Therefore, the requirements for geographical separation between Earth footprints defined by phased array satellite antennas and RAS antennas may be difficult to predict, and may therefore not be practicable for some FSS systems. Systems with a large number of satellites could render impractical the possible mitigation technique of mutually exclusive scheduling of FSS transmissions and RAS observations. Considering the potential number of RAS stations in this band, time-sharing on the time-scale of a few hours may severely constrain the FSS operation.

6.1.4.3.3 Measures that may reduce the susceptibility of RAS stations

RAS susceptibility to the aggregate of emissions above 42.5 GHz which may be reduced by:

- reducing side-lobe levels of RAS antennas;
- pointing the RAS antenna such that the 38° cone of gain greater than 0 dBi does not include any satellite (10° cone for GSO satellites); and
- excising interference in the receiver and/or in the data.

Advantages

- These measures could reduce detrimental interference at the RAS stations.

Disadvantages

- Reducing RAS antenna side-lobe levels is generally not feasible for existing antennas.
- Pointing the RAS antenna cones of avoidance away from satellites may be practical only if there is a small number of satellites operating in the band. Restricted pointing of RAS antennas results in inefficient uses of radio telescopes and may not be practicable.
- Excising interference in the receiver and/or in the data, is equivalent to lost observing time, and should not exceed some acceptable percentage of the observing time.

6.1.4.4 Regulatory and procedural considerations

The technical work for Resolution **128 (WRC-97)** has not been completed. WRC-2000 may consider retaining a suitably modified Resolution **128 (WRC-97)** for the next ITU-R study period in order to provide an opportunity to complete the studies initially ordered by WRC-97.

6.1.5 Resolution 129 (WRC-97) "Criteria and methodologies for sharing between the fixed-satellite service and other services with allocations in the band 40.5-42.5 GHz"

At WRC-97, new co-primary allocations to the FS and the FSS were made in the 40.5-42.5 GHz band. The FSS allocation was for the space-to-Earth direction in Regions 2 and 3 and in certain countries in Region 1; the FS allocation was for all three ITU Regions. Resolution **129 (WRC-97)** invited the ITU-R to undertake, as a matter of urgency, studies of appropriate criteria and methodologies for sharing, including power flux-density limits, between the FSS and the other services with allocations in the 40.5-42.5 GHz band.

6.1.5.1 Summary of technical studies

As noted in § 6.1.2.1 above, there is a strong interest worldwide from both the fixed-satellite service and the fixed service communities for access to spectrum in the 37.5-42.5 GHz range. Sharing between the two services has been shown to be technically feasible, particularly where the FS and/or the FSS would not rely on the ubiquitous deployment of terminals.

6.1.5.1.1 Downlink power flux-density for non-GSO FSS

A number of studies have been carried out, leading to draft new Recommendation ITU-R [Doc. 4-9/1008], (submitted to RA-2000).

The results of studies conducted in the ITU-R of known and proposed non-GSO FSS systems, and of known and proposed P-P and P-MP FS systems, indicate that maximum allowable values of power flux-density of -115/-105 dB(W/(m^2•MHz)) at the surface of the Earth would be adequate to protect terrestrial services from non-GSO FSS networks in the frequency band 40.5-42.5 GHz. Studies supporting this conclusion are summarized in Annex 1 of draft new Recommendation ITU-R SF.[Doc. 4-9/1008].

6.1.5.1.2 Downlink power flux-density for GSO FSS

Previously, studies within the ITU-R had not allowed conclusions to be drawn as to the adequacy of the current power flux-density limits for the band 40.5-42.5 GHz to protect terrestrial services from GSO FSS satellites.

When considering a single geostationary satellite operating at maximum allowable power flux-density levels of -115/-105 dB(W/(m^2•MHz)), the in-line interference level (I/N) at an FS receiver with a 33 dBi antenna is -21 dB when the FS receiver is at a 0 degrees elevation angle, and -5 dB when the FS receiver is at a 10 degrees elevation angle.

In order to meet the long-term interference criterion, I/N = -10 dB, the separation angle between the FS receiver and the GSO arc should be no less than 2.5°. In any FS system deployment, a small percentage of links may point at the GSO arc. For those point-to-point FS systems that do not implement any orbital avoidance, the FS receiver could experience interference above the long-term interference criterion when the separation angle from the GSO arc is less than 2.5º. Arc avoidance is not generally applied to most FS applications in this band, but this and other potential mitigation approaches have not been fully studied.

Some administrations have concluded that the current ITU power flux-density limits of -115/-105 dB(W/(m^2·MHz)), as currently specified in Article **S21** for FSS systems in the band 40.5-42.5 GHz, are adequate to protect the FS from GSO FSS networks in the band 40.5-42.5 GHz.

On the basis of studies carried out by one administration, some administrations had concluded that in the case of interference from a fully populated arc of GSO satellites, the aggregate interference into the FS receiver at 10° elevation angle exceeds the long-term interference criterion for a large range of azimuths. Furthermore, these administrations had also concluded that in the band 40.5-42.5 GHz, for an FS receiver at 10° elevation, a power flux-density level of – -135/-125 dB(W/(m^2•MHz)) would ensure that the long-term criterion would be met for all azimuths. In this case it was concluded that this could preclude operation of GSO FSS systems. Some administrations believe that further ITU-R studies and the appropriate pfd values for the GSO FSS systems will be required. Other administrations believe that these ITU-R studies are not required.

On the subject of power flux-density limits for GSO FSS satellites to protect fixed service systems in the 40.5-42.5 GHz band, some administrations provided results of recent studies directly to CPM99-2. Based on these studies, some administrations proposed the following power flux-density mask as a compromise intended to adequately protect the fixed service without unduly constraining the FSS in this band (see Table 6-4).

TABLE 6-4

pfd limits for GSO FSS in the band 40.5-42.5 GHz

Power flux-density limit in dB(W/(m^2•MHz))	Angle of arrival δ above the horizontal plane
-120	$0° \leq \delta < 5°$
$-120 + (\delta - 5)$	$5° \leq \delta < 15°$
$-110 + 0.5 (\delta - 15)$	$15° \leq \delta < 25°$
-105	$25° \leq \delta$

6.1.5.1.3 Separation distance between the FS transmitter and the FSS receiver

The ITU-R is developing new recommendations on the methodology to determine separation distances between non-GSO FSS earth stations and FS stations.

In one study, addressing the band 40.5-42.5 GHz, it was shown that the coordination distances between fixed service transmitters and certain types of non-GSO fixed-satellite service earth-station receivers is relatively small, ranging from 0.1 km and 23 km (depending on the off-axis angle and the FS transmit antenna characteristics). The study also indicated that if the FS transmit off-axis angle is greater than or equal to 5°, the coordination distance between the two services would be less than 1 km. However, the actual separation distance between the FS transmitters and FSS receivers depends on the off-axis separation angle, FS transmit power density, FSS minimum operational elevation angle, and terrain topography.

6.1.5.2 Methods to satisfy the agenda item

On the basis of studies conducted in the ITU-R of known and proposed non-GSO FSS and FS systems, it is concluded that power flux-density limits of -115/-105 dB(W/(m^2•MHz)) in the band 40.5-42.5 GHz at the surface of the Earth would be adequate to protect terrestrial services from non-GSO FSS networks.

Two methods to satisfy the agenda item were identified.

Method A

Method A is to adopt the agreed power flux density limits in draft new Recommendation ITU-R SF.[Doc. 4-9/1008] for non-GSO FSS (as mentioned above), and is to adopt the following pfd limits developed at CPM99-2 for GSO FSS in the band 40.5-42.5 GHz (see Table 6-5).

TABLE 6-5

pfd limits for GSO FSS in the band 40.5-42.5 GHz

Power flux-density limit in dB(W/(m^2•MHz))	Angle of arrival δ above the horizontal plane
-120	$0° \leq \delta < 5°$
$-120 + (\delta - 5)$	$5° \leq \delta < 15°$

-110 + 0.5 (δ - 15)	15° ≤ δ < 25°
-105	25° ≤ δ

Advantages

- These pfd limits allow access to the band for both services without undue constraints on either service, and provides the consequential benefit of more efficient use of spectrum.
- These pfd limits would facilitate the deployment of GSO and non-GSO FSS applications to earth terminals with small receive antennas, and would not unduly constrain the deployment of most P-MP HDFS systems.
- No further studies are required and a decision could be made at WRC-2000.

Disadvantage

- Some stations in the HDFS may potentially be constrained.

Method B

Since the sharing issues between the FS and the FSS in the 40.5-42.5 GHz range have not been fully resolved, solutions could take the form of power flux-density limits that vary among band segments. Method B would build upon the conclusions reached with regard to non-GSO FSS power flux-density limits, and support the development of a comprehensive sharing approach for the 37.5-42.5 GHz band that includes provision for FS systems and both non-GSO FSS and GSO FSS systems. This method connects the 40.5-42.5 GHz band with the 37.5-40.0 GHz band (see § 6.1.2.3.2) and envisions a solution would encompass the entire 37.5-42.5 GHz range. Under this approach, the conclusions reached with regard to non-GSO FSS power flux-density limits are not sufficient to resolve in full the sharing situation between the FSS and the FS in this band.

Advantages

- The result of such different limits would encourage the development of ubiquitous, high-density FS and FSS applications in different portions of the band, and would require only minor modifications to the existing FSS allocations to obtain global co-primary FS and FSS allocations in the 37.5-42.5 GHz band.
- Depending on frequency bands and pfd limits proposed under this method, a decision on the pfd limits in particular frequency bands may be taken at WRC-2000.
- Provides a global sharing approach that is equitable and allows for future growth of both services.

Disadvantages

- May have some impact on the fixed service in administrations that have made FS assignments in this frequency range.

6.1.5.3 Regulatory and procedural considerations

Regulatory and procedural means to resolve the sharing situation between FS and FSS terminals in the 40.5-42.5 GHz range may take a number of forms, including possible modifications to Table **S21-4** and associated notes.

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6.2 Agenda item 1.5 (Resolution 122 (WRC-97)

"to consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution **122 (WRC-97)**"

*Resolution **122 (WRC-97)** "Use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz by high altitude platform stations in the fixed service and by other services"*

A new telecommunication concept using High Altitude Platform Stations (HAPS) for providing FS operations was officially recognized by WRC-97. WRC-97 has made provisions for operation of HAPS in the 47.2-47.5 GHz and 47.9-48.2 GHz bands. An appropriate definition for the HAPS was added to No. **S1.66A**.

Resolution **122 (WRC-97)** requests that technical studies to be conducted to ascertain the extent to which sharing of the designated bands is feasible between systems using HAPS in the FS and systems in the FS, FSS and MS and to ascertain the requirements to protect the RAS in the 42.5-43.5 GHz and 48.94-49.04 GHz adjacent bands from spurious emissions.

6.2.1 Summary of technical and operational studies, including a list of relevant ITU-R Recommendations

6.2.1.1 Sharing between FS systems using HAPS and other conventional FS systems

Study results have been presented which indicate, that in the WRC-97 designated bands at 47.2-47.5 GHz and 47.9-48.2 GHz, sharing between fixed service systems using HAPS and other conventional fixed service systems in the same area will be difficult unless appropriate interference mitigation techniques are developed and implemented. The studies were based on scenarios using worst-case conditions and it has been recognized that further studies are required before any definite conclusions can be reached.

ITU-R studies have also resulted in the development of a draft new Recommendation ITU-R F.[Doc. 9/1017] presenting a set of preferred characteristics for one proposed HAPS-based system at 47.2-47.5/47.9-48.2 GHz, and a draft new Recommendation ITU-R F.[Doc. 9/1018] providing path loss calculation techniques for use in coordinating HAPS-based fixed service operations at 47.2-47.5/47.9-48.2 GHz. These two draft Recommendations are submitted to RA-2000 for approval.

The agenda for the WRC-2000 also recognizes the need for possible additional frequency allocations for radiocommunication services using HAPS. Description of a system for operation in the range 18-32 GHz has been proposed since the 47 GHz bands are more susceptible to the rain attenuation in certain areas. Preliminary sharing considerations using bands within the above range have been presented in terms of parameters such as required separation distance between the system using HAPS and other systems in the fixed service. Ongoing studies indicate that the technical concept of Dynamic Channel Assignment (DCA), which is one of the mitigation techniques, could be very effective in the case that the band allocated for FS is applied to HAPS uplink. Further study including the use of mitigation techniques will be required in the next ITU-R study period.

6.2.1.2 Sharing between FS systems using HAPS and FSS systems

A draft new Recommendation ITU-R SF.[4-9/1005] (submitted to RA-2000 for approval) has been developed which indicates that under certain deployment scenarios, HAPS-based systems and FSS systems employing 2.4 metre diameter antennas, or antennas with equivalent performance can share HAPS designated bands 47.2-47.5 GHz and 47.9-48.2 GHz. Further study is required to fully assess the implications of these scenarios but the indications are that separation distances from a maximum of about 20 km down to a minimum of less than 1 km are feasible if the operation of the FSS earth station is constrained to the rural coverage area (RAC) of the HAPS. The inner edge of this coverage area is approximately 80 km from the nadir of the HAPS.

Sharing with systems in the FSS using the bands 19 and 29 GHz has also been preliminarily studied. In this study, a HAPS-based system is assumed to operate in reverse band working mode (in relation to the FSS allocation). Studies have also considered other frequency bands for possible pairing with either the 19 or 29 GHz band. This study showed that, under certain operational constraints, these systems may have positive potential for sharing the bands with GSO FSS earth stations which are not deployed ubiquitously. It should be noted that there are plans to ubiquitously deploy GSO and non-GSO earth stations in some portions of these bands. In this situation it is anticipated that coordination between ubiquitous earth stations and HAPS user terminals would be difficult. A national or regional allocation to HAPS in the 19 and 29 GHz bands would reduce the deployment flexibility of FSS earth stations in those countries where such an allocation is made. Studies are required for assessment of:

– interference into GSO and/or non-GSO satellite systems;
– aggregate interference between multiple HAPS systems and multiple GSO or non-GSO satellite systems;
– mitigation techniques to enhance the possibility of frequency sharing;
– impact across international borders.

In relation to the above ongoing study items, the preliminary results indicate that interference from a HAPS-based system into a non-GSO system could be small enough under certain typical conditions. The studies present a methodology and calculated example results on required separation distance of HAPS airship and HAPS ground station from international borders regarding study items of impact across international borders. Furthermore, those results indicate that interference mitigation and operation techniques such as footprint offset, limitation of operational elevation angle, improvement of radiation pattern of on-board HAPS antennas, shielding effects of HAPS airship envelope, dynamic channel assignment and the combination of them could significantly improve the deployment flexibility of FSS earth stations.

It is anticipated that, on a national or regional basis, spectrum bandwidth equivalent to that already designated for HAPS at 47-48 GHz range would be needed to satisfy the requirement described above.

In particular areas for climatic and other related considerations it is not practicable to use the 47-48 GHz band for the deployment of HAPS systems. It has been concluded that in many Region 3 countries alternative spectrum allocation below that band is necessary to reap the benefits of this emerging technology. Thus the feasibility of identifying appropriate spectrum in the 18-32 GHz range, taking account of the above considerations should now be studied as a matter of urgency. These studies should be continued as a complement to the ongoing studies being carried out under Resolution **122 (WRC-97)**. Accordingly, Resolution **122 (WRC-97)** will need to be extended until WRC-02/03 and modified, *inter alia*, at WRC-2000 to provide for the framework for the ITU-R studies.

6.2.1.3 Radio astronomy uses of the 48.94-49.04 GHz and 42.5-43.5 GHz bands

The 48.94-49.04 GHz band is used to observe the CS molecule and its isotopes. The 42.5-43.5 GHz band is used for sensitive observations of the extended continuum emission of radio sources and also contains several lines associated with the SiO molecule. These lines are listed among the radio-frequency lines of greatest importance to radio astronomy (Recommendation ITU-R RA.314).

The detrimental interference level for single dish observations in the 48.94-49.04 GHz band is -209 dB(W/(m^2·Hz)) (Table 2, Recommendation ITU-R RA.769-1). For continuum observations at 43 GHz, the detrimental threshold level for single dish observations is -227 dB(W/(m^2·Hz)) (Table 1, Recommendation ITU-R RA.769-1). This level also provides adequate protection for spectral line observations in this band. VLBI observations are considerably less sensitive to interference than observations with single dish telescopes. Table 4 of Recommendation ITU-R RA.769-1 indicates the detrimental interference level for VLBI stations operating in the 42.5-43.5 GHz and in the 48.94-49.04 GHz bands as -173 dB(W/(m^2·Hz)) and -172 dB(W/(m^2·Hz)), respectively.

The following ITU-R Recommendations are relevant to the protection of the RAS in the 42.5-43.5 GHz and 48.94-49.04 GHz bands:

Recommendations ITU-R RA.611, RA.1237, RA.517 and M.1316.

6.2.2 Analysis of the results of studies

6.2.2.1 Mitigation of detrimental interference to a RAS station from a HAPS

Appendix **S3**, Table II gives the spurious emission limits applicable to HAPS, in terms of attenuation relative to the mean power supplied to the antenna in a reference bandwidth of 1 MHz. Detrimental interference levels to the radio astronomy service are, on the other hand, specified in Recommendation ITU-R RA.769-1 in terms of pfd levels at the radio astronomy antenna. The attenuation required by Appendix **S3** for a representative HAPS transmitter, (12 dBW power/cell, 300 MHz transmitter bandwidth/cell and 38 dBi gain towards the RA antenna, located some 150 km away) is about 55 dB in a 1 MHz reference band. The additional attenuations needed to reach the radio astronomy detrimental threshold levels are calculated to be 24 dB and 42 dB in the 48.94-49.04 GHz and 42.5-43.5 GHz RAS bands, respectively. Protection from the aggregate of the illuminating and adjacent cells may require additional attenuation.

The geographical separation between the radio astronomy antenna and the HAPS, the power and the spectral roll-off of the HAPS transmitter, and the gain of the HAPS antenna directed towards the radio astronomy site, and a series of other parameters that depend on each individual situation must be known, to establish what mitigation measures may be required in each situation.

Additional studies are expected in ITU-R regarding a possible methodology to mitigate potentially detrimental interference from a HAPS-based system to RAS and other services in the 18-32 GHz range.

6.2.2.2 Interference mitigation techniques and regulatory considerations

Administrations may protect RAS stations operating in the 43 and 49 GHz bands from detrimental interference through regulation tailored to the requirements of each individual situation, where a HAPS may be near a RAS antenna. A number of techniques may be used in the design of a HAPS system to prevent or reduce the spurious interference into radio astronomy sites to acceptable levels. These include: antenna design, signal and modulation design, and filtering of the radio-frequency signal before transmission.

Filtering needed to reduce out-of-band emission, can be achieved with a raised cosine filter, which can be implemented either with SAW filters alone, or with a combination of digital (baseband) and analogue filtering using SAW filter(s). SAW filter techniques are extremely flexible: any linear bandpass filter may be synthesized, with arbitrary amplitude and phase, limited only by line width and crystal size. Typically single-phase unidirectional transducer (SPUDT) type SAW filters can attenuate out-of-band emission by up to 60 dB, with a passband flatness of less than 0.5 dB peak-to-peak. With another 16 dB attenuation at the first side lobe of the QPSK power spectral density curve, a 75 dB reduction of the out-of-band emission is readily achievable.

If additional filtering is required to meet specific spurious-interference incidents, waveguide filters can be implemented in the beams of HAPS that require such filters. Finally, if further mitigation is, required, HAPS could reduce the level of spurious emissions at RAS antennas by avoiding service cells near a RAS antenna, or reducing the gain of multiple service antennas toward a RAS antenna.

6.2.2.3 The potential use of HAPS in the frequency bands above 3 GHz allocated exclusively for terrestrial radiocommunications

Systems using HAPS (HAPS-based system) for terrestrial applications in bands above 3 GHz have a potential applicability to various services such as high-capacity communications and Earth observation (note that the option for the provision of IMT-2000 services using HAPS is dealt with under agenda item 1.6). Since the HAPS airship is located at lower altitude compared with the satellite, the transmission delay and path loss in the HAPS-based system is smaller than in the satellite systems. Therefore, it would easily bring about size reduction of communication terminals and realization of high capacity communications.

A HAPS-based system has flexible design possibilities such as number of airships, service area and offered services and applications, so as to fit the area size of land and the status of the infrastructures construction in each country. Therefore, each country can define and operate service items such as offered applications, communication fee and service area, based on the designed system.

Further studies within ITU-R are needed to allow HAPS systems in additional bands above 3 GHz exclusively allocated for terrestrial radiocommunications. It is also important that regulatory considerations should also be envisaged.

These concepts have the following advantages and disadvantages:

Advantages

- Since the HAPS equipment is located on an object at an altitude of 20 to 50 km, the visible area from the HAPS equipment would be within one country or include neighbouring countries, which is narrower than that of the satellite system. Therefore HAPS-based systems could operate in terrestrial radiocommunication if the agreement of neighbouring countries visible from the HAPS station could be obtained.
- The concept would enable flexible domestic operation of a HAPS-based system as in terrestrial radiocommunication and enhance the wide applicability of the HAPS-based system.

Disadvantages

- This concept would have the potential for effectively extending the use of HAPS to all terrestrial frequency bands above 3 GHz. ITU-R studies to date have concentrated on the WRC-97 designated bands, 47.2-47.5 GHz and 47.9-48.2 GHz. Studies for other frequency bands are ongoing, but have not been adequately progressed within ITU-R in order to fully assess the impact on the requirements of non-HAPS-based systems.

6.2.3 Methods to satisfy the agenda item and their advantages and disadvantages

It is concluded that it is technically feasible to protect the RAS in the 42.5-43.5 GHz and 48.94-49.04 GHz bands, from spurious emissions from HAPS operating in the 47.2-47.5 GHz and 47.9-48.2 GHz bands, through appropriate protection measures.

Based on the results of sharing studies, appropriate measures should be implemented to protect the RAS in the 42.5-43.5 GHz and 48.94-49.04 GHz bands from HAPS operating in the 47.2-47.5 GHz and 47.9-48.2 GHz bands.

6.2.4 Regulatory and procedural considerations

Coordination distances may need to be developed between radio astronomy sites and HAPS. Regulatory provisions, based on such coordination distances, may need to be developed to establish coordination procedures between radio astronomy sites and HAPS in the 47 GHz bands.

In order to continue studies at 47 GHz and to accelerate studies with the objective of determining the feasibility of identifying additional spectrum for the HAPS below 47 GHz and specifically in the 18-32 GHz range, Resolution **122(WRC-97)** could be modified as per the example attached in Annex 1.

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6.3 Agenda item 1.8

"to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands"

6.3.1 Summary of technical and operational studies

The bands 3 700-4 200 MHz and 5 925-6 425 MHz are currently allocated on a primary basis to both the FS and the FSS, as well as to the mobile service (MS). The FS uses these bands primarily for trunk point-to-point systems, with typical capacities of 34 Mbit/s and above. The FSS uses these bands primarily for fixed earth stations operating in GSO satellite networks.

Earth stations on board vessels (ESVs) can provide wideband services to cruise liners, passenger ships, naval vessels, seismic research and petroleum exploration vessels and other deep draft vessels. ESVs are therefore essentially mobile by nature and as such pose a new interference risk to 6 GHz fixed links.

Preliminary ITU-R studies carried out at 6 GHz have addressed the development of protection and coordination methods. Analyses are under way to define a minimum distance, beyond which an in-motion ESV will not cause unacceptable interference to existing and future fixed systems operating in the 6 GHz band. These analyses generally agree on how to calculate this minimum distance. However, there is disagreement on assumptions and technical parameters to be used in this calculation.

Since MS systems are generally less sensitive to interference from ESVs than FS systems, the text below will focus on the FS systems only. In addition, the 4 GHz band will not be treated, where the FS systems have the potential to cause interference to ESVs.

6.3.2 Analysis of the results of studies

Using the minimum distance beyond which an in-motion ESV will not cause unacceptable interference as a reference, three operational modes have been identified:

i) operation in-motion beyond a specified distance from land;

ii) operation where the vessel is not moving;

iii) operation of the ESV while the vessel is in motion within the specified distance of land.

Based on error performance requirements for the FS, the ITU-R studies have proposed methods for determining the minimum distance that will be necessary in order to protect the FS from unacceptable interference from an in-motion ESV. The minimum distance calculations depend on the interference criteria chosen, whether Automatic Transmit Power Control (ATPC) will be implemented in FS systems, the predicted number of potential interference exposures from ESVs, and the discrimination angle between the ESV and the fixed service receiver. These studies and some additional studies provided to the CPM illustrated the range of minimum distance values that are possible using certain assumptions.

Some of the proposed technical constraints applied to ESVs in the above studies are:

Minimum diameter of ESV antenna:	2.4 m
Minimum elevation angle of ESV antenna:	10°
Maximum necessary bandwidth per vessel:	2.346 MHz
Maximum ESV transmitter power spectral density at the input to the antenna:	17 dB(W/MHz)

Given that vessels are subject to roll, pitch and yaw motions, severe interference could occur within the FSS. Therefore, the tracking accuracy of the ESV antennas should be constrained to 0.2 degrees, regardless of the sea conditions. The half-power beamwidth of 1.5 degrees required to protect adjacent satellites is consistent with the minimum antenna diameter of 2.4 m mentioned above.

The studies that have been conducted in ITU-R have illustrated that the values for the minimum distance are principally affected by the interference criteria required to protect the fixed service and the number of passages per unit time by vessels equipped with earth stations. Based on different values for these assumptions, the results of these preliminary studies yielded a range of values for the minimum distance from 100 km to 540 km. It should be noted that studies submitted to the CPM by some administrations suggested values for the minimum distance of 150 km to 370 km. However, agreement has not been reached on a single minimum distance figure. Further ITU-R studies are required on the ranges and a single minimum distance value.

It should be noted that the specified distance would be calculated for a moving vessel with a speed of 10 knots (approximately 18.5 km/hr). This speed is considered to be representative. If the vessel were stationary then larger distances would be necessary.

6.3.3 Methods of satisfying the agenda item

Several methods were considered with respect to the type of service under agenda item 1.8, because the status of ESV is not defined and does not clearly fall within the functional description of the FSS. Some proposals considered that the service should be in the maritime mobile-satellite service. However, the ESVs operate in bands allocated to the fixed-satellite service.

The different approaches have different jurisdictional implications with respect to all administrations involved. Resolving these implications is a complex legal matter, which WRC-2000 should take into account but may not be competent to resolve.

6.3.3.1 Option 1

Should WRC-2000 wish to introduce the use of ESVs in these bands, agenda item 1.8 can be satisfied by incorporation of the necessary technical and operational constraints on the operation of ESV terminals in the 3 700-4 200 MHz and 5 925-6 425 MHz bands as well as associated methods to protect the fixed service and to ensure its growth, and to protect other systems within the FSS. This may be accomplished by appropriate footnote references to a Resolution that sets forth these constraints as well as regulatory requirements, as discussed in § 6.3.4.

Given the need for more detailed discussion and analysis regarding the assumptions and technical parameters that are used in the calculation of the minimum distance, it is suggested that an administrative value could be adopted for the minimum distance from the coast if WRC-2000 adopts a related regulatory solution. This interim value would apply only until the next WRC and requires validation or modification to reflect the results of technical studies to be accomplished during this period.

A self contained Resolution that addresses and clarifies responsibilities and conditions, including facilitation of bilateral agreements between administrations, for the operation of ESVs within the Radio Regulations could be considered by WRC-2000 as an interim provision.

6.3.3.2 Option 2

Alternatively, the Conference could decide to make no change to the existing Radio Regulations. In this case the ESV terminals would only be able to continue to operate under **S4.4**. The reason for this is the amount of detailed legal and technical work that would have to be done, and the complexity of the treaty status provisions of two international instruments (the Radio Regulations and the United Nations Convention on the Law of the Sea (UNCLOS)) including treatment of fixed stations on off-shore structures and platforms outside the territorial sea.

6.3.4 Regulatory and procedural considerations

The regulatory environment concerning the operation of radiocommunication facilities from stations beyond land boundaries, at sea or in the air, is very complex and depends on the type of radiocommunication service, the location of the station and even the type of communications traffic involved.

If there is an agreement that some regulatory solution is necessary then this should be based on setting a distance limit that is compatible with UNCLOS and which is compatible with the distances indicated with the interference assessment.

In view of the above when the specified distance is defined, a resolution should specify:

- that there are three modes of operation for ESVs:
  - operation where the vessel is not moving;
  - operation in-motion beyond specified distance from land;
  - operation of the ESV while the vessel is in motion within the specified distance of land;
- that in-motion ESV operation is limited to beyond a minimum specified distance from the coasts and that means should be established to cease emissions within this distance, unless prior agreement has been obtained from the concerned administrations.

This text provides example regulatory text whereby earth stations on vessels may be allowed to operate in these bands without a specific allocation by the addition of an appropriate footnote following the precedent set in footnotes RR **S5.485** and **S5.492**.

Provided that requirements on minimum tracking accuracy and maximum beamwidth were included in the relevant footnote or an equivalent, it is believed that no other regulatory provisions would be necessary concerning frequency sharing with other systems within the FSS.

Introducing ESVs in these bands without restrictions would mean that the coordination procedures of **S9.17** and **S9.18** would have to be applied between these stations and terrestrial stations. However, this need could be fulfilled by the appropriate provisions of a resolution. Text for an example resolution ("Resolution **ZZZ**") is provided in Annex 2 to this chapter.

Introducing ESVs on a secondary basis would mean that this type of application would be secondary to other FSS earth stations, which is probably not appropriate.

Introducing ESVs with a footnote in Article **S5** providing for the protection of and the flexibility for the fixed service would avoid this difficulty. Such an example footnote could be worded in the following way:

"In the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz, transponders on space stations in the fixed-satellite service may be used, additionally, by earth stations on vessels. Such use is subject to the provisions specified in the procedures of Resolution **ZZZ**."

If the Conference decides to take no action with respect to modification of the Radio Regulations to provide for this application then such earth stations on vessels would only be able to continue to operate under **S4.4**.

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6.4 Agenda item 1.12

"to consider the progress of studies on sharing between feeder links of non-geostationary-satellite networks in the mobile-satellite service and geostationary-satellite networks in the fixed-satellite service in the bands 19.3-19.7 GHz and 29.1-29.5 GHz taking into account Resolution **121 (Rev.WRC-97)**"

*Resolution **121 (Rev.WRC-97)** "Continued development of interference criteria and methodologies for fixed-satellite service coordination between feeder links of non-geostationary satellite networks in the mobile-satellite service and geostationary-satellite networks in the fixed-satellite service in the bands 19.3-19.7 GHz and 29.1-29.5 GHz"*

6.4.1 Summary of technical and operational studies

A draft new Recommendation ITU-R S.[Doc. 4/42(Rev.1)] on mitigation techniques has been prepared addressing mitigation techniques. This Recommendation includes the topics of adaptive power control, high gain antennas, geographic isolation, site diversity and link balancing.

In addition the Recommendation addresses coordination. The results of these studies are summarized below.

6.4.1.1 Power control

The use of adaptive uplink power control may be used to maintain system performance during times of increased levels of interference. Recommendation ITU-R S.1255 recommends that networks employing adaptive uplink power control should transmit signals at the lowest possible power level to mitigate interference between GSO/FSS networks and feeder links of non-GSO/MSS networks.

6.4.1.2 High gain antennas

Restricting the GSO earth station minimum antenna size to 1.0 m results in interference levels below the currently proposed aggregate criteria for the LEO-A MSS network feeder links. The interference level is generally higher for the MEO case than the LEO case. For a 1.8 m GSO earth station antenna the interference criteria are exceeded in all links.

6.4.1.3 Geographic isolation

As indicated in CPM Report to WRC-97, maintaining a minimum latitudinal separation of 2º between competing GSO/LEO earth stations is required to reduce the interference to acceptable levels. In the GSO/MEO case, separations greater than 2º in latitude (225 km) are required to reduce the interference to acceptable levels.

Further, it has been shown that the geographic separation of the earth stations of two systems, combined with the use of high gain antennas, would be more effective in mitigating interference than either of the two techniques separately. Geographic isolation down to 60 km is possible with these techniques.

6.4.1.4 Site diversity

Site diversity is the use of an alternate earth station located far enough away from the primary site to provide sufficient antenna discrimination to maintain acceptable interference levels. Its use as an interference mitigation technique depends on the non-GSO MSS space station antenna beamwidth. For example, to be effective in mitigating interference between a LEO-B feeder-link network and a GSO/FSS network (GSO-13) in the 20/30 GHz bands, earth station diversity would require that the LEO-B satellite antennas be so large as to be impractical.

6.4.1.5 Link balancing

The concept of link balancing refers to the design of non-GSO FSS links to reflect the need to mitigate the effects of uplink transmissions from GSO FSS earth stations. In the case of uplink transmissions from non-GSO MSS earth stations, the GSO receive signal is protected because of the distance involved. However, this is not the case for the uplink of the non-GSO MSS earth station vis-à-vis interfering transmissions from the GSO FSS. To "balance" the transmission environment, the non-GSO MSS earth station carries larger fixed uplink margins to protect itself from the GSO.

6.4.1.6 Coordination

To date the studies conducted by ITU-R indicate that geographic isolation provides the best solution to coordination between non-GSO MSS feeder links and the GSO FSS systems. Typically, there are relatively few non-GSO MSS feeder link earth stations in a system dispersed over a wide area. Within such an area, the non-GSO MSS earth station will require less spectrum than the GSO FSS, thus permitting the additional use of either frequency isolation and/or polarization isolation to achieve satisfactory coordination.

6.4.1.7 Satellite diversity

The use of satellite diversity has been considered as a mitigation technique to avoid main beam-to-main beam interference by switching traffic to an alternative satellite. This technique has a number of system design and network operational implications which network operators have to consider before implementing it. The constellation design is determined by how best to accommodate the service links and may not provide visibility statistics such that satellite diversity is possible.

6.4.2 Method to satisfy the agenda item

The above sections are considered to cover the requirements of Resolution **121 (Rev. WRC-97)** and thus satisfies the agenda item. It is suggested that Resolution **121 (Rev. WRC-97)** could now be suppressed.

6.4.3 Regulatory and procedural considerations

The agenda item may be dealt with through ITU-R Recommendations rather than modification of the RR.

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6.5 Agenda item 1.14 (Resolution 123 (WRC-97))

"review the results of the studies on the feasibility of implementing non-GSO MSS feeder links in the 15.43-15.63 GHz in accordance with Resolution **123 (WRC-97)**"

*Resolution **123 (WRC-97)** "Feasibility of implementing feeder links of non-geostationary satellite networks in the mobile-satellite service in the band 15.43-15.63 GHz (space-to-Earth) while taking into account the protection of the radio astronomy service, the Earth exploration-satellite (passive) service and the space research (passive) service in the band 15.35-15.4 GHz"*

6.5.1 Summary of technical and operational studies

Studies conducted subject to Resolution **123 (WRC-97)** dealt with two aspects:

1) demand for allocation to non-GSO MSS feeder links in the band 15.43-15.63 GHz (space-to-Earth);
2) feasibility of implementing non-GSO MSS feeder links in the band 15.43-15.63 GHz (space-to-Earth) regarding protection of RAS, EESS (passive) and SRS (passive) operating in the band 15.35-15.4 GHz.

6.5.1.1 Demands in frequency resource for non-GSO MSS feeder links

Frequency bands in the ranges 5-29 GHz are allocated for non-GSO MSS network feeder links subject to Article **S5**. Accommodation analysis based on ITU-R data for non-GSO MSS networks in the concerned frequency bands showed a high planned usage intensity for all of the bands. Furthermore the analysis revealed that operation in a part of the bands is significantly difficult and sometimes impossible due to imposed limitations.

To define practical usefulness of the frequency resource available for operation of non-GSO MSS feeder links, a quality analysis for current allocations was conducted.

The conducted analysis of current frequency band allocations for non-GSO MSS feeder links and intensity of their employment confirms demand for the frequency resource related to the allocations in the band 15.43-15.63 GHz (space-to-Earth) and shows that the band 15.43-15.63 GHz (space-to-Earth) offers potential for implementing non-GSO MSS feeder links, although the suitable mitigation techniques would be required to meet the RAS protection criteria.

6.5.1.2 Protection of radio astronomy in the band 15.35-15.4 GHz from interference produced by unwanted emissions from non-GSO MSS feeder links operating in the band 15.43-15.63 GHz (space-to-Earth)

Based on Recommendation ITU-R RA.769-1 the level of acceptable interference of -202 dBW is taken as a protection criterion for RAS stations in the frequency band 15.35-15.4 GHz. ITU-R studies have found that in coordination processes between the radio astronomy service and single services or individual systems in such services a provisional figure of no more than 2% should be applied as the acceptable percentage of time, during which interference may be permitted to exceed the threshold levels detrimental to the radio astronomy service.

Based on the above-stated criteria, studies were conducted in relation to interference produced by unwanted emissions from feeder links of two typical non-GSO MSS networks (a LEO-N and a LEO-G as described in Recommendation ITU-R S.1328). Both systems apply additional filtering and use suitable transmitted power levels at the space stations to provide necessary protection of RAS in the band 15.35-15.4 GHz.

The analysis showed that interference produced by unwanted emissions from non-GSO MSS space stations (feeder links) to a RAS station in the band 15 GHz would not exceed the acceptable levels, allowing the 2% percentage of time criterion, in the case of both separate and joint operation of the two systems studied. No other study results, indicating the possibility of unacceptable interference to RAS were obtained.

For non-GSO MSS networks of other types the levels of interference produced could exceed the limits described above. Therefore, taking into account that the number of RAS stations operating in the band 15 GHz is limited and their location is known precisely, the following mitigation techniques could be appropriate and might enable other systems to meet RAS protection criteria:

- employing the steered antennas at non-GSO MSS space stations in the band 15 GHz (space-to-Earth) for establishing feeder links;
- maximizing the separation between non-GSO MSS gateway stations and RAS stations to reduce power of potential interference to RAS stations;
- limiting operational elevation angles at non-GSO MSS gateway stations;
- reducing emitted power when passing through the visibility zone of a radio telescope;
- use of substantial filtration to minimize out-of-band emissions in the band 15.35-15.4 GHz.

Maximum effectiveness would be obtained in integrated employment of different mitigation techniques.

6.5.1.3 Protection of EESS and SRS passive sensors in the band 15.35-15.4 GHz from interference produced by unwanted emissions from non-GSO MSS feeder links operating in the band 15.43-15.63 GHz (space-to-Earth)

Recommendations ITU-R SA.515-3, ITU-R SA.1028-1 and ITU-R SA.1029-1 were taken as a basis for studies of the problem.

The studies showed that the worst-case interference scenario for sharing between passive sensors and non-GSO MSS feeder links would be an interference to passive sensors as produced by the Earth's surface reflecting non-GSO MSS feeder-link emissions in space-to-Earth direction.

The results of the conducted estimations show that the requirements for protection of EESS and SRS passive sensors in the band 15.35-15.4 GHz from interference produced by unwanted emissions from non-GSO MSS feeder links operating in the band 15.43-15.63 GHz (space-to-Earth) would be met with the margin of over 50-60 dB.

6.5.2 Methods to satisfy the agenda item and their advantages and disadvantages

The conducted studies comply with the Resolution **123 (WRC-97)** provisions completely and hence cover all issues related to the agenda item concerned. Taking into account that Resolution **123 (WRC-97)** has attained the assigned objectives and aims, it would be appropriate to suppress it at WRC-2000.

The studies conducted show that for existing systems it should be feasible to implement non-GSO MSS feeder downlinks in the band 15.43-15.63 GHz taking into account the protection requirements for RAS and other passive services in the band 15.35-15.4 GHz. Providing that existing non-GSO MSS feeder downlinks systems planning to use the band are able to do so, no disadvantages are foreseen.

However, for future non-GSO MSS systems using the space-to-Earth allocation at 15.43-15.63 GHz substantial mitigation techniques would be required to adequately protect the RAS from harmful interference. It could be concluded that because of high levels of suppression of out-of-band emissions required, use of the band 15.43-15.63 GHz for space-to-Earth feeder links may be limited to use of non-GSO MSS satellite networks for which advanced publication information has been received by the Bureau prior to WRC-2000.

6.5.3 Regulatory and procedural considerations

No. **S5.511A** could be modified so that the use of the frequency band 15.43-15.63 GHz by the FSS (space-to-Earth) would be limited to non-GSO MSS networks for which advanced publication information has been received by the Bureau prior to the end of WRC-2000. Such systems will be required to restrict their out-of-band satellite emissions in the band 15.35-15.4 GHz to meet the requirements of Recommendation ITU-R RA.769-1 for 98% of the time. If the WRC-2000 decides that the above-mentioned limitations are acceptable, it might be appropriate to delete the reference to Resolution **123 (WRC-97)** in No. **S5.511A**.

ANNEX 1 TO CHAPTER 6 (SECTION 6.2)

EXAMPLE DRAFT MODIFICATION TO RESOLUTION 122 (REV. WRC-2000)

Use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz by high altitude platform stations in the fixed service and by other services and the potential use of bands below 47 GHz by HAPS in the fixed service

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the band 47.2-50.2 GHz is allocated to the fixed, mobile and fixed-satellite services on a co-primary basis;

b) that WRC-97 made provision for operation of high altitude platform stations, also known as stratospheric repeaters, within the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz;

c) that ITU has among its purposes "to promote the extension of the benefit of the new telecommunication technologies to all the world's inhabitants" (No. 6 of the Constitution of the ITU (Geneva, 1992));

d) that systems based on new technologies using high altitude platforms will be able to provide high-capacity, competitive services to urban and rural areas;

e) that the development of any service requires major investment and that manufacturers and operators should be given the confidence to make the necessary investment;

f) that high altitude platform systems are in an advanced stage of development and some countries have notified such systems to ITU;

g) that the Radio Regulations Board issued a provisional rule of procedure concerning notification periods in No. **S11.24/1228** in February 1997;

h) that in spite of the urgency attached to the development of such systems, technical, sharing and regulatory issues should be further studied in order to achieve the most efficient use of the spectrum available for these systems;

i) that technical studies have been undertaken on the characteristics of a HAPS system in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz and on the coordination and sharing requirements between HAPS systems and systems in the conventional fixed service and in other services, but that further studies are still in progress on the potential for interference between such systems;

j) that the radio astronomy service has primary allocations in the bands 42.5-43.5 GHz and 48.94-49.04 GHz;

k) that ITU-R study results have been presented which indicate that in WRC-97 designated bands at 47.2-47.5/47.9-48.2 GHz, sharing between fixed service systems using HAPS and other conventional fixed service systems in the same area will require appropriate interference mitigation techniques to be developed and implemented;

l) that No. **S5.552** urges administrations to reserve fixed-satellite service use of the band 47.2-49.2 GHz for feeder links for the broadcasting-satellite service, and that ITU-R studies indicate that high altitude platform stations in the fixed service may share with broadcasting-satellite feeder links;

m) that ITU-R studies in the bands 47.2-47.5 GHz and 47.9-48.2 GHz indicate that sharing between fixed service systems using HAPS and FSS could be feasible under certain limitation, such as geographical separation between HAPS-based systems and FSS earth stations;

n) that since 47 GHz bands are more susceptible to the rain attenuation in certain areas of Region 3, the 18-32 GHz range has been proposed for possible identification of additional spectrum in ITU-R and preliminary studies are in progress for these bands;

o) that the 18-32 GHz range is already heavily used by a number of different services,

resolves

1 to urge administrations to facilitate coordination between high altitude platform stations in the fixed service operating in the bands 47.2-47.5 GHz and 47.9-48.2 GHz and other co-primary services in their territory and adjacent territories;

2 that, on a provisional basis, the procedures of Article S9 shall be used for coordination between satellite systems and high altitude platform systems;

3 to request ITU-R to continue to carry out urgently studies on the appropriate technical sharing criteria for the situations referred to in *considering i)*;

4 to request ITU-R, taking into account the requirements of other fixed service systems and other services, to urgently conduct studies on the feasibility of identifying additional frequencies for the use of HAPS in the fixed service in the range 18-32 GHz;

5 that WRC-02/03 should review the results of these studies and consider refinement of the regulatory provisions that might facilitate a broader application of these high altitude platform technologies,

instructs the Director of the Radiocommunication Bureau

1 that notices concerning high altitude platform stations that were received by the Bureau prior to 22 November 1997, and provisionally recorded in the Master International Frequency Register in accordance with the provisional rule of procedure issued by the Board, shall be maintained;

2 that from 22 November 1997, and pending review of the sharing studies in *considering i)* and review of the notification process by WRC-02/03, the Bureau shall accept notices in the bands 47.2-47.5 GHz and 47.9-48.2 GHz only for high altitude platform stations in the fixed service and for feeder links for the broadcasting-satellite service, shall continue to process notices for fixed-satellite service networks (except for feeder links for the broadcasting-satellite service) for which complete information for advance publication has been received prior to 27 October 1997, and shall inform the notifying administrations accordingly.

ANNEX 2 TO CHAPTER 6 (SECTION 6.3)

Introduction

The text contained in this annex is an example, in support for Option 1, regulatory mechanism provided for the aid of administrations in their preparation for WRC-2000.

EXAMPLE DRAFT RESOLUTION ZZZ (WRC-2000)

Provisions to enable earth stations located on board vessels to operate in fixed-satellite service networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that there is a demand for global wideband satellite communication services on vessels;

b) that the technology exists that would permit the use of fixed-satellite services (FSS) networks by earth stations on board vessels (ESVs) operating in the 3 700-4 200 and 5 925-6 425 MHz bands;

c) that ESVs have the potential to cause unacceptable interference to the fixed service (FS) systems in the band 5 925-6 425 MHz;

d) that FS systems have the potential to cause interference to ESVs in the 3 700-4 200 MHz band;

e) that ESVs operating in these bands require considerably less than the full bandwidth in this FSS allocation and only a portion of the visible geostationary arc;

f) that there are a limited number of geostationary FSS systems that have global coverage;

g) that in order to ensure the protection and future growth of the FS, the ESV must operate with certain technical and operational constraints;

h) that administrations may authorize radiocommunication stations on off-shore structures and platforms for which they are responsible:

i) that based on appropriate assumptions a minimum distance can be calculated beyond which the ESV will not have the potential to cause unacceptable interference to the fixed service in this band,

noting

a) that operation within the territorial sea is at the discretion of the administration with territorial authority, in which case the relevant procedures of that administration will apply;

b) that operation of earth stations on vessels from specified fixed points at locations outside the territorial sea but for which an administration has territorial jurisdiction is fully within the FSS,

resolves

1 that the administration that issues the radio licence for the use of ESVs in these bands (licensing administration) shall ensure that such stations do not cause unacceptable interference to stations in the fixed service;

2 that licensing administrations shall ensure that ESVs are capable of operating in compliance with the requirements of this Resolution;

3 that operators of ESVs shall comply with the conditions established by the licensing administration(s);

4 that ESVs shall not claim protection from fixed service station transmissions;

5 that any transmissions from ESVs within a distance X km off any given coast shall be based upon the prior agreement of that coastal administration;

6 that the ESV system shall include means of identification and automatic mechanisms to terminate transmissions whenever the station operates outside its pre-authorized geographic (see *resolves* 5) or operational limits;

7 that ESVs shall be equipped so as to enable the licensing administration under the provisions of Article **S18** to verify earth station performance and to accomplish the switch off of the ESV transmission immediately upon request by an administration whose services may be affected;

8 that when ESVs operating beyond the territorial sea but within X km of the coast of an administration fail to comply with the terms required by that administration pursuant to *resolves* 3 and 5, then that administration may:

– request the ESV to comply with such terms or cease operation immediately; or

– request the licensing administration to require such compliance or immediate cessation of the operation;

9 that any licensing authority that licenses ESVs shall agree to maintain at all times a point of contact, which shall be published in a circular of the ITU, that may be contacted by an affected administration seeking assistance pursuant to *resolves* 3 and 5 above.

CHAPTER 7

Other matters

(WRC-2000 agenda items 1.2, 1.3, 2, 4, PP Resolutions and RR No. S5.488)

CONTENTS

Other matters

7.1 Agenda item 1.2

"to finalize remaining issues in the review of Appendix **S3** to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation **66 (Rev.WRC-97)** and the decisions of WRC-97 on adoption of new values of spurious emissions for space services taking effect at a future time"

Although not specifically defined in Article **S1**, the term "space services" is taken to be any service which uses "*Space Radiocommunication*" as is defined in Article **S1**.

7.1.1 Summary of technical studies

Appendix **S3** contains tables of maximum permitted spurious emission power levels. Table I contains the values applicable to transmitters installed on or before 1 January 2003 (valid until 1 January 2012), while Table II applies to the transmitters installed after 1 January 2003 and to all transmitters after 1 January 2012. Note 14 of Table II identifies the spurious emissions limits for space services as "design objectives" until after WRC-2000.

In considering Appendix **S3** and Recommendation **66 (Rev.WRC-97)**, "Studies of the maximum permitted levels of unwanted emissions" and in particular its *recommends* 1 and 2, the following five items are addressed with regard to agenda item 1.2:

i) space services spurious emission limits and how they are applied;

ii) the limiting case of a very narrow-band or unmodulated signal in a wideband amplifier operating particularly in the space services;

iii) the special case of spurious emission limits that should not apply in adjacent transponders within the same transmitting system;

iv) amateur earth stations operating below 30 MHz; and

v) an exemption from spurious emission limits for deep-space satellites,

and these items have been studied by ITU-R.

7.1.2 Analyses of the results of studies

ITU-R concluded that there is no further need for the "design objectives" qualification for space services limits and that at this time, they believe that no changes to the attenuation values or the reference bandwidth for space services are applicable. This reflects its view to transform these "design objectives" into a regulatory limit.

ITU-R discussed the option of distinguishing between two types of earth station, viz., mobile and fixed earth stations, while keeping identical values for spurious emission levels, as a means of indicating that it may be appropriate to have different levels at some future time. It was concluded to maintain this concept within the ongoing studies of ITU-R, but in the meantime, no specific change to categories contained within Table II of Appendix **S3** is suggested. Likewise, it was noted that the requirements for downlink transmissions from the space transmitters of MSS are different from those of FSS and BSS, and again, this concept will be retained under study within the ITU-R.

ITU-R considered the situation of amateur earth stations which use the same transmitting equipment for communication to both space and terrestrial stations but which currently fall into two different categories of spurious emission limits. Amateur earth stations use the same transmitting equipment as amateur stations, both below and above 30 MHz, and there is no reason for the same terrestrially-based equipment to be subject to different spurious emission requirements when transmitting to amateur space stations. Below 30 MHz, amateur stations in the amateur service, use 43 + 10 log(PEP), or 50 dB, whichever is less stringent in determining the applicable spurious limit. Above 30 MHz, Appendix **S3** currently requires amateur earth stations to fall into the "All services" category of Table II, viz., up to 70 dBc suppression, which causes amateur earth stations to have more restrictive limits than other earth stations. Furthermore, longer-term studies should address the appropriate use of spurious emission spectral density limits (dBs) in this case as an alternative to dBc, as some amateur earth stations use SSB emissions. A new footnote in Table II applied against "Space services (earth stations)" would be appropriate for such case. At the same time, it was noted that footnote 12) to Table II of Appendix **S3** gives no value to the Table II service category of "Amateur services operating below 30 MHz (including with SSB)" and may, in fact, add to the ambiguity since it gives no information or instruction. This particular service category includes all amateur stations in any event. Therefore, it would be appropriate to delete the reference to footnote "12)" as noted here.

ITU-R has studied the case where spurious emissions from one transponder fall on a frequency at which a companion transponder is transmitting, on the same satellite, into the same service area. This situation is particularly aggravated when both transponders illuminate the same footprint on Earth. A separate self-explanatory Headnote **11*ter*** to Appendix **S3** has been drafted to cover this case. Appropriate text on the point is suggested in § 7.1.4.

Studies have concluded that there is no reason for *Deep Space* spacecraft, as defined by the RR, to have any spurious emission limits specified. An exemption for these spacecraft is based on the fact that *Deep Space* spacecraft emissions are so weak that only unusual communications equipment, using massive antennas and very low noise cooled amplifiers, can detect even the fundamental signal, let alone any spurious emissions. A consequential suggestion is made to exempt such *Deep Space* spacecraft from requirements for spurious emission limits.

Studies have revealed difficulties with specifying spurious emission limits for very narrow-band or unmodulated space service signals. Therefore, ITU-R concluded that very narrow-band or unmodulated transmissions, where practical application of the term "necessary bandwidth" may be difficult to apply in practice in determining the domain of spurious emissions, need special consideration. A separate self-explanatory Headnote **11*bis*** to Appendix **S3** has been drafted to cover this case. Appropriate text on the point is suggested in § 7.1.4.

7.1.3 Methods to satisfy the agenda item and their advantages and disadvantages

7.1.3.1 Limits regarding space services

To transfer the spurious emission limits currently included in Appendix **S3** for space services as "design objectives" into regulatory limits.

Advantage

- Final adoption of the spurious emission limits currently included in Appendix **S3** for space stations of the space services will provide a general degree of protection for other systems, while not placing an unreasonable burden on the space services given the current state of technology and cost effectiveness of implementing systems.

Disadvantage

- Studies on the differences between vulnerable service requirements and unwanted emission levels that are feasible, and on possible approaches to solve the differences, are ongoing.

7.1.3.2 Other relevant issues

Special consideration is necessary for amateur earth stations, very narrow-band or unmodulated signals in a wideband amplifier operating particularly in the space services, Deep Space space stations, and companion transponders operating within the same satellite.

Advantage

- The advantage of the suggested changes for these four cases is to avoid unnecessary expense in applying limits that are not necessary and for which additional protection need not be afforded.

Disadvantages

None.

7.1.4 Regulatory and procedural considerations

To indicate unambiguous adoption of the space services spurious emission limits currently designated "design objectives", Footnote 14 in Table II of Appendix **S3** can be deleted.

To adequately recognize the case of very narrow-band and unmodulated signals, particularly for the space services, a new Headnote ***11bis*** to Appendix **S3** can be added to read as follows:

> "As an emitted signal becomes more and more narrow (to the limiting case of an unmodulated carrier with theoretical necessary bandwidth of zero), the application of the term "necessary bandwidth" as used in determining the region where spurious emission limits apply to space services, becomes more and more difficult. In the limit, ±250% of necessary bandwidth (generally recognized as establishing the region beyond which spurious emissions are defined), approaches zero. Beacon and other unmodulated signals, such as those used in uplink and downlink circuits in the control and tracking of satellites, are examples of cases where it is difficult to apply, in a practical manner, the term "necessary bandwidth" in determining where out-of-band emissions end, and spurious emissions begin. Pending further studies and definitive action by a future world radiocommunication conference, to specify the region where spurious emission limits apply for transmitters using amplifiers to transmit essentially an unmodulated signal (or a signal with very small bandwidth), the amplifier bandwidth is taken to be the necessary bandwidth (in calculating the regions where spurious emissions will apply)."

To avoid unnecessary design and operational requirements for adjacent transponders in the same transmitting system, a new Headnote ***11ter*** to Appendix **S3** can be added as follows:

> "For satellites employing more than one transponder, and when considering the limits for spurious emission as indicated by Headnote **11** to Appendix **S3**, spurious emissions from one transponder may fall on a frequency at which a companion, second transponder is transmitting or in the guard band between two transponders. In these situations, the level of spurious emission from the first transponder is well exceeded by fundamental emissions of the second transponder or by out-of-band emissions into the guard band. Therefore, the limits of Appendix **S3** should not apply to those spurious emissions on a satellite which fall either within the bands where there are transmissions from different transponders, on the same satellite, into the same service area or within the guard bands between the different transponders."

To avoid "amateur earth stations" having to comply with spurious emission limits different from "amateur stations", a new footnote in Table II, to the "Space services (earth stations)" category, can be added as follows:

> "Amateur earth stations operating below 30 MHz are in the service category "Amateur services operating below 30 MHz (including with SSB)"."

In the Table II service category of "Amateur services operating below 30 MHz (including with SSB)," delete the reference to footnote "12)," retaining footnote 12) itself as well as retaining reference to footnote 12) in the two Table II categories, "SSB from mobile stations" and "Services operating below 30 MHz, except space, radiodetermination, broadcast, those using SSB from mobile stations, and amateur."

To cater for space stations intended to operate in *deep space* (defined in **S1.177**) which have essentially undetectable spurious emissions in every case, a new footnote in Table II, to the "Space services (space stations)" category, can be added as follows:

> "Space stations, intended to operate in *deep* space (defined in **S1.177)** are exempt from spurious emission limits."

7.1.5 Issues not directly related to space services as specified in agenda item 1.2

If considered to be within the competence of WRC-2000, revision of the text in Appendix **S3** regarding radiodetermination (radar) systems will correct the implication that radars are immediately subject to spurious emission limits under Section I, and rightly provide for measurement of radar spurious emissions in the radiated field, allowing for consideration of the benefits of antenna selectivity.

These two separate spurious emission issues related to radar systems have arisen in the context of Appendix **S3**, but are obviously not directly related to space services as specified in agenda item 1.2. However, changes are suggested for Appendix **S3** to bring it into alignment with radar-related ITU-R studies and conclusions, if WRC-2000 agrees to consider these issues.

7.1.5.1 Inclusion of spurious emission limits for radar systems

Appendix **S3** as adopted by WRC-97 includes a paragraph addressing measurement methods for radar systems. The inclusion of this paragraph by WRC-97 immediately under Section I of the Appendix implies that the current spurious emission limits also apply to radar systems. ITU-R has recommended changes to Appendix **S3** that would indicate that spurious emission limits apply to radar systems only under Section II.

It is concluded that WRC-97 may not have intended to include radar systems under the spurious emission limits of Section I of Appendix **S3**. Radar systems have been exempted from the limits in Section I because the required measurement methods had not been determined. The measurement methods now provided in Recommendation ITU-R M.1177 pertain to the spurious emission limits in Section II, which apply to radar transmitters installed after 1 January 2003 and to all radar transmitters after 1 January 2012.

To clarify the possible misunderstanding regarding the applicability of spurious emission limits for radar systems, ITU-R recommends modifying No.6 in Section I of Appendix **S3** to read as follows:

> Radar systems are exempt from spurious emission limits under this section.~~The measurement methods for radar systems should be guided by Recommendation ITU-R M.1177. For those radar systems for which acceptable methods of measurement do not exist, t~~The lowest practicable power of spurious emission should be achieved.

7.1.5.2 Measurement of radiated emissions

Furthermore, ITU-R has considered modification of Section II of Appendix S3 to indicate that spurious emission levels for radar systems should be based on radiated emissions, and not measured at the transmission line as called for in Headnote 1 to the Appendix. This would ensure that the measured spurious emission levels account for the inherent selectivity of certain radar antennas which are integral to the transmitting system.

ITU-R concludes that some radar antennas, such as slotted arrays and some distributed phased arrays, have inherent selectivity reducing the level of spurious emissions. For this reason, Appendix **S3** should indicate that spurious emissions of radar systems should be based on the radiated field, not the power in the transmission line.

To indicate that spurious emission levels for radar systems should be determined from radiated emissions, ITU-R recommends that a new footnote be added to the "Radiodetermination" service category in Table II of Section II to read as follows:

> "Radiodetermination (radar) system spurious emission attenuation (dB) shall be determined for radiated emission levels, not at the antenna transmission line. The measurement methods for determining the radiated spurious emission levels from the radar systems should be guided by Recommendation ITU-R M.1177."

ITU-R recommends also modifying existing Headnote 8 of Section II, adding the words "or for specific applications, such as radar, where the antenna is designed to provide significant attenuation at the spurious frequencies" at the end of the second sentence.

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7.2 Agenda item 1.3

"to consider the results of ITU-R studies in respect of Appendix **S7/28** on the method for the determination of the coordination area around an earth station in frequency bands shared among space services and terrestrial radiocommunication services, and take the appropriate decisions to revise this Appendix"

7.2.1 Summary of technical and operational studies

Draft new Recommendation ITU-R SM.[XX], entitled "Determination of the coordination area around an earth station in frequency bands between 100 MHz and 105 GHz", has been developed with a view to providing a single consolidated recommendation covering methods for determining coordination areas. The Recommendation has included revised propagation models (see Recommendation ITU-R P.620-4), has drawn upon the methods contained in Recommendations ITU-R IS.847-1, IS.848-1 and IS.849-1, and used methodologies and parameter values provided by the relevant ITU-R Study Groups.

7.2.2 Analysis of the results of studies

7.2.2.1 Issues addressed by this Recommendation

There is considerable operational experience suggesting that the methods included in Appendix **S7** produce coordination areas of an acceptable size. Steps were taken to ensure that, where their frequency ranges and situations overlap, the Recommendation referred above and Appendix **S7** produce coordination areas similar in size.

This Recommendation will enable the administrations and the BR to determine coordination areas:

- over an extended frequency range from 100 MHz to 105 GHz;
- for transmitting earth stations with respect to receiving earth stations operating in bidirectionally allocated bands;
- for earth stations operating to GSO satellites in inclined orbits;
- for earth stations operating to satellites anywhere within a defined portion of the GSO arc, with or without orbital inclination;
- for mobile earth stations and BSS earth stations (in the non-planned bands) operating within a defined service area;
- using improved methods for the construction of auxiliary contours to assist in the coordination process;
- introducing supplementary contours to assist in the coordination process.

Also, improved methods for dealing with earth stations operating with non-GSO spacecraft were developed. Two methods (time invariant gain and time variant gain) were retained and guidance for their use are given in this Recommendation. The time invariant gain (TIG) method provides ease of implementation, but overestimates the coordination distance. In order to reduce the coordination burden and on the basis of bilateral or multilateral agreements, administrations can use the time variant gain (TVG) method to obtain more realistic results.

7.2.2.2 Issues needing further studies

The following issues need further studies:

- methods considering the cumulative impact in determining the coordination areas for high-density earth stations (fixed and mobile) or based on system parameters representing high density use (fixed and mobile);
- methods to address propagation mode (1) modelling of VHF/UHF frequencies for percentages of time below 1%;
- methods to address propagation mode (1) water vapour density for both radio climatic Zones B and C;
- refinements to propagation mode (2) to address elevation angle dependency and the displacement of the centre of propagation mode (2) contour from the coordinating earth station;
- some system parameter values are missing from the parameter value tables.

Work is continuing in these areas and will need to be incorporated in a future revision to Appendix **S7**. Furthermore, each WRC might make allocation decisions requiring the updating of the parameter tables.

7.2.3 Methods to satisfy the agenda item and their advantages and disadvantages

7.2.3.1 Revision of Appendix S7

With regard to the revision of Appendix S7, the ITU-R identified the following options not necessarily in order of preference:

Method 1

To replace the text of Appendix **S7** with text based on the Recommendation.

Advantages

- To have the essential material from the Recommendation available as a complete and consistent regulatory procedure.
- Will only duplicate material from the Recommendation that has an agreed regulatory status.

Disadvantage

- In order to update Appendix **S7** in the future, it will have to be placed on a future WRC agenda.

Method 2

To replace the text of Appendix **S7** with text based on the Recommendation and to establish a permanent agenda item to update the tables of parameters in Appendix **S7** in response to allocation decisions made at the previous conference.

Advantages

- To have the essential material from the Recommendation available as a complete and consistent regulatory procedure.
- Will only include material from the Recommendation that has an agreed regulatory status.

Disadvantage

- Requires additional permanent item for WRC agendas.

Method 3

To replace the text of Appendix **S7** with text based on the Recommendation and to create a mechanism, via a new WRC resolution, to allow updating of the system parameter values as needed via an "an extraordinary agenda item" to a WRC. This resolution could be based on the format of Resolution **60 (WARC-79)** but would deal with system parameter values instead of propagation issues. In this format, there will be a need to establish mechanisms to facilitate Radiocommunication Assembly consideration of the revised parameter tables and to initiate an extraordinary agenda item on the agenda of the next WRC.

Advantages

- To have the essential material from the Recommendation available as a complete and consistent procedure.
- Will only include material from the Recommendation that has an agreed regulatory status.
- Would be on the WRC agenda only when needed.

Disadvantages

- Requires a modified or new resolution.
- Resolution 60 mechanism to create an extraordinary agenda item has never been used.

Method 4

To replace the text of Appendix **S7** with text based on most of the Recommendation, but to incorporate by reference the parameter tables of the Recommendation since they require frequent updating.

Advantages

- More easily updated since recommendations incorporated by reference are a permanent WRC agenda item.
- Limits the scope of what might be viewed as changeable.

Disadvantages

- To perform the complete procedure, the user will have to go from Appendix **S7** in Volume 2 of the Radio Regulations to the Recommendation in Volume 4.
- Reproduces whole recommendation, duplicating much of what is in Appendix **S7**.
- Limits the ability to update the methods.

Method 5

To incorporate the Recommendation by reference.

This method would simply require within Appendix **S7** an introductory statement to refer to Annex 1 of Recommendation ITU-R SM.[XX], which provides the methods for determining coordination areas, and to Annex 2 of Recommendation ITU-R SM.[XX], which provides the system parameter tables.

Advantages

- More easily updated since recommendations incorporated by reference may be updated at each WRC.
- Would allow dealing with unresolved issues in the near future.

Disadvantage

- While only the system parameter values require regular updating, this approach may lead to the updating of the entire Recommendation becoming a constant ongoing process.

7.2.3.2 Other related issues

In addition to the revision of Appendix **S7**, there would be value in moving information on predetermined coordination distances from Appendix **S5** to Appendix **S7**. When moving the appropriate material to Appendix **S7**, there may also be some value in combining Tables 1 and 2 of Annex 1 of Appendix **S5** and eliminating listing of uses that are not covered by a protected allocation. An example of this combination and correction of the tables dealing with predetermined coordination distances is shown in Annex 1 of Chapter 7.

Advantage

- To facilitate the application by all administrations of the coordination procedures among earth stations and terrestrial stations by having, as much as practicable, all the appropriate material of Appendices **S5** and **S7** relating to the determination of the coordination areas in a single appendix.

Disadvantage

- Relocation of regulatory text from the familiar location.

7.2.4 Regulatory and procedural considerations

If the Recommendation is used to update Appendix **S7**, the following regulatory and procedural implications have been identified:

– Recommendations ITU-R IS.847-1, IS.848-1, and IS.849-1 might no longer be required in Volume 4, pending the results of the WRC.

– References to Recommendations ITU-R IS.847-1, IS.848-1 and IS.849-1 will need to be revised.

– Resolution **60 (WARC-79)** will need to be revised to accurately reference provisions in Appendix **S7** dealing with propagation. (This Resolution provides the opportunity for updating the propagation component of Appendix **S7** via an extraordinary WRC agenda item. See Method 3.) If the opportunity for an extraordinary agenda item for the propagation component is no longer needed the resolution could be suppressed.

– Implications of extending the frequency range below 1 GHz need to be reviewed for Article **S21**.

– Definitions in Article **S1** (**S1.171**, **S1.172**, **S1.173**) need to be reviewed for alignment with the text in the Recommendation.

The following examples show ways to bring the text of the definitions into agreement with the Recommendation.

MOD S1.171 *coordination area:* When determining the need for coordination, ~~T~~the area surrounding ~~associated with~~ an *earth station* sharing the same frequency band with *terrestrial stations* or surrounding a transmitting *earth station* sharing the same bidirectionally allocated frequency band with receiving *earth stations*, outside of which ~~a terrestrial *station* sharing the same frequency band neither causes nor is subject to interfering *emissions* greater than a~~ the permissible level of interference will not be exceeded and coordination is therefore not required.

NOC S1.172

MOD S1.173 *coordination distance:* When determining the need for coordination, the ~~D~~distance on a given azimuth from an *earth station* sharing the same frequency band with *terrestrial stations* or from a transmitting *earth station* sharing the same bidirectionally allocated frequency band with receiving *earth stations*, beyond which ~~a terrestrial *station* sharing the same frequency band neither causes nor is subject to interfering *emissions* greater than a~~ the permissible level of interference will not be exceeded and coordination is therefore not required.

- Additional data are needed in Appendix **S4** to cover all data elements required to determine the coordination area of a particular earth station.

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7.3 Agenda item 2

"to examine the revised ITUR Recommendations incorporated by reference in the Radio Regulations which have been communicated by the associated Radiocommunication Assembly, in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution **27 (Rev.WRC-97)**"

Resolution 27 (Rev.WRC-97) "References to ITU-R and ITU-T Recommendations in the Radio Regulations"

Resolution 28 (WRC-95) "Revision of references to ITU-R Recommendations incorporated by reference in the Radio Regulations"

7.3.1 Regulatory and procedural considerations

The Radio Regulations have referred to technical and operational material contained in ITU-R (CCIR) Recommendations for many years. Recently though, the concept of using Incorporation By Reference in a more formal context has been the cause of considerable discussion within ITU during WARC-92, WRC-95 and WRC-97. Between WARC-92 and WRC-95 the Voluntary Group of Experts charged with simplifying the Radio Regulations specifically recommended the use concept to satisfy the twin aims of simplifying the Radio Regulations and reducing their volume by replacing many provisions of a technical or operational nature by references to ITU-R Recommendations, i.e., either existing Recommendations or Recommendations constructed for the purpose. Implicit in the concept was that the referenced texts would have the same mandatory character as would the equivalent treaty text in the Radio Regulations.

Thus, to qualify unequivocally as incorporation by reference, a text that is referenced in the Radio Regulations must satisfy the following conditions:

- the introductory language making reference to the text in question must be of a mandatory nature;
- the reference must be explicit, specifying the specific part of the text (if appropriate) and the version or issue number.

These and other principles underlying the concept's application were identified and approved by WRC-95 in Resolutions **27** and **28**.

The implementation of the concept commenced at WRC-95 and progressed further at WRC-97. However, by WRC-97 it was obvious that a large amount of detailed work remained to be done just to ensure that all instances where incorporation by reference was definitely intended had been treated correctly. In addition, there remain a very large number of references to ITU-R Recommendations which, though not intended to be mandatory, were too vague to be of any great value. Resolution **27** was updated at WRC-97 to give guidance on the scope of work required to achieve consistency in all references to ITU-R Recommendations, and some ITU-T Recommendations, whether mandatory, advisory or merely informative.

Some concerns raised by ITU members relate to the need to be aware of which recommendations could be candidates for incorporation by reference into the Radio Regulations. Of equal importance, administrations need to know of any ITU-R Recommendation currently incorporated by reference, which is being (or has been) revised during the current study period. For some administrations, WRC may be the first opportunity to be aware of these recommendations. Many administrations would benefit greatly by being advised as early as possible. Therefore, a mechanism for the early identification should be established.

In accordance with the provisions of Resolution **28 (WRC-95)** and Resolution **27 (Rev.WRC-97)**, each WRC now has to devote time to ensuring that references are up to date because the various Study Groups of the ITU Sectors routinely propose revisions to ITU-R Recommendations that have already been incorporated by reference and, in response to WRC agenda items, generate new Recommendations for incorporation by reference. It was therefore envisaged at WRC-97 to have a standing agenda item for all future WRCs to carry out this essential work.

Several factors have, however, led to the continued usefulness of incorporation by reference being questioned recently. Notably, the concept has failed to provide the practical benefit originally envisaged of simplifying or reducing the volume of the Radio Regulations. In order to satisfy the Rules of Procedure governing WRCs, the Regulations that entered into force on 1 January 1999 now have a fourth volume which contains the Recommendations currently identified as having a mandatory aspect (though many remain to be identified). This also gives rise to problems over the status of the texts incorporated by reference since any texts incorporated by reference have to be published as part of the Radio Regulations in recognition of their mandatory status. However, the texts in question will not have been subject to the full procedures laid down for approval of treaty text at WRCs because the volume of text involved cannot be handled through the usual procedures for approving documentation. (See Annex 2 for a discussion of WRC procedures regarding incorporation by reference.)

The status of incorporation by reference has been discussed during the VGE work and at WARC-92. However, there was no firm conclusion and, despite many requests, no definitive opinion emerged from the ITU legal service as to whether text incorporated by reference is an obligatory part of the Radio Regulations or not. The majority view at WRC-95 was that such texts are obligatory, but still many administrations cannot accept that they have to be treated as an obligatory part of the Radio Regulations.

The legal situation is not the only aspect of status to consider. There is also the structure of the ITU-R Recommendations themselves. Often their intended use was to provide guidance, or even a number of options, and the language used is indeed only advisory, i.e., *"should do...", "may do..."*, etc. Also, the substantive text is usually contained in Annex(es), preceded by introductory text that is superfluous for regulatory purposes. The addition of mandatory text in the Radio Regulations when referring to such Recommendations does not therefore enhance the regulatory status of those texts.

The result is that the complexity of the Radio Regulations does not appear to have been reduced and in fact there is still no firm agreement on the status of provisions employing incorporation by reference are now more confused than before.

Taking all the inputs together, two main options of keeping to the current arrangements or abandoning the concept altogether have been identified coupled with several intermediate possibilities. The range of views presented may be summarized as follows:

1) Retain the present situation and ensure that references to material incorporated by reference are accurate, up to date and appropriate, together with ensuring that other classes of reference are appropriate for the purpose.

2) Eliminate or reduce instances of incorporation by reference by transferring some or all of the incorporated texts explicitly into the Radio Regulations making such changes as necessary to the base Recommendations to ensure regulatory consistency. Under this scheme the remaining non-mandatory references to ITU-R and ITU-T Recommendations would be to the latest version of explicitly identified Recommendations and would only be made for the purposes of supplying necessary guidance or information.

3) Retain the concept but be more selective in its use, possibly limiting mandatory reference only to material developed specifically for a well-defined and agreed purpose within the Radio Regulations or only for stable technical material. Again, references of a non-mandatory nature to the latest versions of Recommendations could be retained for the purpose of guidance and information.

4) Retain incorporation by reference only for material of an operational nature, the maritime and aeronautical services in fact, where differences in legal interpretation would be less contentious since there would be no impact on the decisions of major economic importance that do arise where Recommendations concerning coordination of satellite networks are concerned.

5) Retain incorporation by reference keeping in mind the principles of Resolution **27** and provide administrations with the time to consult with their experts. The Director of the Radiocommunication Bureau would provide to the CPM immediately preceding a WRC a list of ITU-R Recommendations currently incorporated by reference in the Radio Regulations which are being revised for submission to the Radiocommunication Assembly or have been revised and approved through the consultative process of Resolution ITU R-1 during the current study period. This listing would be solely for information to administrations and would not confer any special status to the Recommendations.

In addition, and in order to ensure that the Radio Regulations does contain the complete collection of the ITU-R Recommendations that are incorporated by reference, CPM considers that a more formal mechanism should be adopted via a Resolution at WRC-2000 which would list explicitly all ITU-R Recommendations that are incorporated by reference and which will be published in the Radio Regulations.

Annex 3 shows an example of setting priorities for work under Resolution **27** indexed in order of ITU-R Recommendations. Annex 4 provides one possible approach to improving incorporation by reference. Annex 5 defines several categories of provision making reference to ITU-R Recommendations and then lists those Recommendations by category in the order they are found in the Radio Regulations.

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7.4 Agenda item 4

"in accordance with Resolution **95 (WRC-97)**, to review the resolutions and recommendations of the previous conferences with a view to their possible revision, replacement or abrogation"

*Resolution **95 (WRC-97)** "General review of the resolutions and recommendations of world administrative radio conferences and world radiocommunication conferences"*

CPM took note of the initial study of the Bureau in response to Resolution **95 (WRC-97)**. In addition to the specific suggestions which were addressed to the Director through some input contributions to CPM, CPM also considers that the BR Report to WRC-2000 on this issue should be amended so as to include cross-references to the relevant sections of the CPM Report to WRC-2000 which treat the issues referred to in the Resolutions/Recommendations that are explicitly or implicitly on the agenda of WRC-2000. Furthermore, and in order to facilitate the activities in response to Resolution **95 (WRC-97)** at WRC-2000, appropriate indication of the concerned Committee/Working Group should be included, where appropriate, based on the available information as to the possible structure of the Conference. Some administrations expressed the view that Resolutions and Recommendations dealing with maritime matters should not be revised or abrogated by WRC-2000 excepting those that are explicitly on the agenda of WRC-2000.

The table below contains a list of Resolutions and Recommendations identified by this CPM as related to the Chapters of its Report.

Resolutions/Recommendations
Chapter 1 - IMT-2000, maritime and aeronautical issues
Resolution **212 (Rev.WRC-97)** "Implementation of International Mobile Telecommunications (IMT-2000)"
Resolution **716 (WRC-95)** "Use of the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz in all three Regions and 2 010-2 025 MHz and 2 160-2 170 MHz in Region 2 by the fixed and mobile-satellite services and associated transition arrangements"
Recommendation **622 (WRC-97)** "Use of the frequency bands 2 025-2 110 MHz and 2 200-2 290 MHz by the space research, space operation, earth exploration-satellite, fixed and mobile services"
Resolution **346 (WRC-97)** "Protection of distress and safety communications on the frequencies 12 290 kHz and 16 420 kHz from harmful interference caused by these frequencies being used also for non-safety calling"
Resolution **342 (WRC-97)** "Review of new technology to provide improved efficiency in the use of the band 156-174 MHz by stations in the maritime-mobile service"
Recommendation **318 (Mob-87)** "Improved efficiency in the use of the Appendix **S18/18** VHF frequency spectrum for maritime mobile communications"
Chapter 2 - Mobile-satellite and radionavigation-satellite services
Resolution **218 (WRC-97)** "Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service"
Resolution **213** "Sharing studies concerning possible use of the band 1 675-1 710 MHz by the mobile-satellite service"
Resolution **220 (WRC-97)** "Studies to consider the feasibility of using a portion of the band 1 559-1 610 MHz by the mobile-satellite service (space-to-Earth)"
Resolution **214 (Rev.WRC-97)** "Sharing studies relating to consideration of the allocation of bands below 1 GHz to the non-geostationary mobile-satellite service"

Resolution **728 (WRC-97)** "Studies relating to consideration of allocations in the broadcasting band 470-862 MHz to non-geostationary mobile-satellite services"
Resolution **219 (WRC-97)** "Studies relating to consideration of the allocation to the non-geostationary mobile-satellite service in the meteorological aids band 405-406 MHz and the impact on primary services allocated in the adjacent bands"
Chapter 3 – Non-GSO FSS issues
Resolution **130 (WRC-97)** "Use of non-geostationary systems in the fixed-satellite service in certain frequency bands"
Resolution **538 (WRC-97)** "Use of the frequency bands covered by Appendices **30/S30** and **30A/S30A** by non-GSO systems in the fixed-satellite service"
Resolution **131 (WRC-97)** "Pfd limits applicable to non-GSO FSS systems for protection of terrestrial services in the bands 10.7-12.75 GHz and 17.7-19.3 GHz"
Chapter 4 - Space science services and radio astronomy
Resolution **723 (WRC-97)** "Consideration by a future competent world radiocommunication conference of issues dealing with allocations to science services"
Chapter 5 - Appendices **S30** and **S30A**
Resolution **49 (WRC-97)** "Administrative due diligence applicable to some satellite communication services"
Resolution **53 (WRC-97)** "Updating of the "Remarks" columns in the tables of Article **9A** of Appendix **S30A** and Article **11** of Appendix **S30**"
Resolution **73 (WRC-97)** "Measures to solve the incompatibility between the broadcasting-satellite service in Region 1 and the fixed-satellite service in Region 3 in the frequency band 12.2-12.5 GHz"
Resolution **532 (WRC-97)** "Review and possible revision of the 1997 BSS Plans for Regions 1 and 3"
Resolution **533 (WRC-97)** "Implementation of the decisions of the WRC-97 relating to Appendices **S30** and **S30A** to the Radio Regulations"
Resolution **534 (WRC-97)** "Implementation of Annex 5 to Appendix **S30** and Annex 3 to Appendix **S30A** of the Radio Regulations"
Resolution **536 (WRC-97)** "Operation of broadcasting satellites serving other countries"
Resolution **538 (WRC-97)** "Use of the frequency bands covered by Appendices **S30/30** and **S30A/30A** by non-geostationary-satellite systems in the fixed-satellite service"
Recommendation **35 (WRC-95)** "Procedures for modification of a frequency allotment or assignment plan"

Chapter 6 - Fixed and fixed-satellite services
Resolution **126 (WRC-97)** "Use of the frequency band 31.8-33.4 GHz for high-density systems in the fixed service"
Resolution **726 (WRC-97)** "Frequency bands above 30 GHz available for high-density applications in the fixed service"
Resolution **128 (WRC-97)** "Allocation to the fixed-satellite (space-to-Earth) service in the 41.5-42.5 GHz band and protection of the radio astronomy service in the 42.5-43.5 GHz band"
Resolution **129 (WRC-97)** "Criteria and methodologies for sharing between the fixed-satellite service and other services with allocations in the band 40.5-42.5 GHz"
Resolution **133 (WRC-97)** "Sharing between the fixed service and other services in the band 37-40 GHz"
Resolution **134 (WRC-97)** "Use of the frequency band 40.5-42.5 GHz by the fixed-satellite service"
Resolution **122 (WRC-97)** "Use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz by high altitude platform stations in the fixed service and by other services"
Resolution **121 (Rev.WRC-97)** "Continued development of interference criteria and methodologies for fixed-satellite service coordination between feeder links of non-geostationary satellite networks in the mobile-satellite service and geostationary-satellite networks in the fixed-satellite service in the bands 19.3-19.7 GHz and 29.1-29.5 GHz"
Resolution **123 (WRC-97)** "Feasibility of implementing feeder links of non-geostationary satellite networks in the mobile-satellite service in the band 15.43-15.63 GHz (space-to-Earth) while taking into account the protection of the radio astronomy service, the earth exploration-satellite (passive) service and the space research (passive) service in the band 15.35-15.4 GHz"
Chapter 7 - Other matters
Recommendation **66 (Rev.WRC-97)** "Studies of the maximum permitted levels of unwanted emissions"
Resolution **27 (Rev.WRC-97)** "References to ITU-R and ITU-T Recommendations in the Radio Regulations"
Resolution **28 (WRC-95)** "Revision of references to ITU-R Recommendations incorporated by reference in the Radio Regulations"
Resolution **60 (WARC-79)** "Relating to information on the propagation of radio waves used in the determination of the coordination area"
Resolution **95 (WRC-97)** "General review of the resolutions and recommendations of world administrative radio conferences and world radiocommunication conferences"
Resolution **721 (WRC-97)** "Agenda for the 1999 World Radiocommunication Conference"
Resolution **722 (WRC-97)** "Preliminary agenda for the 2001 World Radiocommunication Conference"

7.5 PP Resolutions

The Plenipotentiary Conference (Minneapolis, 1998) adopted the following Resolutions with respect to matters that may need to be addressed by WRC-2000:

- Resolution 85 (COM5/11): "Evaluation of the administrative due diligence procedure for satellite networks adopted by the World Radiocommunication Conference (Geneva, 1997)".
- Resolution 86 (COM5/17): "Coordination and notification procedures for satellite networks".
- Resolution 87 (COM5/19): "Role of the notifying administration in the case of an administration notifying on behalf of a named group of administrations".
- Resolution 88 (COM5/22): "Implementation of processing charges for satellite network filings and administrative procedures".

These Resolutions were transmitted to the Special Committee on Regulatory/Procedural Matters and the CPM for appropriate studies.

7.5.1 Resolution 85 - Administrative Due Diligence

It was noted that the BR is required to submit a report to WRC-2000 on the application of Resolution **49 (WRC-97)**. The BR is requested:

- to separate in its report to WRC-2000 those cancellations of filings that were as a result of the application of Resolution **49** from those that would have been cancelled without Resolution **49** due solely to the date limits in the Radio Regulations;
- make its report available as soon as possible so that administrations are able to judge the effectiveness of the administrative due diligence process;
- to include in its report to the WRC any comments from administrations reflecting any difficulty that they have experienced in the application of Resolution **49**.

7.5.2 Resolution 86 - Improvements to the Satellite Coordination and Notification procedures

7.5.2.1 Date of bringing into use of satellite frequencies

In the present Regulations, the phrase "Date of Bringing into use" is used but there is no definition as to what is meant by this phrase. During the past couple of years this lack of clarity has resulted in some problems. There were two contributions to the SC/CPM suggesting some changes to the appropriate sections in Appendix **S4** and Annex 2 of Appendices **S30** and **S30A**. The intent of this proposal was to clarify what is meant by this phrase and in so doing draw upon some elements of No. **S13.6**. A possible example would be as follows:

> Appendix **S4** Annex 2A, A.2 *a)* - The date (actual or foreseen, as appropriate) of bringing the frequency assignment (new or modified) into use. <u>In the case of geostationary-satellite networks the date of bringing into use denotes the date at which the frequency is brought into regular operation to provide the published radiocommunication service with the technical parameters within the technical characteristics notified to the Bureau.</u> Whenever the assignment is changed in any of its basic characteristics (except in the case of a change in § A.1 *a)*, the date to be given shall be that of the latest change (actual or foreseen, as appropriate).

Some administrations expressed their concern to recommend a definition of the date of operation applicable only to one service, and consider that the matter should be left for further studies.

The original suggestion would have applied to both GSO and non-GSO networks and there were some concerns about the manner in which such changes could be applied in the case of non-GSO networks. The possible application of this type of provision to non-GSO networks has been examined and due to the complexity of this issue for non-GSO networks, this suggestion is now limited to GSO networks.

7.5.2.2 Coordination trigger

At the present time Appendix **S8** (formerly Appendix 29) is used to determine the coordination requirements, and with the increasing complexity of the notices these calculations are very complex. The present procedures of Articles **S9, S11** and the Appendix **S8** calculations require detailed data (Appendix **S4** - previously Appendix 3 data) on the satellite networks.

A possible approach could be that coordination would only be required with those networks that are within a specified orbital separation of the proposed network and having a frequency overlap. The major volume of notices is for the FSS service and perhaps a more simplistic approach should be tried for that service first. This separation angle could be different for the different frequency bands. One submission suggested that as a result of some preliminary studies based on a specific system in certain bands the trigger angles could be in the range of 7-8 degrees with different values for different frequency ranges, however the specific angles mentioned are still under study by ITU-R and therefore have not been considered by the CPM. These studies under way relate to the FSS but a similar concept could be applied to other services, but there has been no detailed study as to what the angles might be. Some concerns were expressed that this concept might not identify possibly affected networks outside the coordination angle. A possible variation was suggested that would permit administrations, if they have networks outside the coordination arc, and can show using Appendix **S5** that this network might be affected to be included in the coordination process as provided for presently by No. **S9.41**. Another suggestion was that administrations should have the right to exclude networks from the coordination process, if those administrations can show using Appendix **S5** that those networks would not be affected. However, one administration expressed concern about this suggestion.

Concerns were expressed as to the impact that such a suggestion may have on the role and workload of administrations especially in developing countries, if an extensive self-identification regime proves necessary to safeguard their interests. There were also concerns that requests for coordination originated through self-identification would be treated with equal status to those identified by the new procedures in the BR.

A suggestion was made to include the service area separation as another factor; however, there were also concerns expressed about including this aspect.

7.5.2.3 Separation of uplink and downlink data

Another suggestion to further simplify the provisions of the Radio Regulations involves the separation of the uplink and downlink in determining the need for coordination. At the present time, the data requirements are complicated by the need to provide strapping tables to cover all of the possible combinations of the uplink and downlink frequencies, however, in the end it is necessary to identify separate coordination requirements for the two directions of transmissions. With the simplified coordination angle triggers it would be possible to treat the uplink and downlink completely separately by looking only at the orbital separation where there is a frequency band overlap and considering the two directions separately. For identifying possible coordination needs outside the coordination arc, there would be considerable simplification in the exchange of data between administrations, if the strapping information is not a part of the data.

Within the current ΔT/T approach there would be considerable simplification under the present process for both the coordination and notification phases if the two directions were treated separately.

This approach could be effected by deleting parts of Section D of Appendix **S4** and with the appropriate consequential changes to Appendix **S8**.

A concern was expressed that the deletion of these strapping data from Appendix S4 may have some other consequences. It was noted that this suggestion relates only to the identification of potentially affected administrations. Specific frequency coordination between administrations would continue to be based on the use of the relevant ITU-R Recommendations.

7.5.2.4 Identification of networks subject to coordination

Under the present procedures, Appendix **S8** (formerly Appendix 29) is used to identify the **networks**, with which coordination is required, but the procedures require the identification of the **administrations** affected and this results in some problems. Under the existing provisions in the application of No. **S9.7** plus others, the BR is required to identify the administrations with which coordination is required. The trigger requirements under Appendix **S8** are based on individual networks. The present practice of the BR is to stop the examination for networks of a particular administration, once one network is identified. This identified network may be an insignificant or very significant problem in the coordination process. In the publications of the BR including the Special Sections and the MR, BR only identifies the administration with no identification of the networks involved. The reasons for including an administration in the coordination requirements are not public, as the networks are not listed. When an administration receives the publication indicating that it is included in the coordination requirements for the network being published, it does not know which of its networks triggered the coordination requirement. It is then necessary for the administrations to agree on which networks will be included. Once the coordination is completed and communicated to the BR, there is no record with BR as to whether a particular network was included in the agreement or not. There are also provisions in Appendix **S5** which state that no coordination is required for a modification if the interference is not increased, but BR has no record as to whether the networks were in fact coordinated in the first place. Some administrations were concerned that this would place an additional burden on the BR, which would benefit only a limited number of administrations. This approach could easily be effected by adding a footnote to No. **S9.36** to indicate that in the case of coordination under Nos. **S9.7**, **S9.8**, **S9.9**, **S9.12** and **S9.13**, BR is required to identify for information purposes the specific satellite networks.

This new approach could be equally applicable if a coordination angle is used for the trigger.

7.5.2.5 Proposed simplifications to Article S9 and Appendix S5

A contribution was received for the simplification of Article **S9** and Appendix **S5** in respect of the coordination between earth stations and terrestrial stations. The simplification is based on the consideration that, for the same situation of interference, up to three different entry points currently exist in Article **S9** and the associated provisions in Appendix **S5**, leading to essentially identical procedures, with some of them being in addition incomplete or even non-existent:

- Nos. **S9.15** and **S9.17** both address the coordination of an earth station with terrestrial stations, respectively in the bands covered by No. **S9.11A** (Resolution **46**) and in other bands at frequencies higher than 1 GHz;
- Nos. **S9.16, S9.18** and **S9.19** all address the coordination of a transmit terrestrial station with a receive earth station, respectively in the bands covered by No. **S9.11A** (Resolution **46**), in

bands not covered by No. **S9.11A** nor by No. **S9.19** at frequencies higher than 1 GHz, and in the bands covered by No. **S9.11**, i.e. allocated to unplanned BSS. This leads to an extremely complex definition of the scope of each of these provisions, whilst it would be equivalent to have only one provision referring to different sections of Appendix **S7**.

Based on the above considerations, this contribution concluded that the simplification would be achieved by the merging of Nos. **S9.15** and **S9.17** on one hand, and Nos. **S9.16**, **S9.18** and **S9.19** on the other hand, the intent of this contribution was to address several situations where no coordination currently exists. The method to effect coordination has been developed by the ITU-R under agenda item 1.3 of WRC-2000.

It was noted, however, that this merging may cause difficulty in the coordination procedures and place additional costs on administrations and terrestrial station operators and possibly earth station operators and the Bureau, and therefore that no attempt should be made to merge these provisions. It was also noted that aspects of coordination not presently specified in the RR should be left to negotiation between administrations. Two contributions were of the view that the bringing into use of a non-GSO network can take much longer than a GSO network, and a FS network can be brought into use much faster than either type of satellite network. The existing Radio Regulations were constructed to, and do achieve, a reasonable balance among all these factors.

It was also noted that the proposed merging would need to take into account that coordination of typical FSS earth stations under **S9.15** is not allowed under **S9.17**.

7.5.2.6 Coordination among typical earth stations and terrestrial stations

A contribution was received addressing the possible application of the current procedures of the Radio Regulations in the case where typical earth stations and terrestrial stations are used. It was noted that several agenda items of WRC-2000 (1.3, 1.4, 1.5, 1.8, 1.13 and 1.20) could be expected to address this issue, in particular in the cases involving high-density applications.

The use of spectrum under these circumstances is a three dimensional problem covering the spectrum itself, but also the geographical area and the time-frame in which this spectrum is to be used. The current restrictions to specific earth stations in the procedures of Nos. **S9.17**, **S9.17A** and **S9.18** and associated provisions in Article **S11** allow full use of these three dimensions to enable equitable access to the spectrum resources.

A concern was expressed that if typical earth stations were to be used generally instead of specific ones (with the obvious exception of mobile stations, which evidently cannot be anything else than typical), the process may become a one shot exercise in which the major parameters which allow to equitably access spectrum resources between neighbouring administrations, i.e. time and geographic distributions, may be lost, thereby allowing a one shot pre-emption of common resources by one service in one country over the entire border area with another country at the detriment of the other services in this country.

On the other hand, the protection of services like BSS or BS require the regulatory possibility to protect typical stations. One contribution reviewed the way in which this situation is addressed in the current Radio Regulations and concluded that, with some adjustments to the current provisions in Article **S9**, an adequate response could be given to the legitimate requirements of the administrations.

The Radio Regulations provide an example of how this difficulty has been resolved in the past in the case of the broadcasting-satellite service (BSS) in the frequency bands shared with terrestrial services with equal primary status:

- in the frequency bands subject to Appendix **S30** Plans, Article 6 of Appendix **S30** gives a super-primary status to the BSS with respect to terrestrial services by protecting the entire service area of the BSS assignments in the Plan against interference from terrestrial stations, from the date the BSS assignment is entered in the Plan;
- in the frequency bands not subject to a Plan, Resolution **33** does not provide any specific protection to non-planned receiving BSS earth stations. However, **S9.19** through the criteria contained in Appendix **S5** does provide for the coordination of transmit terrestrial stations with respect to an earth station of the BSS when the pfd of the terrestrial station exceeds the permissible level at the edge of the service area.

On this example, this contribution concluded that one solution found in the past in the case of coexistence between BSS and terrestrial services in certain frequency bands, was equivalent to downgrading the status of the terrestrial services. However, the pfd is not a hard limit, but a coordination threshold. If an administration with a terrestrial station wishes to exceed this pfd, it can coordinate with affected administrations. Further, in the Appendix **S30** bands, as pending modification to the Plans are not protected from terrestrial stations until they become a part of the Plans (which can be a lengthy process), it seems that the terrestrial stations may actually have an advantage.

Article 6 of Appendix **S30A** provides a somewhat different approach to protect terrestrial services from interference caused by the transmit feeder-link earth stations in the Plan: as in the case of Appendix **S30**, the procedure is intended to protect the entire service area from constraints arising from the need to share with terrestrial services. However, if the procedure of Article 6 of Appendix **S30A** is initiated by an administration intending to bring a terrestrial station in operation, the administration with the feeder-link assignment in the Plan has to indicate the exact coordinates of the feeder-link earth station which may cause interference into the terrestrial station. Short of that, the terrestrial station will have to be protected in the future. In Region 2, an additional provision is that the feeder-link earth station is also entered in the Plan following this process. However, due to the ubiquitous nature of BSS receive earth stations, this approach, which requires knowledge of the location of each earth station, would not be practical.

Another view is that if BSS receive earth stations would be protected anywhere in their service area, there will be a situation where BSS in many cases precludes easy implementation of future terrestrial services within a geographical area; thus, this situation does not present an equitable balance between services.

It was noted that both WRC-95 and WRC-97 contemplated the coordination of typical earth stations in bands subject to **S9.11A** and **S9.19**.

In the context of the use of typical stations, the discussions on the possible merging of the various provisions in Article **S9** relating to coordination between earth stations and terrestrial stations discussed in section 7.5.2.5 above identified the following problem areas:

1) The merging of No. **S9.15** into No. **S9.17** would require the identification of specific earth stations in certain bands allocated to the FSS and would place a significant burden on administrations to provide specific earth station information when the earth stations are expected to be ubiquitous and are authorized on an area basis. In any case, the coordination of either typical or specific earth stations, both of which are included in **S9.15**, cannot be completed without the agreement of the neighbouring administration. One administration expressed the need for WRC to consider the notification of typical earth stations coordinated under **S9.15**. Another administration believes that the existing notification provisions must be retained.

2) In situations where No. **S9.17** currently applies, terrestrial-station operators would not have earth station information to use in designing their terrestrial links if specific earth stations are not coordinated. Additionally, if an administration coordinates assignments for typical earth stations but never notifies assignments for specific earth stations, terrestrial-station operators would not have earth station information to use in designing their networks. Due to lack of earth station information, coordination of terrestrial stations may become a trial-and-error method.

3) The benefit of coordinating receiving terrestrial stations is not evident. If an administration coordinates a receiving terrestrial station within the coordination area of typical earth stations, the administration responsible for the typical earth stations could agree to coordination, subject to the terrestrial stations accepting interference, and not be required to provide specific earth station information. This could present additional work for the Bureau if its assistance is required to effect coordination.

4) Taking the specific situation of the broadcasting-satellite service (BSS), Article 6 and Annex 3 of Appendix **S30** recognizes the need to protect BSS receiving earth stations within the entire BSS service area. The development of No. **S9.19**, and the associated criteria in Appendix **S5**, recognizes that the BSS needs to be protected as typical earth stations.

One administration expressed concern that the coordination of typical earth stations may lead to decreased efficiency in the use of the spectrum.

7.5.2.7 Possible modifications to Article S11 in order to resolve anomalies in relation to recording of assignments in the Master International Frequency Register

The simplification process conducted by the VGE, WRC-95 and WRC-97 has led to merging into Articles **S9** and **S11** various provisions previously included in different Articles (11, 12, 13 and 14), Resolutions (**33** and **46**) and Appendices (**S30** and **S30A**) of the Radio Regulations, noting that certain provisions of Article **S9** (e.g. **S9.17**) are suspended with respect to Appendices **S30** and **S30A**.

With a few exceptions, the notification and recording procedures of Article **S11** are now common for most situations. One significant difference in the treatment of the various types of assignments remains however, in relation to recording of assignments for which the relevant coordination procedure under Article **S9** could not be concluded successfully.

The CPM received a contribution on this aspect of Article **S11** that concluded that there would be significant advantage to harmonize the recording provisions under these circumstances. In particular, in the cases of assignments subject to coordination under Nos. **S9.12** to **S9.16** (formerly Resolution **46**), the lack of harmonization of the recording provisions results in a situation where the coexistence between GSO and non-GSO systems and between non-GSO earth stations and terrestrial stations may lead to blockage of the recording process by the first user of the frequency band.

In the cases where the coordination of an assignment under Nos. **S9.7, S9.17, S9.17A** and **S9.18** could not be concluded successfully, Article **S11** foresees a two-step approach to record this assignment in the Master Register:

- In the first step, the Bureau conducts an examination of the probability of harmful interference (No. **S11.32A** for No. **S9.7** and No. **S11.33** for Nos. **S9.17, S9.17A** and **S9.18**). If this examination is favourable, the assignment is recorded.

- In the second step, should the examination under the first step be unfavourable, the assignment may be resubmitted and recorded if the Bureau is informed that it has been in use, together with the assignment which was the basis for the unfavourable finding, for at least four months without any complaint of harmful interference being made (No. **S11.41**). After this second step, the assignment remains under the Damocles of No. **S11.42**, i.e. any harmful interference has to be ceased if it occurs into the assignments which was the basis of the unfavourable finding.

This approach, which follows the pattern previously used under Articles **11** and **13** since 1971, for GSO networks ensures that an administration cannot block the recording process, hence the establishment of the rights of other administrations, for undue reasons.

In particular, the entry points corresponding to Resolution **46** (Nos. **S9.12** to **S9.16**) are not covered by these provisions. This means that in case of disagreement in the coordination process under any of Nos. **S9.12** to **S9.16**, recording in the Master Register is not possible.

In the case of Nos. **S9.12** and **S9.13** (coordination between non-GSO and GSO satellite systems) the coordination in non-planned bands is triggered by bandwidth overlap only, and no coordination threshold or method currently exists in these cases. This means that disagreeing to a coordination request, without any technical reason, is sufficient to prevent the access to frequencies of subsequent satellite systems (GSO or non-GSO), even if in practice no interference would occur. However, ITU-R is working to establish interference criteria in these cases.

It was noted that this procedural gap could be resolved by appropriate changes to Articles **S9** and **S11**.

Three possible suggestions for dealing with this issue were identified as follows:

a) keep No. **S11.32A** applicable to only GSO (**S9.7**);

b) expand No. **S11.32A** to make it applicable to both the GSO and non-GSO situations;

c) suppress No. **S11.32A** with the consequence that network frequencies that are not coordinated could be recorded directly in the Master Register under the conditions of No. **S11.41**.

Each of the above suggestions has implications for GSO and non-GSO networks which require further study.

A similar approach was suggested with respect to No. **S11.33**.

7.5.2.8 Publication of coordination requests

A contribution was considered illustrating regulatory changes that might be made to Article **S9** to facilitate accelerated availability of coordination request data.

The data submitted to the BR pursuant to No. **S9.30** is not required to be sent directly to administrations. Thus, according to the current Radio Regulations, most administrations will not see the coordination request until it is published by the BR after the complete examination (No. **S9.35**). and identification of administrations with which coordination must be effected (No. **S9.36**). The CPM considered an alternative to the existing process that would provide for the BR publishing this data after an expedited examination for conformity with No. **S11.44**. Thereafter, the BR would continue to examine the data to complete the rest of its obligations; this proposal makes no change to the scope of the BR's examination. However with this approach, administrations would be able to review data several months earlier than at present.

Having coordination data available as early as possible relative to when the data are assembled by the requesting administration may facilitate early identification of coordination issues and permit preliminary consultations to occur pending completion of the BR's examination. Given that satellite payload design decisions have to be made early in the manufacturing process, the early identification of issues that may affect those designs may help reduce incompatibilities and facilitate coordination.

A concern was expressed that publishing the coordination data in a two-step process might result in additional work for the BR. This disadvantage may, however, be tempered by the possibility that the "second" publication may be much smaller than the initial publication - it could be as small as a report by the BR listing the administrations with which coordination must be effected. Additional concern over this approach relates to uncertainty over the status of the coordination data published at the first step. If changes to the data emerge during the BR's examination, they would need to be taken into account in any ensuing coordination. Some administrations were of the opinion that no useful conclusions could be reached on the basis of raw data and that the uncertainties thus introduced could actually reduce the efficiency of the coordination process. In addition it will lead to additional non-justified efforts and cost for the BR.

If some improved process were to be adopted by WRC-2000, it may be appropriate to include some means to treat the backlog of pending coordination requests. This might be accomplished by a resolution that details transitional measures for the dissemination of coordination requests pending in the backlog. Some views were expressed that this might also be facilitated by electronic means, whereas other views expressed concern about the use of electronic means only.

7.5.2.9 Coordination procedures for non-GSO/BSS (sound)

In the bands 2310-2360 MHz and 2535-2655 MHz, there are allocations to groups of countries to the BSS (sound) in accordance with No. **S5.393** and No. **S5.418**, respectively.

Some administrations were of the view that there are no provisions in the Radio Regulations that preclude the use of non-GSO BSS (sound) in the above bands.

At the present time the use of a space station for the broadcasting-satellite service is to be applied under the coordination procedure of Resolution **33** and Article **S9** depending on the date of receipt for the API or the request for coordination.

The coordination procedure between space stations in the broadcasting-satellite service and terrestrial stations in Resolution **33** is specified with no distinction between broadcasting-satellite services employing geostationary-satellite orbit (GSO) and non-geostationary-satellite orbit (non-GSO).

However, while the provisions of Nos. **S9.11** and **S9.19** specify the coordination procedure between "a space station" and terrestrial services, Table S5-1 in Appendix **S5** indicates the procedure between "GSO/terrestrial". In order to resolve this inconsistency, the reference "GSO/terrestrial" in the first column of Table S5-1 of Appendix **S5** for Nos. **S9.11** and **S9.19** could be modified as "GSO, non-GSO/terrestrial".

In addition to this inconsistency, it was noted that there is no coordination procedure applied for non-GSO/BSS (sound) in respect of GSO/BSS (sound) or other non-GSO/BSS (sound) systems. In view of the fact that the broadcasting-satellite systems employing a type of highly elliptical-orbit for non-GSO/BSS (sound) in the 1-3 GHz band are now being planned for operation in the near future, it would be appropriate to establish coordination procedures applicable to non-GSO/BSS (sound) in respect of GSO/BSS (sound) or other non-GSO/BSS (sound) in the before-mentioned frequency bands with appropriate changes to Article **S5** and Appendix **S5**. Some transitional measures would be necessary to deal with GSO networks filed prior to WRC-2000.

Concerning the frequency sharing between GSO/BSS (sound) and non-GSO/BSS (sound) systems and between non-GSO/BSS (sound) systems in the band 1-3 GHz, the view was expressed that this scope could be included in the provisions of Nos. **S9.12** and **S9.13** or hard limits on non-GSO/BSS (sound) may need to be established to share the frequencies with GSO/BSS (sound).

The same situation could exist with respect to other frequency bands.

7.5.2.10 Possible modifications to Appendix S5

Section 2 of Annex 1 to Appendix **S5** contains "hard limits" which have to be met and which are intended to protect terrestrial services, thereby eliminating the need for coordination between these services and the space stations. For this reason, the CPM proposes to remove Section 2 of that Appendix and to add clarifying language to make it unambiguous that coordination is not required between the space stations and terrestrial services in bands where Article **S21** limits apply. This Section of the Annex is not necessary since the specific power limits are already contained in Articles **S21** and **S22** and these limits are not used to determine the need for coordination.

An example on how these changes could be implemented is provided in the following text. Other editorial changes might be required to Appendix **S5** to correct certain deficiencies as shown in the following examples.

Example change to Table **S5-1** of Appendix **S5**:

TABLE S5-1 *(continued)*

Technical conditions for coordination
(see Article **S9**)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**
No. **S9.14** Non-GSO/ terrestrial, GSO/terrestrial	For a space station in a satellite network in the frequency bands for which a footnote refers to No. **S9.11A** in respect of stations of terrestrial services where threshold(s) is (are) exceeded	See Table S5-~~2~~1A	There are no limits in Article **S21** and threshold(s) of~~See~~ § 1 of Annex 1 of this Appendix is(are) exceeded.

One administration expressed its concern about the application of **S9.14** coordination when no trigger is specified in paragraph 1 of Annex 1, and requires a clarification by WRC-2000.

The following are consequential or editorial changes that could be required to AP **S5**~~.~~:

A Example change to Table **S5-1A** of Appendix **S5**:

TABLE S5-1A

Applicability of No. S9.11A for space services

NOTE - Section 1 of Annex 1 contains the relevant coordination thresholds for sharing between the mobile-satellite service (MSS) (space-to-Earth) and terrestrial services. It also contains the relevant coordination thresholds for sharing between non-GSO MSS feeder links (space-to-Earth) and terrestrial services. Section 2 contains the relevant coordination areas for earth stations providing feeder links for non-GSO satellites operating in the MSS and for non-GSO FSS earth stations as well as the relevant coordination areas for mobile earth stations operating below 3 GHz.

B In Table S5-1, **replace** all occurrences of "Table S5-2" to "Table S5-1A" which contains the frequency bands where the relevant Articles apply.

C **Suppress** section 2 of Annex 1, because the limits are already contained in Article **S21** (Sections 2.1, 2.3, 2.4) and **S22** (Section 2.2) and are not used for determining if coordination is required.

D **Renumber** the following sections of Annex 1 and modify §3 of Annex 1 to Appendix **S5** as shown to change the reference from Resolution **46** to Article **S9.11A**.

2 Coordination areas for mobile earth stations operating below 3 GHz and earth stations providing feeder links for non-GSO satellites operating in the MSS and for non-GSO FSS earth stations

2.1 Objectives

In order to apply the provisions of **S9.15** and **S9.16**, this Section specifies the coordination area (see No. **S1.171**) for mobile earth stations as well as earth stations providing feeder links for non-GSO networks. In both cases, the coordination contour (see No. **S1.172**) associated with the coordination area is drawn to scale on an appropriate map in order to depict the coordination area and the extent to which it overlaps the territory of administrations that may be affected. Tables 1-3 specify coordination distances (see No. **S1.173**) for certain frequency sharing situations and frequency bands in which the provisions of Article **S9.11A** are applied. Table 4 applies to non-GSO FSS earth stations.

NOC, remainder of section.

2.2 General considerations

E Update Table 4 of Annex 1 to Appendix **S5** to reflect changes adopted to **S5.523A** at WRC-97.

TABLE 4

Non-GSO FSS earth stations

Frequency sharing situation		**Coordination distance (in sharing situations involving services allocated with equal rights)**
Frequency band and earth station for which coordination area is determined	**Other service or station (station in terrestrial service or earth station)**	
18.~~9~~8-19.3 GHz and 28.~~7~~6-29.1 GHz; earth station operating co-directionally with other earth stations	Ground-based stations in terrestrial services	Determined using Recommendations ITU-R IS.847 and ITU-R IS.849 with the parameters specified therein for terrestrial stations and all applicable equations and figures.

Note – The references in this Table may need to be revised following other decisions by RA-2000 and by WRC-2000.

7.5.3 Resolution 87 - Role of the Notifying Administration

This Resolution deals with the need to clarify the role of the notifying administration when it is notifying on behalf of a group of administrations. There was one administration which submitted proposals and one administration and a Sector Member which submitted comments not in favour of the original proposal. The original proposal which is included here as an example of how WRC-2000 could address this problem would be to have a Resolution with the following *resolves*:

1 that when an administration acts as the notifying administration of a satellite network on behalf of a group of named administrations in accordance with Nos. **S9.1.1** and **S11.15.1** and the Rules of Procedures for Appendices **S30** and **S30A**, the following procedures shall be applied:

- the group of named administrations shall select one of them to act as the notifying administration for that particular network;
- the administration identified as the notifying administration shall act on behalf of all members of the group of administrations listed in the application of the Radio Regulations with respect to particular networks;

2 that the group of named administrations shall ensure that the notifying administration is able to act on their behalf in carrying out the provisions of the Radio Regulations.

There were concerns expressed by one administration and one sector member as follows:

- Some administrations were of the view that the present provisions are adequate, work well and that such changes are not necessary.
- It was pointed out that intergovernmental organizations are composed of sovereign administrations and that the internal procedures of the organization include the identification of the notifying administration to communicate with the BR on its behalf.
- There were concerns expressed about the proposal that the notifying administration shall be one of the group of listed administrations and that the notifying administration may not wish to associate itself with a particular satellite network.

- The view was also expressed that in the case of intergovernmental organizations with its management organization, these organizations are responsible for carrying out the obligations under the Regulations and that the notifying administration is only requested to convey the collective decisions of the intergovernmental organization to the BR and that the notifying administration has no mandate over the intergovernmental organization to enforce the Radio Regulations.
- There were concerns expressed about the conflicting responsibilities between administrations, especially as regards action in the event of harmful interference, when ownership of satellites, licensing of satellites, location of control stations, etc. may involve administrations other than the notifying administration; accordingly the interaction of their relationships, especially the roles of licensing under Article **S18**, needs to be addressed.
- There were concerns that the present provisions of the Radio Regulations only provide an opportunity for the notifying administration to respond to the BR with respect to its own networks if the notifying administration is one of the listed administrations in the group.

In the contributions to some of the main provisions of the Radio Regulations that relate to the roles and responsibilities of the notifying administration were noted as follows:

- **S4.4** - assignment of frequencies not in conformity with the RR by an administration on the condition of no interference;
- **S8.4** - recording of assignments with a reference to No. **S4.4** only when the administration makes a commitment;
- **S9.3** - no comments within a time period equals no objection by the administration, and administrations shall endeavour to cooperate to resolve any difficulties;
- **S9.4** - the administration shall explore all possible means, etc.;
- **S9.43** - an administration not responding shall be considered as not affected;
- **S9.47-49** - an administration undertakes to not make a claim about harmful interference and to not cause harmful interference;
- **S9.51** - an administration shall act within a specified period;
- **S11.36** - undertaking by the notifying administration to not cause harmful interference;
- **S11.39B** - as per No. **S11.36**;
- **Art. S18.**

As for the question of licensing on Article **S18**, this issue is not applicable to Chapter **SIII** of the Radio Regulations, as there is no mention of licensed stations in this Chapter. Article **S18** is a parallel set of obligations under the Radio Regulations and not related to the provisions of Chapter **SIII**.

In addition some administrations do not license or are not authorized by national legislation to license the space stations for which they are the notifying administration and in the case of space stations operated by intergovernmental organizations, they are not licensed by any administration. Also the application of Article **S18** is limited to private stations.

Except for Article **S18** the other provisions listed in paragraph 1.2 fall into one of two categories:

- Those relating to the coordination of specific earth stations and terrestrial stations or between earth stations and the notification and operation of specific earth stations and in this case, it is the administration on whose territory the earth station is situated that is responsible.

- Those relating to the API, coordination, notification and operations of the space station (with typical earth stations as appropriate) and in this case (for non-intergovernmental operating entities) it is the notifying administration of the space station that is responsible. In the case of intergovernmental operating entities, this is the aspect that is not clear and is being addressed in this section.

Administrations are invited to give further consideration to the questions and the concerns expressed above.

7.5.4 Resolution 88 - Processing Charges for Satellite Networks

This Resolution requests WRC-2000 to consider whether any relevant amendments to the Radio Regulations may be necessary, in light of the Council Decision. Council (99) adopted Decision 482. The SC received one contribution on this matter suggesting action by WRC-2000 to deal with the consequences of non-payment of these processing charges. It was suggested that the consequence of non-payment should be addressed in the Radio Regulations, as there are no other provisions of the ITU including the Constitution and the Convention that would apply to this situation. The document suggested that the provisions of the RR should be changed to instruct the Bureau to cancel the relevant publications in the case of non-payment in accordance with the Council Decision. An example of such a change to the Radio Regulations would be footnotes to the appropriate provisions referring to the publications of the Special Sections and is given below.

Add a footnote to that part of Nos. **S9.2B** and **S9.38** referring to the publication, as well as the appropriate provisions of Appendices **S30** and **S30A**.

> If the payments are not received, after suitable reminders, in accordance with the provisions of [Council Decision 482]/[the prevailing Decision of Council] on the Implementation of Cost Recovery for Satellite Network Filings, the Bureau shall cancel the publication and inform all administrations of such action and that this network no longer has to be taken into consideration by other administrations

Some administrations expressed the view that this particular example may not be suitable and that it may impinge upon the rights of administrations under the Radio Regulations, Constitution and the Convention as reflected in the footnote to the Council Decision. Other views were expressed that it is necessary that the administrative process provide for adequate reminders before the BR takes such action. It is to be noted that in signing the Final Acts of a WRC, administrations have certain rights as well as obligations and there are many cases in which administrations' rights are affected in a similar manner in that the right to keep specific satellite filings/frequencies active with ITU are subject to certain conditions such as:

- No. **S9.5D** in which the API publication is cancelled by the Bureau if the coordination request is not received within 24 months of the date of receipt of the API request;
- No. **S11.44** in which the assignments are cancelled by the Bureau if they are not brought into use within the time period provided for by the Regulations;
- Resolution **49** *resolves* 6 in which the publications are cancelled if certain specified data is not provided to ITU within the time period specified.

In addition, Council Decision 482 in *decides* 3 specifically addresses the question of the rights of administrations in that each administration is permitted to have one satellite filing per year at no charge.

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7.6 Application of RR No. S5.488

7.6.1 Background

A procedural matter related to clarification of provision No. **S5.488** (formerly No. **839**) was brought to the attention of the CPM. This matter was addressed in a document from BR, in an information paper from the Chairman of ITU-R Study Group 9 and in contributions from two administrations.

7.6.2 Summary of regulatory situation

Former Radio Regulations provision RR **839** included the requirement for agreement under Article 14 for FSS in the frequency band 11.7-12.2 GHz in Region 2. This provision was modified by WRC-95 to become **S5.488.** WRC-97 did not introduce any change to that provision.

The RRB revised the Rules of Procedure relating to **S5.488** at its 13th meeting 6-14 July, Geneva, 1998 which became effective as from 1 January 1999. This revision was based on the understanding that the new wording of **S5.488**, with no explicit reference to **S9.21**, means that there is no longer a need for the specific procedures of **S9.21** to be applied to FSS networks in the band 11.7-12.2 GHz in Region 2. The use of the frequency band 11.7-12.2 GHz, for FSS GSO in Region 2, was subject to the application of Article 14 until 1 January 1999.

Since there are now no hard pfd limits applicable to geostationary FSS in this band, the revised Rule removes the only regulatory mechanism available to terrestrial services for their protection from GSO FSS service. It is worth mentioning that terrestrial services are protected from non-GSO FSS systems through provisional pfd levels contained in Resolution **131 (WRC-97)**, and in **S21.16**. All other intra- and inter-service relations in this band are not affected by the modified Rule since, for them, there are other regulatory mechanisms that apply.

In order to bridge the apparent regulatory gap, there is a need to establish an appropriate regulatory mechanism by which the terrestrial service sharing the same frequency band with the space service, on an equal basis, are to be adequately protected.

CPM supported the need to clarify this regulatory procedural situation to ensure protection of the fixed service operating in the band 11.7-12.2 GHz.

7.6.3 Regulatory and procedural considerations

Three approaches were identified:

7.6.3.1 **Approach 1:** The introduction of hard pfd limits for geostationary fixed-satellite networks of Region 2 similar to those currently in Article **S21** (**S21.16**) for non-GSO FSS systems operating in this frequency band. An example of this approach is given in Annex 6 to Chapter 7. Additionally, CPM noted existing Recommendation ITU-R SF.385-5 which identifies maximum permissible values of pfd in the frequency bands above 1 GHz for frequency bands immediately adjacent to the 11.7-12.2 GHz band; these values of pfd, if applied to this frequency band, could constitute hard limits for the use of this band by geostationary FSS of Region 2. Hard limits might be placed in Article **S21**. Also, there may be a need for consequential modifications to **S5.488**.

7.6.3.2 **Approach 2:** The introduction of pfd values which are thresholds. Under this approach, for any Region 2 FSS network exceeding the specified pfd values, there would be a requirement to reach agreement with any affected administration. If WRC-2000 were to decide to adopt trigger values, they might be placed in a new resolution, with consequential modifications to **S5.488**, as given by example in Annex 7 to Chapter 7. Annex 8 to Chapter 7 contains an extract of Recommendation ITU-R SF.674-1 which was used to identify pfd thresholds to facilitate the application of former Article 14 in the identification of potentially-affected administrations. It was noted that these threshold values are 2 dB more stringent than the example hard limits of Annex 6 to Chapter 7.

7.6.3.3 **Approach 3:** Existing provision **S5.488** might be modified to refer explicitly to **S9.21** as shown in Annex 9 to Chapter 7. This example is intended to restore the previous requirement of FSS networks of Region 2 to obtain agreement under former Article 14 (now **S9.21**). Coordination requests under Article 14 now pending in BR are being processed using the pfd values of Recommendation ITU-R SF.674-1 as thresholds to determine affected administrations in regard to the protection of terrestrial services. These values are identical to those given in Annex 7 to Chapter 7. A view was expressed that the reinsertion of **S9.21** does not provide any advantage beyond that of the two previous approaches and has the drawback of implementing a limited period for comments in the regulatory process with potential loss of rights. Consequently, only two ways to protect terrestrial services should be considered - through hard limits (Approach 1) or through coordination thresholds (Approach 2).

ANNEX 1 TO CHAPTER 7

Predetermined coordination distances

(Example of combination and revision of Tables 1 and 2 of Annex 1 of Appendix **S5**)

The predetermined coordination distances specified in Tables 1 and 2 are used for transmitting and receiving earth stations, respectively, in cases defined by the corresponding frequency sharing situation.

TABLE 1

Frequency sharing situation		**Coordination distance** (in sharing situations involving services allocated with equal rights) (km)	***Source of information and comments*** *This column is for clarification purpose only and is not to be kept in the final text that may be included in Appendix* ***S7***
Earth station for which coordination area is determined	**Station in Terrestrial service**		
Ground-based	Mobile (aircraft)	500	*Tables 1 and 2 (Section 3 of Annex 1 of Appendix* ***S5****) for frequencies below 3 GHz No coordination distance is provided for frequencies above 3 GHz (e.g. in the band 5 725-7 075 MHz)*
Aircraft (mobile)	Ground-based	500	*Tables 1 and 2 (Section 3 of Annex 1 of Appendix* ***S5****) for frequencies below 3 GHz Table S5-1 of Appendix* ***S5*** *(under the No.* ***S9.17****) for frequencies above 1 GHz*
Aircraft (mobile)	Mobile (aircraft)	1 000	
Ground-based in the bands: 400.15-401 MHz 1 675-1 700 MHz	Station in the meteorological aids service (radiosonde)	580	*Tables 1 and 2 (Section 3 of Annex 1 of Appendix* ***S5****)*

Aircraft (mobile) in the bands: 400.15-401 MHz 1 675-1 700 MHz	Station in the meteorological aids service (radiosonde)	1 080	
~~Ground-based in the bands:~~ ~~454-456 MHz~~ ~~459-460 MHz~~	~~Ground-based~~	~~500~~	*Table 1 (Section 3 of Annex 1 of Appendix **S5**)* *This case can be deleted since under **S5.286B** MSS earth stations shall not cause harmful interference to, or claim protection from, stations of the fixed or mobile services*
Ground-based in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz 2 483.5-2 500 MHz 2 500-2 516.5 MHz	Ground-based	100	*Table S5-1 of Appendix **S5** (under the No. **S9.17**)*
Airborne earth station in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz 2 483.5-2 500 MHz 2 500-2 516.5 MHz	Ground-based	400	

Receiving earth stations in the meteorological-satellite service	Station in the meteorological aids service	The coordination distance is considered to be the visibility distance as a function of the earth station horizon elevation angle for a radiosonde at an altitude of 20 km above mean sea level, assuming 4/3 Earth radius (see NOTE 1)	*Table S5-1 of Appendix **S5** (under the No. **S9.17**)* *Note 3 of Recommendation ITU-R IS.850*

TABLE 2

Non-GSO MSS feeder-link earth stations

Frequency sharing situation		**Coordination distance** **(in sharing situations involving services allocated with equal rights) (km)**	***Source of information and comments*** *This column is for clarification purpose only and is not to be kept in the final text that may be included in Appendix **S7***
Earth station for which coordination area is determined	**Other service or station (station in terrestrial service or earth station)**		
Earth station operating in opposite direction in bands in which the FSS is already allocated	Ground-based stations in terrestrial services or Earth station operating in opposite direction of transmission	– 170 (in the band 19.3-19.7 GHz) – 300 (in the band 6 700-7 075 MHz)	*Table 3 (Section 3 of Annex 1 of Appendix **S5**)* *These distances would be in conflict with the ones calculated by using the method provided in the TG 1/6 DNR that may be used for revising Appendix **S7***

Transmit non-GSO MSS feeder-link earth station in the band 15.4-15.7 GHz	Aeronautical radionavigation	"the coordination distances required to protect the aeronautical radionavigation stations from harmful interference from feeder-link earth station emissions are: – 515 km from the aircraft landing surface for aircraft landing systems (ALS) – 600 km from aircraft using general purpose radars (MPR) – 270 km from the aircraft landing for radar sensing and measurement systems"	***S5.511C*** *Recommendation ITU-R S.1340 (recommends 7)* *If these distances have to be counted from the location of the earth station (as defined in **S1.173**) only the worst distance of 600 km is proposed to be retained in order to cover all cases of sharing (e.g. all systems used in aeronautical radionavigation stations). If these distances have to be counted from the terrestrial station, they are not "coordination distances" in the sense of the Radio Regulations and they might not be included in this table but only be referred in Article **S5** as another coordination method*
Receive non-GSO MSS feeder-link earth station in the band 15.4-15.7 GHz	Aeronautical radionavigation	"the threshold distance for the coordination of emissions from stations in the aeronautical radionavigation service with respect to feeder-link earth stations for the MSS based on an earth station antenna gain in the local horizontal plane of 11.5 dBi are: – 150 km from the ground segment for aircraft landing system (ALS) – 600 km from aircraft using general purpose radars – 60 km from the aircraft landing surface for radar sensing and measurement systems"	***S5.511A*** *Recommendation ITU-R S.1341 (recommends 5)* *If these distances have to be counted from the location of the earth station (as defined in **S1.173**) only the worst distance of 600 km is proposed to be retained in order to cover all cases of sharing (e.g. all systems used in aeronautical radionavigation stations). If these distances have to be counted from the terrestrial station, they are not "coordination distances" in the sense of the Radio Regulations and they might not be included in this table but only be referred in Article **S5** as another coordination method*
All bands and earth stations	Terrestrial mobile (aircraft)	500	*Table 3 (Section 3 of Annex 1 of Appendix **S5**)*

NOTE 1 - The coordination distance, d (km), for fixed earth stations in the meteorological-satellite service vis-à-vis stations in the meteorological aids service assumes a radiosonde altitude of 20 km and is determined as a function of the physical horizon elevation angle θ (degrees) for each azimuth, as follows:

$$d = 100 \qquad \textit{for } \theta \geq 11$$

$$d = 582\left(\sqrt{1+(0.254\theta)^2} - 0.254\theta\right) \qquad \textit{for } 0 < \theta < 11,$$

$$d = 582 \qquad \textit{for } \theta \leq 0$$

The minimum and maximum coordination distances are 100 km and 582 km, and correspond with physical horizon angles greater than 11° and less than 0°.

ANNEX 2 TO CHAPTER 7

WRC procedures for adoption of texts for incorporation by reference

According to **CV462** (PP-98: **RoP112**), the texts forming the "Final Acts" are only considered final following approval upon second reading in Plenary. However the texts of Recommendations incorporated by reference will not form part of the Final Acts (see Annex 1 to Resolution **27**) and are therefore not subject to this obligation.

The question then arises of how such texts will actually be approved and accorded treaty status during a WRC. There was a huge potential problem at WRC-97 where the texts identified for incorporation by reference totalled more than 1 000 pages per language. Distributing this material either as input documents or with the Final Acts would have absorbed the entire conference reproduction facilities for five days. This was not acceptable from a logistical point of view but the problem still remained that the principle set out in **CV374** (PP-98: **RoP36**) provides that proposals presented after the opening of the conference shall be published and distributed as conference documents.

However, **CV378** (PP-98: **RoP40**) mitigates this principle inasmuch as it gives the Chairman of the conference or of the relevant committee or working group the discretion to decide whether a proposal submitted during a meeting should or should not be published and distributed as a conference document. WRC-97 therefore proceeded on a similar basis in respect of the texts incorporated by reference. The logic of not reproducing these texts in the Final Acts is reinforced by the fact that WRCs have no mandate to amend such texts; they can only adopt the text or one or more parts thereof as found.

In order for a WRC to incorporate new texts or to update references to texts already incorporated, the following working procedures therefore need to be observed:

– the actual references to Recommendations liable to be incorporated must be published as conference documents, and approved on second reading by the plenary meeting in all cases where a WRC wishes them to be definitively incorporated by reference;

– for a plenary meeting to adopt a text as being definitively incorporated by reference, it is necessary and sufficient that the delegations participating in the plenary meeting should have been provided access to the text in question, but this does not necessarily mean that the texts should be published as official conference documents.

During the course of a WRC it will therefore be necessary to ensure that a list of the Recommendations proposed for incorporation by reference is developed, maintained and published in line with developments during the conference, and that all the listed texts are available for delegates to consult in their final English, Spanish and French versions.

By adoption of a reference to a Recommendation at second reading in accordance with the above conditions, the plenary meeting is therefore deemed to have formally adopted the text of the Recommendation.

ANNEX 3 TO CHAPTER 7

List of ITU-R Recommendations and provisions of the Radio Regulations potentially involved in by incorporation by reference showing suggested priority of work under Resolution 27

Priority (P)	Type of reference and recommended action
A	The reference to an ITU-R Recommendation in this provision is of a **mandatory** character and the referenced text is **explicitly** identified. **Ensure that a standard method of reference is used.**
B	The reference to an ITU-R Recommendation in this provision seems to be of a **mandatory** character and the referenced text is **explicitly** identified, but a **non-standard wording** is used in this respect. There is a **need to review** these provisions with a view to using a standard wording.
C	The reference to an ITU-R Recommendation in this provision is of an **undefined** character, but the referenced text is **explicitly** identified. There is a **need to review** these provisions with a view to indicating the character of the referenced text (i.e. mandatory or non-mandatory).
D	The reference to an ITU-R Recommendation in this provision is of a **non-mandatory** character, but the referenced text is **explicitly** identified. **No need for review**, unless administrations wish to consider changing the character of this provision.

ITU Rec.	Reference	P	Observations
IS.847-1	AP **S5**, Table S5-1, calculation method re No. **S19.17A**	A	
	AP **S5**, Annex **1**, Table 2	A	
	AP **S5**, Annex 1, Table 3	A	
	AP **S5**, Annex 1, Table 4	A	
IS.848-1	AP **S5**, Table S5-1, calculation method re No. **S19.17A**	A	
IS.849-1	AP **S5**, Table S5-1, calculation method re No. **S19.17A**	A	
	AP **S5**, Annex 1, Table 2	A	
	AP **S5**, Annex 1, Table 3	A	
	AP **S5**, Annex 1, Table 4	A	
IS.1143	AP **S5**, Annex 1, § 1.2.1	D	
	AP **S5**, Annex 1, § 1.2.3.2	D	
M.257-3	**S19.38**	A	
	S19.92	A	
	S52.222.1	A	

ITU Rec.	Reference	P	Observations
M.257-3 cont.	**S52.235**	B	The application of this provision is not mandatory but, if used, the referenced procedures are: **MOD S52.235**: The frequency 156.8 MHz may be used by ship stations and coast stations for selective calling as defined for sequential single-frequency code systems in Recommendation ITU-R M.257-3. *As the referenced procedures relate only to SSFC, this provision requires suitable narrowing.*
	S19.83	C	**MOD S19.83**: When a station~~s~~ of the maritime mobile service uses selective calling devices in accordance with Recommendations ITU-R M.476-5, M.625-3, M.627-1 and M.257-3, ~~their~~ its call numbers shall be assigned by the responsible administrations in accordance with the provisions below.
	S52.188	C	**SUP S52.188**: ~~However, ..., coast stations may also use class H2B emissions when using the selective calling system defined in Recommendation ITU-R M.257-3~~ *Not needed as there is no H2B prohibition.*
	S54.2	D	Consider whether the application and use of the procedures referenced are mandatory. **MOD S54.2**: Selective calling ~~may~~ must be carried out using either a sequential single-frequency code system in accordance with Recommendation ITU-R M.257-3 or a digital selective-calling system in accordance with Recommendations ITU-R M.493-9, M.541-8, M.821-1 and M.825-2 in the shore-to-ship, ship-to-shore and ship-to-ship directions.
M.476-5	**S51.41**	A	
	S19.83	C	**MOD S19.83**: When a station~~s~~ of the maritime mobile service uses selective calling devices in accordance with Recommendations ITU-R M.476-5, M.625-3, M.627-1 and M.257-3, ~~their~~ its call numbers shall be assigned by the responsible administrations in accordance with the provisions below.
M.489-2	**S51.77**	A	
	S52.231	A	
M.492-6	**S52.27**	A	

ITU Rec.	Reference	P	Observations
M.541-8	**S51.35**	A	**MOD S51.35**: All ship stations equipped with ... shall be able to: send and receive class F1B or J2B emissions on an international calling channel ~~(see~~ in accordance with Recommendation ITU-R M.541-8~~)~~ ...;
	S52.159	A	**MOD S52.159**: The frequency 156.525 MHz is an international frequency ... used for distress, urgency, safety and calling by digital selective-calling techniques ~~(see~~ in accordance with ... Recommendation ITU-R M.541-8~~)~~.
	S52.149	C	
	S52.148	D	
	S52.152	D	
	S52.153	D	
	S54.2	D	Consider whether the application and use of the procedures referenced are mandatory. **MOD S54.2**: Selective calling ~~may~~ must be carried out using either a sequential single-frequency code system in accordance with Recommendation ITU-R M.257-3 or a digital selective-calling system in accordance with Recommendations ITU-R M.493-9, M.541-8, M.821-1 and M.825-2 in the shore-to-ship, ship-to-shore and ship-to-ship directions.
M.625-3	**S51.41**	A	
	S19.83	C	
M.627-1	**S51.41**	A	
	S19.83	C	**MOD S19.83**: When a station~~s~~ of the maritime mobile service uses selective calling devices in accordance with Recommendations ITU-R M.476-5, M.625-3, M.627-1 and M.257-3, ~~their~~ its call numbers shall be assigned by the responsible administrations in accordance with the provisions below.
M.821-1	**S54.2**	D	Consider whether the application and use of the procedures referenced are mandatory. **MOD S54.2**: Selective calling ~~may~~ must be carried out using either a sequential single-frequency code system in accordance with Recommendation ITU-R M.257-3 or a digital selective-calling system in accordance with Recommendations ITU-R M.493-9, M.541-8, M.821-1 and M.825-2 in the shore-to-ship, ship-to-shore and ship-to-ship directions.

ITU Rec.	Reference	P	Observations
M.825-2	**S54.2**	D	Consider whether the application and use of the procedures referenced are mandatory. **MOD S54.2**: Selective calling ~~may~~ must be carried out using either a sequential single-frequency code system in accordance with Recommendation ITU-R M.257-3 or a digital selective-calling system in accordance with Recommendations ITU-R M.493-9, M.541-8, M.821-1 and M.825-2 in the shore-to-ship, ship-to-shore and ship-to-ship directions.
M.1169	**S47.26**	A	**MOD S47.26**: ...certificate is authorized to embark as chief operator of a ship station of the fourth category ~~(see~~ in accordance with Recommendation ITU-R M.1169~~)~~.
	S47.27	A	**MOD S47.27**: However, before becoming chief or sole operator of a ship station of the fourth category ~~(see~~ in accordance with Recommendation ITU-R M.1169~~)~~ which is required by international agreements to carry a radiotelegraph operator, the holder of a radiocommunication general operator's certificate or a first- or second-class radiotelegraph operator's certificate shall have had....
	S47.28	A	**MOD S47.28**: Before becoming chief operator of a ship station of the second or third category ~~(see~~ in accordance with Recommendation ITU-R M.1169~~)~~, the holder of a radiocommunication general operator's certificate or a first- or second-class radiotelegraph operator's certificate shall have had, as operator on board ship or in a coast station, at least six months' experience of which at least three months shall have been on board ship.
	S47.29	A	**MOD S47.29**: Before becoming chief operator of a ship station of the first category ~~(see~~ in accordance with Recommendation ITU-R M.1169~~)~~, the holder of a radiocommunication general operator's certificate or a first-class radiotelegraph operator's certificate shall have had, as operator on board ship or in a coast station, at least one year's experience of which at least six months shall have been on board ship.
	S50.9	A	
M.1170	**S52.25**	A	**MOD S52.25**: Before transmitting on 500 kHz, a station~~s must~~shall listen ... ~~(see~~ in accordance with Recommendation ITU-R M.1170~~)~~.

ITU Rec.	Reference	P	Observations
M.1170 cont.	**S52.31**	A	**MOD S52.31**: The frequency for replying ... shall be as follows: either 500 kHz, or the frequency specified by the calling station ~~(see~~ <u>in accordance with</u>... Recommendation ITU-R M.1170~~)~~.
	S52.69	A	**MOD S52.69**: ...a coast station shall take adequate steps to ensure ... the prompt receipt of Morse radiotelegraphy calls ~~(see~~ <u>in accordance with</u> Recommendation ITU-R M.1170~~)~~.
	S55.1	A	
	S52.23	B	
	S51.71	D	
	S52.32	D	**MOD S52.32**: In regions of heavy traffic, coast stations may answer calls made by ship stations of their own nationality in accordance with special arrangements made by the administration concerned ~~(see~~ <u>in accordance with</u> Recommendation ITU-R M.1170~~)~~.
	S52.63	D	**MOD S52.63**: So far as is practicable, a coast station shall transmit its calls at specified times in the form of traffic lists on the frequency or frequencies indicated in the List of Coast Stations ~~(see~~ <u>in accordance with</u> Recommendation ITU-R M.1170~~)~~.
M.1171	**S52.195**	A	**MOD S52.195**: Before transmitting on the carrier frequency 2 182 kHz, a station shall listen ... to make sure that no distress traffic is being sent ~~(see~~ <u>in accordance with</u> Recommendation ITU-R M.1171~~)~~.
	S52.224	A	**MOD S52.224**: ...a station shall listen on the frequency for a reasonable period to make sure that no distress traffic is being sent ~~(see~~ <u>in accordance with</u> Recommendation ITU-R M.1171~~)~~.
	S52.240	A	**MOD S52.240**: ...a station shall listen on this frequency for a reasonable period to make sure that no distress traffic is being sent ~~(see~~ <u>in accordance with</u> Recommendation ITU-R M.1171~~)~~.
	S57.1	A	
	S52.192	C	**MOD S52.192**: [The frequency 2 182 kHz may also be used:] ... by coast stations to announce the transmission, on another frequency, of traffic lists ~~(see~~ <u>in accordance with</u> Recommendation ITU-R M.1171~~)~~.
	S51.71	D	

ITU Rec.	Reference	P	Observations
M.1171 cont.	**S52.213**	D	**MOD S52.213**: ...a ship station may use one of its own assigned national ship-to-shore frequencies for communication with a coast station of another nationality, under the express condition that the coast station as well as the ship station take precautions ~~(see~~ in accordance with Recommendation ITU-R M.1171~~)~~ ...
	S52.234	D	**MOD S52.234**: [The frequency 156.8 MHz may also be used:] ... *b)* by coast stations to announce the transmission on another frequency of traffic lists and important maritime information ~~(see~~ in accordance with Recommendation ITU-R M.1171~~)~~.
M.1172	**S19.48**	A	
	S32.7	D	
	AP **S13**, Part AI § 5.	D	
M.1173	**S52.181**	A	
	S52.229	A	
M.1174	**S5.287**	A	
	S5.288	A	
M.1185-1	AP **S5**, Annex 1, Table 1	A	
M.1187	AP **S4**, Annex 2A, § C.11 *d)*	A	
RA.769-1	**S5.511A**	B	
	S5.208A	D	
	S29.12	D	Refers to RA.769 not RA.769-1
S.1341	**S5.511A**	B	
SA.1071	**S5.503A**	D	
SM.1139	**S16.2**	C	
	S16.6	D	

ITU Rec.	Reference	P	Observations
SF.675-3	AP **S4**, Annex 2A, § C.8 *a)* footnote	D	
SF.765	**S21.2.2**	D	
	S21.4.1	D	
TF.460-5	**S1.14**	B	**MOD S1.14**: Coordinated Universal Time (UTC): Time scale, based on the second (SI), using the definition ~~as defined~~ in ITU-R Recommendation ITU-R TF.460-5.

ANNEX 4 TO CHAPTER 7

One possible approach to improving incorporation by reference

1 Introduction

Although the principle of Incorporation by Reference was widely supported by ITU members, its implementation in practice leads to various difficulties; these again lead to lengthy discussions during world radio conferences.

Two reasons may be identified which lead to this situation:

a) In selecting the relevant ITU-R Recommendation, one may be inclined to overlook the fact that the concerned Recommendation was not developed with the clear objective that it should, at a later date, be incorporated into the Radio Regulations; therefore such a Recommendation may contain technical material for which there is not an absolute need to be adopted as part of the Radio Regulations; furthermore, it may be relevant that ITU members are less critical to the context of a document when its purpose remains limited to a recommendation, as compared to a regulatory text.

b) Not the full membership of ITU is in a position to participate actively in the work of the study groups of ITU-R. This means that a large number of ITU members did or could not contribute to the contents of the specific Recommendation, which, only after its adoption, becomes a nominee for a regulatory provision, and therefore gains considerably in importance.

In summary, one might say: the regulatory text was drafted before one knew that it should be a regulatory text.

To overcome these difficulties, ITU should develop procedures which allow the development of the necessary technical provisions in such a way that all ITU members are aware of the fact that at a later stage, the concerned text may have a regulatory character.

2 Example of a selective approach

Therefore, it is proposed that ITU considers the following procedure:

At WRCs decisions should be taken on which subjects the principle of Incorporation by Reference might be applied.

Such could be done via the adoption of a relevant footnote in the Radio Regulations stating that the provisions of Recommendation ITU-R XX-RR-yy to be developed shall apply, from the date of adoption by the next competent WRC.

(XX stands for the character/study group of the Recommendation; RR indicates it is foreseen for Incorporation by Reference, and yy is a serial number.)

In combination with the decision on the footnote, a WRC Resolution may be adopted containing the following basic elements:

a) an instruction to the ITU-R to develop such a Recommendation ITU-R XX-RR-yy;

b) a scope statement for the Recommendation concerned;

c) if desired or appropriate, an annex which contains any pertinent information.

This approach would have the following advantages:

a) it is known in advance that the Recommendation under development will have a regulatory character;

b) the Recommendation will, via the scope statement, limit itself to those requirements which are deemed necessary by the ITU membership;

c) the whole membership of ITU will be aware of the fact that such a text is under development, especially since it carries the special indicator "RR", and will therefore be in a better position to give it the necessary attention during its phase of development and approval in accordance with Resolution ITU-R 1.

This approach would have the following disadvantages:

a) it could result in the adoption of numerous footnotes to the Radio Regulations that have no regulatory impact;

b) it could expand the number of items that have to be automatically considered at future conferences.

ANNEX 5 TO CHAPTER 7

List of ITU-R Recommendations incorporated by reference and the referring provisions of the Radio Regulations

1 Definition of categories

Annex 3 of Resolution **27 (Rev.WRC-97)** identified several categories of provisions making reference to ITU-R Recommendations, notably:

a) The reference to an ITU-R Recommendation is of a **mandatory** character and the referenced text is **explicitly** identified; in such a case, there is a need to **ensure that a standard method of reference is used**.

b) The reference to a Recommendation seems to be of a **mandatory** character and the referenced text is **explicitly** identified, but a **non-standard wording** is used; in such a case, there is a **need to review** the reference with a view to using a standard wording.

c) The reference to a Recommendation is of a **mandatory** character, but the referenced text is **not explicitly** identified; in such a case, there is a **need to review** the reference with a view to identifying the referenced text explicitly and ensure that a standard method of reference is used.

d) The reference to a Recommendation is of a **non-mandatory** character, but the referenced text is **explicitly** identified; in such a case there is **no need for review**, unless administrations wish to consider changing the character of the referenced text.

e) The reference to a Recommendation is of a **non-mandatory** character, but the referenced text is **not explicitly** identified; in such a case there is **no need for review**, unless administrations wish to consider changing the character of the referenced text.

f) The reference to a Recommendation is of an **undefined** character, but the referenced text is **explicitly** identified; in such a case, there is a **need to review** the reference with a view to indicating the character of the referenced text (i.e., mandatory or non-mandatory).

g) The reference to a Recommendation is of an **undefined** character, but the referenced text is **not explicitly** identified; in such a case, there is a **need to review** the reference with a view to indicating the character of the referenced text (i.e., mandatory or non-mandatory) and, if necessary, **to identify** the referenced text explicitly.

2 Provisions of category A (see paragraph 1 above)

No.	Text (RR-98)	Possible action
S5.287	In the maritime mobile service, the frequencies 457.525 MHz, 457.550 MHz, 457.575 MHz, 467.525 MHz, 467.550 MHz and 467.575 MHz may be used by on-board communication stations. Where needed, equipment designed for 12.5 kHz channel spacing using also the additional frequencies 457.5375 MHz, 457.5625 MHz, 467.5375 MHz and 467.5625 MHz may be introduced for on-board communications. The use of these frequencies in territorial waters may be subject to the national regulations of the administration concerned. The characteristics of the equipment used shall conform to those specified in Recommendation ITU-R M.1174 (see Resolution **341 (WRC-97)**). (WRC-97)	NOC
S5.288	In the territorial waters of the United States and the Philippines, the preferred frequencies for use by on-board communication stations shall be 457.525 MHz, 457.550 MHz, 457.575 MHz and 457.600 MHz paired, respectively, with 467.750 MHz, 467.775 MHz, 467.800 MHz and 467.825 MHz. The characteristics of the equipment used shall conform to those specified in Recommendation ITU-R M.1174.	NOC
S5.391	In making assignments to the mobile service in the bands 2 025-2 110 MHz and 2 200-2 290 MHz, administrations shall not introduce high-density mobile systems, as described in Recommendation ITU-R SA.1154, and shall take that Recommendation into account for the introduction of any other type of mobile system. (WRC-97)	NOC *Note: Recommendation ITU-R SA.1154 has to be included in any further revision of Annex 4 to Resolution* ***27****, as well as in Volume 4 of the RR.*

S5.511C	Stations operating in the aeronautical radionavigation service shall limit the effective e.i.r.p. in accordance with Recommendation ITU-R S.1340. The minimum coordination distance required to protect the aeronautical radionavigation stations (No. **S4.10** applies) from harmful interference from feeder-link earth stations and the maximum e.i.r.p. transmitted towards the local horizontal plane by a feeder-link earth station shall be in accordance with Recommendation ITU-R S.1340. (WRC-97)	NOC *Note: Recommendation ITU-R S.1340 has to be included in any further revision of Annex 4 to Resolution* ***27****, as well as in Volume 4 of the RR.*
S19.38	§ 19 1) Each administration shall choose the call signs and, if the selective calling system used is in accordance with Recommendation ITU-R M.257-3, the ship station selective call numbers and the coast station identification numbers of its stations from the international series allocated or supplied to it; and shall notify this information to the Secretary-General together with the information which is to appear in Lists I, IV, V, VI and VIIIA. These notifications do not include call signs assigned to amateur and experimental stations.	§ 19 1) Each administration shall choose the call signs and, <u>where appropriate,</u> ~~if the selective calling system used is in accordance with Recommendation ITU-R M.257-3,~~ the ship station selective call numbers and the coast station identification numbers of its stations from the international series allocated or supplied to it; and shall notify this information to the Secretary-General together with the information which is to appear in Lists I, IV, V, VI and VIIIA. These notifications do not include call signs assigned to amateur and experimental stations. *Justification: The emphasis of this provision is on the selection of the means of identities, and not on the technical characteristics. They are dealt with in No.* ***S54.2****.*
S19.48	*b)* [shall not be used as call signs:] combinations reserved for the abbreviations to be used in the radiocommunication services (see Recommendation ITU-R M.1172).	*b)* [shall not be used as call signs:] combinations reserved for the abbreviations to be used in the radiocommunication services<u>, which are in accordance with</u> ~~(see~~ Recommendation ITU-R M.1172~~)~~.
S19.92	§ 38 1) In cases where selective call numbers for ship stations and identification numbers for coast stations are required for use in the maritime mobile service and the selective calling system is in accordance with Recommendation ITU-R M.257-3, the selective call numbers and identification numbers shall be supplied by the Secretary-General on request. Upon notification by an administration of the introduction of selective calling for use in the maritime mobile service:	§ 38 1) In <u>the</u> case where <u>the sequential single frequency</u> selective<u>-calling system is used,</u> ~~call numbers for ship stations and identification numbers for coast stations are required for use in the maritime mobile service and the selective calling system is in accordance with Recommendation ITU-R M.257-3,~~ the selective call numbers and identification numbers shall be supplied by the Secretary-General on request. Upon notification by an administration of the introduction of selective calling for use in the maritime mobile service:

S22.5A	§ 5 In the frequency band 6 700-7 075 MHz, the maximum aggregate power flux-density produced at the geostationary-satellite orbit and within ±5° of inclination around the geostationary-satellite orbit by a non-geostationary-satellite system in the fixed-satellite service shall not exceed –168 dB(W/m^2) in any 4 kHz band. The maximum aggregate power flux-density shall be calculated in accordance with Recommendation ITU-R S.1256. (WRC-97)	NOC *Note: Recommendation ITU-R S.1256 has to be included in any further revision of Annex 4 to Resolution **27**, as well as in Volume 4 of the RR.*
S22.5C	§ 6 1) The equivalent power flux-density[2], at any point on the Earth's surface visible from the geostationary-satellite orbit, produced by emissions from all the space stations of a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Table **S22-1**, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the limits given in Table **S22-1** for the given percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions, into a reference antenna and in the reference bandwidth specified in Table **S22-1**, for all pointing directions towards the geostationary-satellite orbit. (WRC-97)	NOC *Note: Table **S22-1** contains reference to Recommendation ITU-R BO.1213, which is already included in Volume 4 of the RR.*
S47.26	§ 8 1) The holder of a radiocommunication general operator's certificate or a first- or second-class radiotelegraph operator's certificate is authorized to embark as chief operator of a ship station of the fourth category (see Recommendation ITU-R M.1169).	§ 8 1) The holder of a radiocommunication general operator's certificate or a first- or second-class radiotelegraph operator's certificate is authorized to embark as chief operator of a ship station of the fourth category, as defined in ~~(see~~ Recommendation ITU-R M.1169~~)~~.

[2] **S22.5C.1** (Not reproduced).

S47.27	2) However, before becoming chief or sole operator of a ship station of the fourth category (see Recommendation ITU-R M.1169) which is required by international agreements to carry a radiotelegraph operator, the holder of a radiocommunication general operator's certificate or a first- or second-class radiotelegraph operator's certificate shall have had adequate experience as operator on board ship at sea.	2) However, before becoming chief or sole operator of a ship station of the fourth category, as defined in ~~(see~~ Recommendation ITU-R M.1169~~,)~~ which is required by international agreements to carry a radiotelegraph operator, the holder of a radiocommunication general operator's certificate or a first- or second-class radiotelegraph operator's certificate shall have had adequate experience as operator on board ship at sea.
S47.28	3) Before becoming chief operator of a ship station of the second or third category (see Recommendation ITU-R M.1169), the holder of a radiocommunication general operator's certificate or a first- or second-class radiotelegraph operator's certificate shall have had, as operator on board ship or in a coast station, at least six months' experience of which at least three months shall have been on board ship.	3) Before becoming chief operator of a ship station of the second or third category, as defined in ~~(see~~ Recommendation ITU-R M.1169~~)~~, the holder of a radiocommunication general operator's certificate or a first- or second-class radiotelegraph operator's certificate shall have had, as operator on board ship or in a coast station, at least six months' experience of which at least three months shall have been on board ship.
S47.29	4) Before becoming chief operator of a ship station of the first category (see Recommendation ITU-R M.1169), the holder of a radiocommunication general operator's certificate or a first-class radiotelegraph operator's certificate shall have had, as operator on board ship or in a coast station, at least one year's experience of which at least six months shall have been on board ship.	4) Before becoming chief operator of a ship station of the first category, as defined in Recommendation ITU-R M.1169, the holder of a radiocommunication general operator's certificate or a first-class radiotelegraph operator's certificate shall have had, as operator on board ship or in a coast station, at least one year's experience of which at least six months shall have been on board ship.
S50.9	§ 5 The services of ship stations for international public correspondence shall be provided in accordance with the provisions of Recommendation ITU-R M.1169.	NOC
S51.35	*b)* send and receive class F1B or J2B emissions on an international calling channel (see Recommendation ITU-R M.541-8) in each of the HF maritime mobile bands necessary for their service;	*b)* send and receive class F1B or J2B emissions on an international calling channel (see Part A of Appendix S17 ~~Recommendation ITU-R M.541-8~~) in each of the HF maritime mobile bands necessary for their service; *Justification: The emphasis in this provision is on the indication of the relevant frequencies, rather than on the detailed procedures.*

S51.41	2) The characteristics of the narrow-band direct-printing equipment shall be in accordance with Recommendations ITU-R M.476-5, ITU-R M.625-3 and ITU-R M.627-1.	NOC
S51.77	*d)* except as provided in No. **S51.75**, aircraft station transmitters shall comply with the technical characteristics given in Recommendation ITU-R M.489-2;	NOC
S52.25	4) Before transmitting on 500 kHz, stations must listen on this frequency for a reasonable period to make sure that no distress traffic is being sent (see Recommendation ITU-R M.1170).	4) Before transmitting on 500 kHz, stations must listen on this frequency for a reasonable period to make sure that no distress traffic is being sent. ~~(see Recommendation ITU-R M.1170).~~ *Justification: The reference to Recommendation ITU-R M.1170 is redundant as it specifies the same condition in a slightly different language.*
S52.27	§ 11 1) The general calling frequency which, except as provided under Recommendation ITU-R M.492-6, shall be used by any ship station or coast station engaged in radiotelegraphy in the authorized bands between 415 kHz and 535 kHz, and by aircraft stations desiring to enter into communication with a station of the maritime mobile service using frequencies in these bands, is the frequency 500 kHz.	§ 11 1) The general calling frequency which~~, except as provided under Recommendation ITU-R M.492-6,~~ shall be used by any ship station or coast station engaged in radiotelegraphy in the authorized bands between 415 kHz and 535 kHz, and by aircraft stations desiring to enter into communication with a station of the maritime mobile service using frequencies in these bands, is the frequency 500 kHz. However, when using direct-printing telegraphy or similar systems in any of these frequency bands allocated to the maritime mobile service, the call may, by prior arrangement, be made on a working frequency available for such systems. *Justification: The broad reference to Recommendation ITU-R M.492-6 does not provide for sufficient guidance.*

S52.31	§ 13 1) The frequency for replying to a call sent on the general calling frequency (see No. **S52.27**) shall be as follows: – either 500 kHz, – or the frequency specified by the calling station (see No. **S52.29** and Recommendation ITU-R M.1170).	§ 13 1) The frequency for replying to a call sent on the general calling frequency (see No. **S52.27**) shall be as follows: – either 500 kHz, – or the frequency on which the calling station keeps watch, unless the ~~specified by the~~ calling station has specified a frequency for the reply (see No. **S52.29** ~~and Recommendation ITU-R M.1170~~). *Justification: The broad reference to Recommendation ITU-R M.1170 does not provide for sufficient guidance.*
S52.69	§ 28 In order to reduce interference on Morse radiotelegraphy calling frequencies, a coast station shall take adequate steps to ensure, under normal conditions, the prompt receipt of Morse radiotelegraphy calls (see Recommendation ITU-R M.1170).	§ 28 In order to reduce interference on Morse radiotelegraphy calling frequencies, a coast station shall take adequate steps to ensure, under normal conditions, the prompt receipt of Morse radiotelegraphy calls in accordance with ~~(see~~ Recommendation ITU-R M.1170~~)~~.
S52.159	§ 71 1) The frequency 156.525 MHz is an international frequency in the maritime mobile service used for distress, urgency, safety and calling by digital selective-calling techniques (see Nos. **S33.8** and **S33.31**, Appendix **S15** and Recommendation ITU-R M.541-8).	§ 71 1) The frequency 156.525 MHz is an international frequency in the maritime mobile service used for distress, urgency, safety and calling by digital selective-calling techniques (see Nos. **S33.8**, ~~and~~ **S33.31** and **S54.2**, as well as Appendix **S15** ~~and Recommendation ITU-R M.541-8~~). *Justification: With the introduction of the reference to **S54.2**, the reference to Recommendation ITU-R M.541-8 becomes redundant.*
S52.181	§ 85 Single-sideband apparatus in radiotelephone stations of the maritime mobile service operating in the bands allocated to this service between 1 605 kHz and 4 000 kHz and in the bands allocated exclusively to this service between 4 000 kHz and 27 500 kHz shall satisfy the technical and operational conditions specified in Recommendation ITU-R M.1173.	NOC

S52.195	§ 89 1) Before transmitting on the carrier frequency 2 182 kHz, a station shall listen on this frequency for a reasonable period to make sure that no distress traffic is being sent (see Recommendation ITU-R M.1171).	§ 89 1) Before transmitting on the carrier frequency 2 182 kHz, a station shall listen on this frequency for a reasonable period to make sure that no distress traffic is being sent~~ (see Recommendation ITU-R M.1171)~~. *Justification: The reference to Recommendation ITU-R M.1171 is superfluous, as it does not contain any additional information in this respect.*
S52.222.1	These frequencies may also be used by coast stations with class H2B emission, when using the selective calling system defined in Recommendation ITU-R M.257-3.	These frequencies may also be used by coast stations with class H2B emission, when using the <u>sequential single-frequency </u>selective calling system~~ defined in Recommendation ITU-R M.257-3~~.
S52.224	§ 99 1) Before transmitting on the carrier frequencies 4 125 kHz, 6 215 kHz, 8 291 kHz, 12 290 kHz or 16 420 kHz a station shall listen on the frequency for a reasonable period to make sure that no distress traffic is being sent (see Recommendation ITU-R M.1171).	§ 99 1) Before transmitting on the carrier frequencies 4 125 kHz, 6 215 kHz, 8 291 kHz, 12 290 kHz or 16 420 kHz a station shall listen on the frequency for a reasonable period to make sure that no distress traffic is being sent~~ (see Recommendation ITU-R M.1171)~~. *Justification: The reference to Recommendation ITU-R M.1171 is superfluous, as it does not contain any additional information in this respect.*
S52.229	4) The technical characteristics of transmitters used for radiotelephony in the bands between 4 000 kHz and 27 500 kHz are specified in Recommendation ITU-R M.1173.	4) The technical characteristics of <u>single-sideband </u>transmitters used for radiotelephony in the bands between 4 000 kHz and 27 500 kHz <u>shall conform to those </u>~~are~~ specified in Recommendation ITU-R M.1173.
S52.231	§ 101 1) The frequency 156.8 MHz is the international frequency for distress traffic and for calling by radiotelephony when using frequencies in the authorized bands between 156 MHz and 174 MHz (see Appendix **S13** for details of use). The class of emission to be used for radiotelephony on the frequency 156.8 MHz shall be G3E (see Recommendation ITU-R M.489-2).	§ 101 1) The frequency 156.8 MHz is the international frequency for distress traffic and for calling by radiotelephony when using frequencies in the authorized bands between 156 MHz and 174 MHz (see Appendix **S13** for details of use). The class of emission to be used for radiotelephony on the frequency 156.8 MHz shall be G3E~~ (see Recommendation ITU-R M.489-2)~~. *Justification: The reference to Recommendation ITU-R M.489-2 is misleading as it specifies the relevant condition in a different manner (e.g., "the class of emission should be F3E/G3E").*

S52.240	8) Before transmitting on the frequency 156.8 MHz, a station shall listen on this frequency for a reasonable period to make sure that no distress traffic is being sent (see Recommendation ITU-R M.1171).	8) Before transmitting on the frequency 156.8 MHz, a station shall listen on this frequency for a reasonable period to make sure that no distress traffic is being sent~~ (see Recommendation ITU-R M.1171)~~. *Justification: The reference to Recommendation ITU-R M.1171 is superfluous, as it does not contain any additional information in this respect.*
S55.1	The radiotelegraph procedure detailed in Recommendation ITU-R M.1170 is obligatory, except in cases of distress, urgency, or safety, to which the provisions of Appendix **S13** are applicable.	NOC
S57.1	§ 1 The procedure detailed in Recommendation ITU-R M.1171 is applicable to radiotelephone stations, except in cases of distress, urgency or safety, to which the provisions of Appendix **S13** are applicable.	NOC

3 Provisions of category B (see paragraph 1 above)

S1.14	*Coordinated Universal Time (UTC):* Time scale, based on the second (SI), as defined in ITU-R Recommendation ITU-R TF.460-5. For most practical purposes associated with the Radio Regulations, UTC is equivalent to mean solar time at the prime meridian (0° longitude), formerly expressed in GMT.	*Coordinated Universal Time (UTC):* Time scale, based on the second (SI), in accordance with the definition ~~as defined~~ in ITU-R Recommendation ITU-R TF.460-5. For most practical purposes associated with the Radio Regulations, UTC is equivalent to mean solar time at the prime meridian (0° longitude), formerly expressed in GMT.

S5.511A	Use of the band 15.43-15.63 GHz by the fixed-satellite service (space-to-Earth (see Resolution **123 (WRC-97)**) and Earth-to-space) is limited to feeder links of non-geostationary systems in the mobile-satellite service, subject to coordination under No. **S9.11A**. In the space-to-Earth direction, the minimum earth station elevation angle above and gain towards the local horizontal plane and the minimum coordination distances to protect an earth station from harmful interference shall be in accordance with Recommendation ITU-R S.1341. Also in the space-to-Earth direction, harmful interference shall not be caused to stations of the radio astronomy service using the band 15.35-15.4 GHz. The threshold levels of interference and associated power flux-density limits which are detrimental to the radio astronomy service are given in Recommendation ITU-R RA.769-1. Special measures will need to be employed to protect the radio astronomy service in the band 15.35-15.4 GHz. (WRC-97)	NOC
S52.23	*b)* by coast stations to announce by means of Morse telegraphy the transmission of their traffic lists under the conditions provided for in Recommendation ITU-R M.1170.	*b)* by coast stations to announce by means of Morse telegraphy the transmission of their traffic lists to all stations, in accordance with ~~under the conditions provided for in~~ Recommendation ITU-R M.1170.
S52.235	3) The frequency 156.8 MHz may be used by ship stations and coast stations for selective calling as defined in Recommendation ITU-R M.257-3.	3) The frequency 156.8 MHz may be used by ship stations and coast stations for selective calling using the sequential single frequency calling system.~~as defined in Recommendation ITU-R M.257-3.~~

4 Provisions of category C (see paragraph 1 above)

S3.2	Also, as far as is compatible with practical considerations, the choice of transmitting, receiving and measuring equipment shall be based on the most recent advances in the technique as indicated, *inter alia*, in ITU-R Recommendations.	Also, as far as is compatible with practical considerations, the choice of transmitting, receiving and measuring equipment should ~~shall~~ be based on the most recent advances in the technique as indicated, *inter alia*, in ITU-R Recommendations. *Justification: The combination "as far as..." and "shall" is inherently inconsistent.*
S5.138	The following bands: 6 765-6 795 kHz (centre frequency 6 780 kHz), 433.05-434.79 MHz (centre frequency 433.92 MHz) in Region 1 except in the countries mentioned in No. **S5.280**, 61-61.5 GHz (centre frequency 61.25 GHz), 122-123 GHz (centre frequency 122.5 GHz), and 244-246 GHz (centre frequency 245 GHz) are designated for industrial, scientific and medical (ISM) applications. The use of these frequency bands for ISM applications shall be subject to special authorization by the administration concerned, in agreement with other administrations whose radiocommunication services might be affected. In applying this provision, administrations shall have due regard to the latest relevant ITU-R Recommendations.	The following bands: 6 765-6 795 kHz (centre frequency 6 780 kHz), 433.05-434.79 MHz (centre frequency 433.92 MHz) in Region 1 except in the countries mentioned in No. **S5.280**, 61-61.5 GHz (centre frequency 61.25 GHz), 122-123 GHz (centre frequency 122.5 GHz), and 244-246 GHz (centre frequency 245 GHz) are designated for industrial, scientific and medical (ISM) applications. The use of these frequency bands for ISM applications shall be subject to special authorization by the administration concerned, in agreement with other administrations whose radiocommunication services might be affected. ~~In applying this provision, administrations shall have due regard to the latest relevant ITU-R Recommendations.~~ *Justification: The deleted phrase has no regulatory implications as it does not indicate any specific Recommendation.*

S5.458C	Administrations making submissions in the band 7 025-7 075 MHz (Earth-to-space) for geostationary-satellite systems in the fixed-satellite service after 17 November 1995 shall consult on the basis of relevant ITU-R Recommendations with the administrations that have notified and brought into use non-geostationary-satellite systems in this frequency band before 18 November 1995 upon request of the latter administrations. This consultation shall be with a view to facilitating shared operation of both geostationary-satellite systems in the fixed-satellite service and non-geostationary-satellite systems in this band.	Administrations making submissions in the band 7 025-7 075 MHz (Earth-to-space) for geostationary-satellite systems in the fixed-satellite service after 17 November 1995 shall consult ~~on the basis of relevant ITU-R Recommendations~~ with the administrations that have notified and brought into use non-geostationary-satellite systems in this frequency band before 18 November 1995 upon request of the latter administrations. This consultation shall be with a view to facilitating shared operation of both geostationary-satellite systems in the fixed-satellite service and non-geostationary-satellite systems in this band. *Justification: The emphasis in this provision is on consultation. It is obvious that the administrations will use the relevant ITU-R Recommendations in such consultations.*
S13.13	The Rules of Procedure shall include, inter alia, calculation methods and other data required for the application of these Regulations. These shall be based upon the decisions of world radiocommunication conferences and the Recommendations of the Radiocommunication Sector. Where requirements arise for new data for which there are no such decisions or Recommendations the Bureau shall develop such data in accordance with No. **S13.14**, and shall revise them when appropriate decisions or Recommendations are available.	NOC
S21.1	§ 1 Sites and frequencies for terrestrial stations and earth stations, operating in frequency bands shared with equal rights between terrestrial radiocommunication and space radiocommunication services, shall be selected having regard to the relevant ITU-R Recommendations with respect to geographical separation between earth stations and terrestrial stations.	§ 1 Sites and frequencies for terrestrial stations and earth stations, operating in frequency bands shared with equal rights between terrestrial radiocommunication and space radiocommunication services, <u>should</u> ~~shall~~ be selected having regard to the relevant ITU-R Recommendations with respect to geographical separation between earth stations and terrestrial stations. *Justification: The linking mandatory language ("shall") is inoperative in view of the lack of explicit references.*

S29.13	§ 10 Administrations shall take note of the relevant ITU-R Recommendations with the aim of limiting interference to the radio astronomy service from other services.	§ 10 Administrations are urged to ~~shall~~ take note of the relevant ITU-R Recommendations with the aim of limiting interference to the radio astronomy service from other services.
S32.5	§ 4 Digital selective calling shall be in accordance with the relevant ITU-R Recommendations.	SUP *Justification: This provision is redundant, as No.* ***S54.2*** *contains the necessary information in a clear and explicit manner.*
S32.9.3	The format of distress calls and distress messages shall be in accordance with the relevant ITU-R Recommendations (see Resolution **27 (Rev.WRC-97)**).	The format of distress calls and distress messages shall be in accordance with the relevant ITU-R Recommendations (see Resolution **27 (Rev.WRC-97)**). *Note: The linking mandatory language ("shall") is inoperative in view of the lack of explicit references. The relevant ITU-R Recommendations are M.493-9 (for DSC), M.632-3 (for satellite EPIRBs in the 1.6 GHz band) and M.633-1 (for satellite EPIRBs in the 406 MHz band).*
S32.21	§ 13 Acknowledgement by digital selective calling of receipt of a distress alert in the terrestrial services shall be in accordance with relevant ITU-R Recommendations (see Resolution **27 (Rev.WRC-97)**).	SUP *Justification: This provision is redundant, as No.* ***S54.2*** *contains the necessary information in a clear and explicit manner.*
S32.43	§ 27 1) Error correction techniques in accordance with relevant ITU-R Recommendations shall be used for distress traffic by direct-printing telegraphy. All messages shall be preceded by at least one carriage return, a line feed signal, a letter shift signal and the distress signal MAYDAY.	§ 27 1) Error correction techniques ~~in accordance with relevant ITU-R Recommendations~~ shall be used for distress traffic by direct-printing telegraphy. All messages shall be preceded by at least one carriage return, a line feed signal, a letter shift signal and the distress signal MAYDAY. *Justification: The reference to ITU-R Recommendations in this provision is redundant as No.* ***S51.41*** *contains the necessary information in a clear and explicit manner (mandatory incorporation by reference).*

S32.64	4) Locating signals shall be in accordance with the relevant ITU-R Recommendations (see Resolution 27 **(Rev.WRC-97)**).	SUP *Justification: The linking mandatory language ("shall") is inoperative in view of the lack of explicit references.*
S33.17	§ 9 1) Error correction techniques in accordance with relevant ITU-R Recommendations shall be used for urgency messages by direct-printing telegraphy. All messages shall be preceded by at least one carriage return, a line feed signal, a letter shift signal and the urgency signal PAN PAN.	§ 9 1) Error correction techniques ~~in accordance with relevant ITU-R Recommendations~~ shall be used for urgency messages by direct-printing telegraphy. All messages shall be preceded by at least one carriage return, a line feed signal, a letter shift signal and the urgency signal PAN PAN. *Justification: The reference to ITU-R Recommendations in this provision is redundant as No.* ***S51.41*** *contains the necessary information in a clear and explicit manner (mandatory incorporation by reference).*
S33.37	§ 20 1) Error correction techniques in accordance with relevant ITU-R Recommendations shall be used for safety messages by direct-printing telegraphy. All messages shall be preceded by at least one carriage return, a line feed signal, a letter shift signal and the safety signal SECURITE.	§ 20 1) Error correction techniques ~~in accordance with relevant ITU-R Recommendations~~ shall be used for safety messages by direct-printing telegraphy. All messages shall be preceded by at least one carriage return, a line feed signal, a letter shift signal and the safety signal SECURITE. *Justification: The reference to ITU-R Recommendations in this provision is redundant as No.* ***S51.41*** *contains the necessary information in a clear and explicit manner (mandatory incorporation by reference).*
S33.41	§ 22 The mode and format of the transmissions mentioned in Nos. **S33.43**, **S33.45**, **S33.46** and **S33.48** shall be in accordance with the relevant ITU-R Recommendations.	SUP *Justification: The linking mandatory language ("shall") is inoperative in view of the lack of explicit references. This provision is redundant as No.* ***S51.41*** *contains the necessary information in a clear and explicit manner (mandatory incorporation by reference).*
S34.1	§ 1 The emergency position-indicating radiobeacon signal transmitted on 156.525 MHz and satellite EPIRB signals in the band 406-406.1 MHz or 1 645.5-1 646.5 MHz shall be in accordance with relevant ITU-R Recommendations (see Resolution 27 **(Rev.WRC-97)**).	SUP *Justification: The linking mandatory language ("shall") is inoperative in view of the lack of explicit references.*

S34.2	§ 2 The characteristics of the "distress call" (see No. **S32.9**) in the digital selective calling system shall be in accordance with relevant ITU-R Recommendations (see Resolution 27 **(Rev.WRC-97)**).	SUP *Justification: This provision is redundant, as No.* ***S54.2*** *contains the necessary information in a clear and explicit manner.*
S51.25	§ 12 The characteristics of the digital selective calling equipment shall be in accordance with ITU-R Recommendations (see Resolution 27 **(Rev.WRC-97)**).	SUP *Justification: This provision is redundant, as No.* ***S54.2*** *contains the necessary information in a clear and explicit manner.*
S52.112	§ 51 The characteristics of the digital selective-calling equipment shall be in accordance with the relevant ITU-R Recommendations (see Resolution 27 **(Rev.WRC-97)**).	SUP *Justification: This provision is redundant, as No.* ***S54.2*** *contains the necessary information in a clear and explicit manner.*
S58.1	The provisions of the International Telecommunications Regulations, taking into account ITU-T Recommendations, shall apply.	NOC

5 Provisions of category D (see paragraph 1 above)

S5.208A	In making assignments to space stations in the mobile-satellite service in the bands 137-138 MHz, 387-390 MHz and 400.15-401 MHz, administrations shall take all practicable steps to protect the radio astronomy service in the bands 150.05-153 MHz, 322-328.6 MHz, 406.1-410 MHz and 608-614 MHz from harmful interference from unwanted emissions. The threshold levels of interference detrimental to the radio astronomy service are shown in Table 1 of Recommendation ITU-R RA.769-1. (WRC-97)	NOC

S5.503A	Until 1 January 2000, stations in the fixed-satellite service shall not cause harmful interference to non-geostationary space stations in the space research and Earth exploration-satellite services. After that date, these non-geostationary space stations will operate on a secondary basis in relation to the fixed-satellite service. Additionally, when planning earth stations in the fixed-satellite service to be brought into service between 1 January 2000 and 1 January 2001, in order to accommodate the needs of spaceborne precipitation radars operating in the band 13.793-13.805 GHz, advantage should be taken of the consultation process and the information given in Recommendation ITU-R SA.1071.	NOC
S5.536A	Administrations installing earth exploration-satellite earth stations cannot claim protection from fixed and mobile stations operated by neighbouring administrations. In addition, earth stations operating in the earth exploration-satellite service should take into account Recommendation ITU-R SA.1278. (WRC-97)	NOC *Note: Recommendation ITU-R SA.1278 has to be included in any further revision of Annex 4 to Resolution **27**, but not in Volume 4 of the RR.*
S16.6	Administrative and procedural requirements for use and operation of the international monitoring system should be in accordance with the provisions of Recommendation ITU-R SM.1139.	NOC
S21.2.2 **S21.4.1**	Information on this subject is given in the most recent version of Recommendation ITU-R SF.765 (see Resolution **27 (Rev.WRC-97)**).	<u>For calculation of the separation angles between radio-relay antenna beams and the geostationary-satellite orbits, administrations may use</u> ~~Information on this subject is given in~~ the most recent version of Recommendation ITU-R SF.765 ~~(see Resolution 27 (Rev.WRC-97))~~.
S29.12	§ 9 In applying the measures outlined in this Section, administrations are urged to bear in mind that the radio astronomy service is extremely susceptible to interference from space and airborne transmitters (for further information, see Recommendation ITU-R RA.769).	NOC
S32.7	§ 6 The Phonetic Alphabet and Figure Code in Appendix **S14** and the abbreviations and signals in accordance with Recommendation ITU-R M.1172 should be used where applicable[1].	NOC

S51.71	§ 28 In the case of communication between stations on board aircraft and stations of the maritime mobile service, radiotelephone calling may be renewed as specified in Recommendation ITU-R M.1171 and radiotelegraph calling may be renewed after an interval of five minutes, notwithstanding Recommendation ITU-R M.1170.	§ 28 In the case of communication between stations on board aircraft and stations of the maritime mobile service, radiotelephone calling may be renewed ~~as specified in Recommendation ITU-R M.1171~~ under the following conditions: 1) when a station called does not reply to a call sent three times at intervals of two minutes, the calling shall cease; 2) however, when a station called does not reply, the call may be repeated at three minute intervals. § 28A In the case of communication between stations on board aircraft and stations of the maritime mobile service, ~~and~~ radiotelegraph calling may be renewed after an interval of five minutes.~~, notwithstanding Recommendation ITU-R M.1170.~~ *Justification: Provision Nos.* ***S55.1*** *and* ***S57.1*** *make a clear and explicit reference to the mandatory character of the procedures referred to in Recommendations ITU-R M.1170 and ITU-R M.1171. The current linking provision in No.* ***S51.71*** *("may") gives the impression of a non-mandatory character, although the procedures of Recommendation ITU-R M.1170 are mandatory.*
S52.32	2) In regions of heavy traffic, coast stations may answer calls made by ship stations of their own nationality in accordance with special arrangements made by the administration concerned (see Recommendation ITU-R M.1170).	2) In regions of heavy traffic, coast stations may answer calls made by ship stations of their own nationality in accordance with special arrangements made by the administration concerned ~~(see Recommendation ITU-R M.1170)~~. *Justification: The emphasis in this provision is on the national arrangements. The reference to Recommendation ITU-R M.1170 is superfluous as provision No.* ***S55.1*** *makes a clear and explicit reference to the mandatory character of the procedures referred to in Recommendation ITU-R M.1170.*

S52.63	2) So far as is practicable, a coast station shall transmit its calls at specified times in the form of traffic lists on the frequency or frequencies indicated in the List of Coast Stations (see Recommendation ITU-R M.1170).	2) So far as is practicable, a coast station shall transmit its calls at specified times in the form of traffic lists on the frequency or frequencies indicated in the List of Coast Stations~~ (see Recommendation ITU-R M.1170)~~. *Justification: The reference to Recommendation ITU-R M.1170 is superfluous as provision No.* ***S55.1*** *makes a clear and explicit reference to the mandatory character of the procedures referred to in Recommendation ITU-R M.1170.*
S52.148	*b)* subject to the provisions of No. **S52.149**, one of the international digital selective-calling frequencies indicated in Recommendation ITU-R M.541-8.	*b)* subject to the provisions of No. **S52.149**, one of the international digital selective-calling frequencies indicated in Part A of Appendix **S17**. ~~Recommendation ITU-R M.541-8.~~
S52.152	*b)* subject to the provisions of No. **S52.153**, one of the international digital selective-calling frequencies indicated in Recommendation ITU-R M.541-8.	*b)* subject to the provisions of No. **S52.153**, one of the international digital selective-calling frequencies indicated in Part A of Appendix **S17**. ~~Recommendation ITU-R M.541-8.~~
S52.153	2) The international digital selective-calling frequencies indicated in Recommendation ITU-R M.541-8 may be assigned to any coast station. In order to reduce interference on these frequencies, they may be used as a general rule by coast stations to call ships of another nationality, or in cases where it is not known on which digital selective-calling frequencies within the bands concerned the ship station is maintaining watch.	2) The international digital selective-calling frequencies indicated in Part A of Appendix **S17** ~~Recommendation ITU-R M.541-8~~ may be assigned to any coast station. In order to reduce interference on these frequencies, they may be used as a general rule by coast stations to call ships of another nationality, or in cases where it is not known on which digital selective-calling frequencies within the bands concerned the ship station is maintaining watch.
S52.234	*b)* by coast stations to announce the transmission on another frequency of traffic lists and important maritime information (see Recommendation ITU-R M.1171).	*b)* by coast stations to announce the transmission on another frequency of traffic lists and important maritime information~~ (see Recommendation ITU-R M.1171)~~. *Justification: The broad reference to Recommendation ITU-R M.1171 does not serve any useful purpose. In any case, Recommendation ITU-R M.1171 is of a mandatory character, as specified in No.* ***S57.1***.

S54.2	2) Selective calling may be carried out using a sequential single-frequency code system in accordance with Recommendation ITU-R M.257-3 or a digital selective-calling system in accordance with Recommendations ITU-R M.493-9, ITU-R M.541-8, ITU-R M.821-1 and ITU-R M.825-2 in the shore-to-ship, ship-to-shore and ship-to-ship directions.	2) Selective calling shall ~~may~~ be carried out using either a sequential single-frequency code system in accordance with Recommendation ITU-R M.257-3 or a digital selective-calling system in accordance with Recommendations ITU-R M.493-9, ITU-R M.541-8, ITU-R M.821-1 and ITU-R M.825-2 in the shore-to-ship, ship-to-shore and ship-to-ship directions. *Justification: The current wording of this provision makes unclear its character. The proposed amendment removes that ambiguity, by specifying the mandatory character of either procedure with explicit references of the relevant ITU-R Recommendations.*
S56.2	§ 2 The procedures specified in Recommendation ITU-R M.492-6 should be employed except in cases of distress, urgency, or safety, in which case alternate or non-standard procedures may be used.	NOC

6 Provisions of category E (see paragraph 1 above)

S1.156	*power:* Whenever the power of a radio transmitter, etc. is referred to it shall be expressed in one of the following forms, according to the class of *emission*, using the arbitrary symbols indicated: – *peak envelope power* (*P*X or *p*X); – *mean power* (*P*Y or *p*Y); – *carrier power* (*P*Z or *p*Z). For different *classes of emission*, the relationships between *peak envelope power*, *mean power* and *carrier power*, under the conditions of normal operation and of no modulation, are contained in ITU-R Recommendations which may be used as a guide. For use in formulae, the symbol *p* denotes power expressed in watts and the symbol *P* denotes power expressed in decibels relative to a reference level.	NOC

S3.4	To the maximum extent possible, equipment to be used in a station should apply signal processing methods which enable the most efficient use of the frequency spectrum in accordance with the relevant ITU-R Recommendations. These methods include, *inter alia*, certain bandwidth expansion techniques, and in particular, in amplitude-modulation systems, the use of the single-sideband technique.	NOC
S3.7	Transmitting stations shall conform to the maximum permitted power levels for out-of-band emissions specified for certain services and classes of emission in the present Regulations. In the absence of such specified maximum permitted power levels transmitting stations should, to the maximum extent possible, satisfy the requirements relating to the limitation of the out-of-band emissions specified in the most recent ITU-R Recommendations (see Resolution 27 **(Rev.WRC-97)**).	NOC
S3.14	To ensure compliance with these Regulations, administrations shall arrange for frequent checks to be made of the emissions of stations under their jurisdiction. For this purpose, they shall use the means indicated in Article **S16**, if required. The technique of measurements and the intervals of measurements to be employed shall be, as far as is practicable, in accordance with the most recent ITU-R Recommendations.	To ensure compliance with these Regulations, administrations shall arrange for frequent checks to be made of the emissions of stations under their jurisdiction. For this purpose, they shall use the means indicated in Article **S16**, if required. The technique of measurements and the intervals of measurements to be employed should~~shall~~ be, as far as is practicable, in accordance with the most recent ITU-R Recommendations. *Justification: The combination "as far as..." and "shall" is inherently inconsistent.*
S5.474	In the band 9 200-9 500 MHz, search and rescue transponders (SART) may be used, having due regard to the appropriate ITU-R Recommendation (see also Article **S31**).	NOC

S9.50.1	In the absence of specific provisions in these Regulations relating to the evaluation of interference, the calculation methods and the criteria should be based on relevant ITU-R Recommendations agreed by the administrations concerned. In the event of disagreement on a Recommendation or in the absence of such a Recommendation, the methods and criteria shall be agreed between the administrations concerned. Such agreements shall be concluded without prejudice to other administrations.	NOC
S15.10	§ 6 The out-of-band emissions of transmitting stations should not cause harmful interference to services which operate in adjacent bands in accordance with these Regulations and which use receivers in conformity with Nos. **S3.3**, **S3.11**, **S3.12**, **S3.13** and relevant ITU-R Recommendations.	§ 6 The out-of-band emissions of transmitting stations should not cause harmful interference to services which operate in adjacent bands in accordance with these Regulations and which use receivers in conformity with Nos. **S3.3**, **S3.11**, **S3.12**~~,~~ and **S3.13**.~~and relevant ITU-R Recommendations.~~ *Justification: The broad reference to "relevant ITU-R Recommendations", with no explicit specification of the relevant references, does not serve any useful purpose.*
S15.12.1 **S15.13.1**	In this matter, administrations should be guided by the latest relevant ITU-R Recommendation.	NOC
S16.1	To assist to the extent practicable in the implementation of these Regulations, in particular to help ensure efficient and economical use of the radio-frequency spectrum and to help in the prompt elimination of harmful interference, administrations agree to continue the development of monitoring facilities and, to the extent practicable, to cooperate in the continued development of the international monitoring system, taking into account the relevant ITU-R Recommendations.[1]	NOC
S19.3	2) Where practicable and in appropriate services, identification signals should be automatically transmitted in accordance with relevant ITU-R Recommendations.	NOC

S19.23	§ 6 To the extent possible the identification signal should be transmitted in accordance with relevant ITU-R Recommendations.	NOC
S19.24	§ 7 Administrations should ensure that wherever practicable superimposed identification methods be employed in accordance with ITU-R Recommendations.	NOC
S19.35	§ 16 The Secretary-General shall be responsible for allocating additional maritime identification digits (MIDs) to administrations within the limits specified[2], provided that he is satisfied that the possibilities offered by the MIDs allocated to an administration will soon be exhausted despite judicious ship station identity assignment as outlined in Section VI, which should be in conformity with the relevant ITU-R and ITU-T Recommendations.	NOC
S19.99	§ 39 When a station[5] in the maritime mobile service or the maritime mobile-satellite service is required to use maritime mobile service identities, the responsible administration shall assign the identity to the station in accordance with the provisions described in Nos. **S19.100** to **S19.126**; in so doing, it should take into account the relevant ITU-R and ITU-T Recommendations. In accordance with No. **S20.16**, administrations shall notify the Bureau immediately when assigning maritime mobile service identities.	NOC
S19.112	*a)* [Administrations should] follow the guidelines contained in the relevant ITU-R and ITU-T Recommendations for the assignment of ship station identities;	NOC

[2] **S19.35.1** (Not reproduced).

[5] **S19.99.1** (Not reproduced).

S19.115	*d)* [Administrations should] assign one-trailing-zero or two-trailing-zero identities to vessels when they require automatic access only on a national or regional level, as defined in the relevant ITU-T Recommendations;	NOC
S19.126	2) The MID represents only the territory or geographical area of the administration assigning the group coast station call identity. The identity may be assigned to stations of one administration which are located in only one geographical region as indicated in the relevant ITU-T Recommendations.	NOC
S21.6.1 **S21.12.1** **S21.16.1**	The equality of right to operate when a band of frequencies is allocated in different Regions to different services of the same category is established in No. **S4.8**. Therefore any limits concerning inter-Regional interference which may appear in ITU-R Recommendations should, as far as practicable, be observed by administrations.	NOC
A.S22.1	In applying the provisions of this Article, the level of accepted interference (see No. **S1.168**) shall be fixed by agreement between the administrations concerned, using the relevant ITU-R Recommendations as a guide.	NOC
S22.22.2	The level of harmful interference is determined by agreement between the administrations concerned, with the guidance of the relevant ITU-R Recommendations.	NOC
S30.1	§ 1 This Chapter contains the provisions for the operational use of the global maritime distress and safety system (GMDSS), which is fully defined in the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended. Distress, urgency and safety transmissions may also be made, using Morse telegraphy or radiotelephony techniques, in accordance with the provisions of Appendix **S13** and relevant ITU-R Recommendations. Stations of the maritime mobile service, when using frequencies and techniques in conformity with Appendix **S13**, shall comply with the appropriate provisions of that Appendix.	NOC

S56.7	§ 6 Where transmission over the telecommunication channels open to public correspondence (excluding the telecommunication channels of the mobile service and of the mobile-satellite service and its feeder links) is involved, the provisions of the International Telecommunication Regulations and the relevant ITU-T Recommendations should be taken into account.	NOC

7 Provisions of category F (see paragraph 1 above)

S16.2	The international monitoring system comprises only those monitoring stations which have been so nominated by administrations in the information sent to the Secretary-General in accordance with Recommendation ITU-R SM.1139. These stations may be operated by an administration or, in accordance with an authorization granted by the appropriate administration, by a public or private enterprise, by a common monitoring service established by two or more countries, or by an international organization.	The international monitoring system comprises only those monitoring stations which have been so nominated by administrations in the information sent to the Secretary-General, following the guidelines indicated in ~~accordance with~~ Recommendation ITU-R SM.1139. These stations may be operated by an administration or, in accordance with an authorization granted by the appropriate administration, by a public or private enterprise, by a common monitoring service established by two or more countries, or by an international organization. *Justification: As the original linkage language is unclear, the proposed modification is intended to indicate the non-mandatory character of the referenced text.*

S19.83	§ 36 When stations of the maritime mobile service use selective calling devices in accordance with Recommendations ITU-R M.257-3, ITU-R M.476-5, ITU-R M.625-3 and ITU-R M.627-1, their call numbers shall be assigned by the responsible administrations in accordance with the provisions below.	§ 36 When <u>a</u> station~~s~~ of the maritime mobile service <u>is required to</u> use selective calling devices<u>, either for sequential single frequency calling equipment or for narrow-band direct printing equipment,</u>~~in accordance with Recommendations ITU-R M.257-3, ITU-R M.476-5, ITU-R M.625-3 and ITU-R M.627-1, their call numbers shall be assigned by~~ the responsible administration~~s~~ <u>shall assign call numbers to the stations</u> in accordance with the provisions below. *Justification: As the original linkage language is unclear, the proposed modification is intended to clarify the provision, without making references to the ITU-R Recommendations. The mandatory character of these Recommendations is indicated in Nos.* ***S54.2*** *(for SSFC) and in* ***S51.41*** *(for NBDP).*
S19.96A	3) Five-digit ship station selective call numbers are assigned to sequential single frequency selective calling (SSFC) equipment (as described in Recommendation ITU-R M.257-3) for calling in radiotelephony and for the phasing in of narrow-band direct printing (NBDP) equipment (as described in Recommendation ITU-R M.476-5). Within one administration the same five-digit number may be used: – for identification of ship stations fitted with both SSFC and NBDP equipment; – for identification of ship stations of two different ships fitted with either SSFC or NBDP equipment only.	3) Five-digit ship station selective call numbers are assigned to sequential single frequency selective calling (SSFC) equipment ~~(as described in Recommendation ITU-R M.257-3)~~ for calling in radiotelephony and for the phasing in of narrow-band direct printing (NBDP) equipment ~~(as described in Recommendation ITU-R M.476-5)~~. Within one administration the same five-digit number may be used: – for identification of ship stations fitted with both SSFC and NBDP equipment; – for identification of ship stations of two different ships fitted with either SSFC or NBDP equipment only. *Justification: As the linkage language is not clear, the proposed modification (deletion of references to ITU-R Recommendations) eliminates any ambiguity. The emphasis in this provision is to the use of five-digit numbers. The mandatory character of the relevant ITU-R Recommendations is indicated in Nos.* ***S54.2*** *(for SSCF) and in* ***S51.41*** *(for NBDP).*

S52.149	2) The international digital selective-calling frequencies indicated in Recommendation ITU-R M.541-8 may be used by any ship station. In order to reduce interference on these frequencies, they shall only be used when calling cannot be made on nationally assigned frequencies.	2) The international digital selective-calling frequencies indicated in Appendix **S17** (Part A, Note 1)~~Recommendation ITU-R M.541-8~~ may be used by any ship station. In order to reduce interference on these frequencies, they shall only be used when calling cannot be made on nationally assigned frequencies.
S52.188	4) Transmissions in the bands 2 170-2 173.5 kHz and 2 190.5-2 194 kHz with the carrier frequency 2 170.5 kHz and the carrier frequency 2 191 kHz, respectively, are limited to class J3E emissions and are limited to a peak envelope power of 400 W. However, on the frequency 2 170.5 kHz and with the same power limit, coast stations may also use class H2B emissions when using the selective calling system defined in Recommendation ITU-R M.257-3 and exceptionally, in Regions 1 and 3 and in Greenland, may also use class H3E for safety messages.	4) Transmissions in the bands 2 170-2 173.5 kHz and 2 190.5-2 194 kHz with the carrier frequency 2 170.5 kHz and the carrier frequency 2 191 kHz, respectively, are limited to class J3E emissions and are limited to a peak envelope power of 400 W. However, on the frequency 2 170.5 kHz and with the same power limit, coast stations may also use class H2B emissions when using the sequential single frequency selective calling system~~ defined in Recommendation ITU-R M.257-3~~ and exceptionally, in Regions 1 and 3 and in Greenland, may also use class H3E for safety messages.
S52.192	*b)* by coast stations to announce the transmission, on another frequency, of traffic lists (see Recommendation ITU-R M.1171).	*b)* by coast stations to announce the transmission, on another frequency, of traffic lists to all stations, in accordance with~~(see~~ Recommendation ITU-R M.1171~~)~~. *Justification: The broad reference to Recommendation ITU-R M.1171 is not sufficient.*
S52.213	2) In exceptional circumstances, if frequency usage according to Nos. **S52.203** to **S52.208** or No. **S52.210** is not possible, a ship station may use one of its own assigned national ship-to-shore frequencies for communication with a coast station of another nationality, under the express condition that the coast station as well as the ship station take precautions (see Recommendation ITU-R M.1171) to ensure that the use of such a frequency will not cause harmful interference to the service for which the frequency in question is authorized.	2) In exceptional circumstances, if frequency usage according to Nos. **S52.203** to **S52.208** or No. **S52.210** is not possible, a ship station may use one of its own assigned national ship-to-shore frequencies for communication with a coast station of another nationality, under the express condition that the coast station as well as the ship station take precautions~~ (see Recommendation ITU-R M.1171)~~ to ensure that the use of such a frequency will not cause harmful interference to the service for which the frequency in question is authorized. *Justification: The reference to Recommendation ITU-R M.1171 is redundant as it specifies the same condition in a slightly different language.*

8 Provisions of category G (see paragraph 1 above)

S1.153	*occupied bandwidth:* The width of a frequency band such that, below the lower and above the upper frequency limits, the *mean powers* emitted are each equal to a specified percentage ß/2 of the total *mean power* of a given *emission.* Unless otherwise specified in an ITU-R Recommendation for the appropriate *class of emission*, the value of ß/2 should be taken as 0.5%.	NOC
S1.167	*permissible interference*[3]*:* Observed or predicted *interference* which complies with quantitative *interference* and sharing criteria contained in these Regulations or in ITU-R Recommendations or in special agreements as provided for in these Regulations.	NOC
S26.6	§ 4 In selecting the technical characteristics of standard frequency and time signal transmissions, administrations shall be guided by the relevant ITU-R Recommendations.	§ 4 ~~In selecting the t~~Technical characteristics of standard frequency and time signal transmissions should be selected having due regard to ~~, administrations shall be guided by~~ the relevant ITU-R Recommendations. *Justification: As the original linkage language is unclear, the proposed modification is intended to indicate the non-mandatory character of the referenced text.*

ANNEX 6 TO CHAPTER 7

Example of hard pfd limits (Approach 1)

Under this approach, in order to protect the terrestrial services, the following pfd levels would be established. With respect to the examination of the FSS assignments under **S11.31** in Region 2, the following pfd values are not to be exceeded in any 4 kHz band, on the territory of any administration having frequency assignments in a band shared with equal rights to space and terrestrial radiocommunication services:

-148	dB(W/m^2) in 4 kHz	for 0° < θ = 5°
-148 + 0.5 (θ-5)	dB(W/m^2) in 4 kHz	for 5° = θ = 25°
-138	dB(W/m^2) in 4 kHz	for 25° = θ = 90°

where θ is the angle of arrival (degrees) on the surface of the Earth.*

It is to be noted that these levels constitute the hard limits currently contained in **S21.16** for a non-geostationary satellite network in relation to the terrestrial service.

ANNEX 7 TO CHAPTER 7

Example of pfd thresholds (Approach 2)

EXAMPLE RESOLUTION XYZ (WRC-2000)

Protection of terrestrial services in all Regions from Region 2 GSO FSS networks using the frequency band 11.7-12.2 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that, in Regions 1 and 3, the band 11.7-12.2 GHz is allocated on a co-primary status to terrestrial services and to the broadcasting-satellite service;

b) that, in Region 2, the band 11.7-12.1 GHz is allocated on a co-primary status to terrestrial services (except in the countries listed in S5.486) and to the fixed-satellite service;

c) that, in Region 2, the band 12.1-12.2 GHz is allocated on a co-primary status to terrestrial services in Peru (see S5.489) and to the fixed-satellite service;

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* These values relate to the pfd and angles of arrival which would be obtained under free-space propagation conditions.

d) that the protection of the broadcasting-satellite service in Regions 1 and 3 from the fixed-satellite service in Region 2 is assured by Article 7 and Annex 4 to Appendix S30;

e) that the protection of the fixed-satellite service in Region 2 from the fixed-satellite service in Region 2 is assured either by S9 (S9.7 or S9.12) or S22;

f) that the protection of terrestrial services in Regions 1, 2 and 3 from non-geostationary satellite systems in the fixed-satellite service in Region 2 is assured by S21;

g) that there is a need to protect terrestrial services in Regions 1, 2 and 3 from geostationary-satellite networks in the fixed-satellite service in Region 2,

recognizing

a) that ITU-R has developed Recommendation ITU-R SF.674-1, dealing with sharing between the fixed-satellite service in Region 2 and the fixed service in the band 11.7-12.2 GHz in Region 2;

b) that the power flux-density limits contained in Article S21 (Table S21-4) and applicable to the fixed-satellite service in the band 10.7-11.7 GHz afford an adequate protection to terrestrial services;

c) that the limits referred in *recognizing b)* are 2 dB less stringent than the coordination thresholds contained in Recommendation ITU-R SF.674-1,

resolves

that coordination is requested for Region 2 geostationary FSS networks operating in the 11.7-12.2 GHz band, with any administration of Regions 1, 2 and 3 having a primary allocation to terrestrial services in the same frequency band if the power flux-density produced on its territory by a geostationary fixed-satellite space station exceeds the following thresholds:

-150	$dB(W/m^2)$ in 4 kHz	for $0° \leq \Theta \leq 5°$
$-150 + 0.5 (\Theta-5)$	$dB(W/m^2)$ in 4 kHz	for $5° < \Theta \leq 25°$
-140	$dB(W/m^2)$ in 4 kHz	for $\Theta \geq 25°$

where Θ is the angle of arrival of the incident wave above the horizontal plane, in degrees.*

MOD **S5.488** The use of the bands 11.7-12.2 GHz by geostationary-satellite networks in the fixed-satellite service in Region 2 and 12.2-12.7 GHz by the broadcasting-satellite service in Region 2 is limited to national and subregional systems. The use of the band 11.7-12.2 GHz by geostationary-satellite networks in the fixed-satellite service in Region 2 is subject to ~~previous agreement between administrations concerned and those having services, operating or planned to operate in accordance with the Table, which may be affected (see Articles **S9** and **S11**)~~the provisions of Resolution **XYZ (WRC-2000)**. For the use of the band 12.2-12.7 GHz by the broadcasting-satellite service in Region 2, see Appendix **S30**.

* These values relate to the pfd and angles of arrival which would be obtained under free-space propagation conditions.

ANNEX 8 TO CHAPTER 7

Example of pfd thresholds (Approach 2)

EXTRACT OF RECOMMENDATION ITU-R SF.674-1

POWER FLUX-DENSITY VALUES TO FACILITATE THE APPLICATION OF ARTICLE 14 OF THE RADIO REGULATIONS FOR FSS IN RELATION TO THE FIXED-SATELLITE SERVICE IN THE 11.7-12.2 GHz BAND IN REGION 2

(Question ITU-R 62/4)

(1990-1997)

The ITU Radiocommunication Assembly,

considering

...

recommends

1 that in the frequency band 11.7-12.2 GHz shared between systems in the FSS in Region 2 and line-of-sight radio-relay systems, the values of pfd on the territory of the affected administrations using the FS which would be used to identify these administrations to facilitate the application of Article 14 of the RR (S9.21, RR revised by the World Radiocommunication Conference (Geneva, 1995) (WRC-95)), should be, in any 4 kHz band:

-150	$dB(W/m^2)$ in 4 kHz	for $0° \leq \theta \leq 5°$
$-150 + 0.5\ (\theta - 5)$	$dB(W/m^2)$ in 4 kHz	for $5° < \theta < 25°$
-140	$dB(W/m^2)$ in 4 kHz	for $25° \leq \theta \leq 90°$

where θ is the angle of arrival (degrees) on the surface of the Earth of the radio-frequency wave;

2 that the above values relate to the pfd and angles of arrival which would be obtained under free-space propagation conditions;

3 that the following Note should be regarded as part of this Recommendation:

NOTE 1 - Pfd limits where appropriate are contained in the RR. The values in § 1 are intended to facilitate the application of Article 14 (S9.21, RR revised by WRC-95) and are not intended as pfd limits.

ANNEX 9 TO CHAPTER 7

Example of regulatory Approach 3

MOD S5.488 The use of the bands 11.7-12.2 GHz by geostationary-satellite networks in the fixed-satellite service in Region 2 and 12.2-12.7 GHz by the broadcasting-satellite service in Region 2 is limited to national and subregional systems. The use of the band 11.7-12.2 GHz by geostationary-satellite networks in the fixed-satellite service in Region 2 is subject to previous agreement between the administrations concerned and those having services, operating or planned to operate in accordance with the Table, which may be affected (see Articles **S9**, including No. **S9.21**, and **S11**). For the use of the band 12.2-12.7 GHz by the broadcasting-satellite service in Region 2, see Appendix **S30**.

CHAPTER 8

Progress of studies for future conferences

CONTENTS

8.1 Agenda item 7.2

"to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent Conference and on possible agenda items for future conferences"

8.1.1 Preliminary agenda for WRC-02/03

The ITU-R has commenced studies on the items identified in Resolution **722 (WRC-97)** for inclusion in the agenda for WRC-02/03 that will require preparatory work by the ITU-R. Resolution **722 (WRC-97)** includes the following items:

"1 to take appropriate action in respect of those urgent issues that were specifically requested by WRC-99;

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-99, to consider and take appropriate action in respect of the following topics:

2.1 requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution **26 (Rev.WRC-97)**;

2.2 consideration of Article **S25** concerning the amateur and amateur-satellite services;

2.3 issues related to Appendix **S3**:

2.3.1 to consider the results of studies regarding the boundary between spurious and out-of-band emissions;

2.3.2 to consider the inclusion of general limits for out-of-band emissions in the Radio Regulations, in particular with regard to whether it is appropriate to do so, taking into account the results of ITU-R studies;

2.4 review of the frequency and channel arrangements in the MF and HF bands allocated on a primary basis to the maritime mobile service, taking into account the use of new digital technology, in accordance with Resolution **347 (WRC-97)**;

2.5 to review in Appendix **S2** the Table of transmitter frequency tolerances, taking into account the frequency tolerance limits specified in Recommendation ITU-R SM.1045;

2.6 to consider the status of allocations to the radiolocation service in the bands around 3 GHz and around 5.5 GHz, the date of a conference is under discussion;

2.7 sharing between the fixed-satellite service (FSS) and fixed service in the 19 GHz band, when used bidirectionally by the FSS to provide feeder links for non-geostationary-satellite orbit (non-GSO) mobile-satellite service (MSS) systems;

2.8 to consider spectrum requirements for wideband aeronautical telemetry in the band between 3 GHz and 30 GHz;

2.9 review of allocations to the space-research service (deep space) (space-to-Earth) and the inter-satellite service in the frequency range 32-32.3 GHz with a view to improving the sharing conditions between these services;

2.10 to consider Appendix **S13** and Resolution **331 (Rev.WRC-97)** with a view to their deletion and, if appropriate, consider related changes to Chapter **SVII** and other provisions of the Radio

Regulations as necessary, taking into account the continued transition to the Global Maritime Distress and Safety System (GMDSS);

2.11 to consider the results of studies, and take necessary actions relating to:

2.11.1 the exhaustion of the maritime mobile service identity numbering resource (Resolution **344 (WRC-97)**);

2.11.2 shore-to-ship distress communication priorities (Resolution **348 (WRC-97)**);

2.12 consideration of the need to realign the allocations to the amateur, amateur-satellite and broadcasting services around 7 MHz on a worldwide basis, taking into account Recommendation **718 (WARC-92)**;

2.13 examination of the adequacy of the frequency allocations for HF broadcasting from about 4 MHz to 10 MHz, taking into account the seasonal planning procedures adopted by WRC-97, and to consider bringing forward the date of availability of the HF bands allocated by WARC-92 to the broadcasting service in response to Resolution **29 (WRC-97)** and Resolution **537 (WRC-97)**;

3 to consider the results of the studies related to the following with a view to considering them for inclusion in the agendas of future conferences:

3.1 Resolution **528 (WARC-92)**;

3.2 possible allocations in the frequency bands above 275 GHz;

3.3 potential for sharing around 4 300 MHz between radio altimeters and space-based passive earth sensors;

3.4 additional allocations on a worldwide basis for the non-GSO MSS with service links operating below 1 GHz in accordance with Resolution **728 (WRC-97)**;

3.5 allocations on a worldwide basis for feeder links in bands around 1.4 GHz to the non-GSO MSS with service links operating below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolution **127 (WRC-97)**;

3.6 use of frequency adaptive systems in the MF/HF bands in accordance with Resolution **729 (WRC-97)**;

3.7 allocation of the frequency band 14.5-14.8 GHz to the FSS (Earth-to-space) in Region 3 (expansion of FSS to include other than feeder links of the broadcasting-satellite service);

4 to examine the revised ITU-R recommendations incorporated by reference in the Radio Regulations which have been communicated by the 2001 Radiocommunication Assembly, in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in the Annex to Resolution **27 (Rev.WRC-97)**;

5 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the conference;

6 in accordance with Resolution **95 (WRC-97)**, to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

7 to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. **135** and **136** of the Convention (Geneva, 1992);

8 to identify those items requiring urgent action by the radiocommunication study groups;"

8.1.2 Items formerly identified in Resolution 721 (WRC-97)

The ITU commenced studies of all items identified in Resolution **721 (WRC-97)** and has made progress on the matters listed for agenda item 8 that where deleted from the revised agenda given in Resolution **1130**. These items were:

"8.1 to consider the regulatory and technical provisions for the quasi-geostationary satellite networks;

8.2 to examine the spectrum requirements for telemetry, tracking, and telecommand of FSS networks operating with service links in the frequency bands above 17 GHz;

8.3 to review the use of the frequency band 415-526.5 kHz by the aeronautical radionavigation and maritime mobile services;

8.4 to review the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to meeting the changing needs of these services;

8.5 to consider possible extension of the allocation to the MSS (Earth-to-space) on a secondary basis in the band 14-14.5 GHz to cover aeronautical applications as stipulated in Resolution **216 (WRC-97)**;

8.6 to consider the provision of up to 3 MHz of frequency spectrum for the implementation of telecommand links in the space research and space operation services in the frequency range between 100 MHz and 1 GHz, taking into account Resolution **723 (WRC-97)**;

8.7 to consider provision of up to 6 MHz of frequency spectrum to the Earth exploration-satellite service (active) in the frequency band 420-470 MHz, in accordance with Resolution **727 (WRC-97)**;

8.8 consideration of changes to the allocations in Region 3 for the band 1 350-1 400 MHz to permit co-primary use by the fixed service."

8.1.3 Studies by the ITU-R for future conferences

The studies of the ITU-R on the items above are expected to be completed in time for the next conference after WRC-2000.

CPM-99 took note of the interim report of the Director of the Radiocommunication Bureau on the issues referred to in Resolution **29 (WRC-97)** notably:

a) information on the occupancy by the fixed and mobile services in some HF bands which were allocated by WARC-92 to the broadcasting service; and

b) status report with regard to studies on possible sharing between broadcasting and other services in the HF bands.

CPM-99 commended the Director, BR for the interim report and noted that a further report will be submitted to WRC-2000.

Progress on the following studies have been reported to the CPM.

8.1.3.1 Earth exploration-satellite service (active) in the frequency band 420-470 MHz, in accordance with Resolution 727 (WRC-97)

Preliminary ITU-R studies have presented a sharing analysis between possible EESS (active) and the amateur-satellite services in the band 430-440 MHz. This study falls within former WRC-2000 agenda item 8.7.

The discussions have shown the need for further study on this issue and clearly indicate the interest of the scientific community on one hand and the need to protect the existing services on the other.

8.1.3.2 Earth exploration-satellite service (active) in the band 5 460-5 570 MHz

Studies within ITU-R have considered the feasibility of sharing between EESS (active) and other services above the band 5 250-5 460 MHz currently allocated to EESS (active). This has drawn to the drafting of a new Recommendation on sharing in the band 5 250-5 570 MHz between the Earth exploration-satellite (active) and space research (active) services and other services allocated in this band.

The sharing studies have shown the potential for sharing between spaceborne altimeters and proposed Hiperlan systems above 5 460 MHz.

8.1.3.3 Implementation of telecommand links in the space research and space operation services in the frequency range between 100 MHz and 1 GHz, taking into account Resolution 723 (WRC-97)

This item is being currently considered by the ITU-R. As former agenda 8.6 of Resolution **721 (WRC-97)** and considering the interest on this issue, it is felt that this item could be considered in the agenda of the conference following WRC-2000.

8.1.3.4 Possible allocations in the frequency bands above 275 GHz and potential for sharing around 4 300 MHz between radio altimeters and space-based passive earth sensors

These two items have already been considered by the ITU-R and studies will be completed by the year 2002. These are included in Resolution **722 (WRC-97)** to be considered in the agendas of future conferences (items 3.2 and 3.3). It is there felt that this could be included earlier in the agenda of the conference following WRC-2000.

8.1.3.5 Sharing between high-altitude non-GSO (quasi-GSO) and non-GSO systems

ITU-R studies regarding sharing between high-altitude non-GSOs (i.e. quasi-GSOs) and lower-altitude non-GSOs, such as LEOs and MEOs are continuing. It has been noted that the large difference in orbital characteristics may impose constraints, which need to be assessed through future study by the ITU-R. This matter was included in the former agenda 8.1 of Resolution **721 (WRC-97)**.

ANNEX TO THE CPM REPORT

List of the ITU-R Recommendations related to the CPM Report to WRC-2000

Chapter 1 - IMT-2000, maritime and aeronautical issues		
ITU-R M.816-1	Framework for services supported on International Mobile Telecommunications-2000 (IMT-2000)	1997 M-series, Part 2
Recommendation ITU-R M.687-2	International Mobile Telecommunications-2000 (IMT-2000)	1997 M-series, Part 2
ITU-R M.1390	Methodology for the calculation of IMT-2000 terrestrial spectrum requirements	1997 M-series, Part 2, Sup. 1
ITU-R M.1391	Methodology for the calculation of IMT-2000 satellite spectrum requirements	1997 M-series, Part 2, Sup. 1
Recommendation ITU-R SA.1154	Provisions to protect the space research (SR), space operations (SO) and Earth-exploration satellite services (EEES) and to facilitate sharing with the mobile service in the 2 025-2 110 and 2 200-2 290 MHz bands	1997 SA-series
Recommendation ITU-R M.1036-1	Spectrum considerations for implementation of International Mobile Telecommunications-2000 (IMT-2000) in the bands 1 885-2 025 MHz and 2 110-2 200 MHz	1997 M-series, Part 2
DNR ITU-R M.[IMT-HAPS]	Minimum performance characteristics and operational conditions for HAPS operating within the IMT-2000 system in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz	Doc. 8/115
Recommendation ITU-R RA.1031-1	Protection of the radio astronomy service in frequency bands shared with other services	1997 RA-series
Recommendation ITU-R RA.769-1	Protection criteria used for radio astronomical measurements	1997 RA-series
Recommendation ITU-R F.1242	Radio-frequency channel arrangements for digital radio systems operating in the range 1 350 MHz to 1 530 MHz	1997 F-series, Part 1
Recommendation ITU-R F.1098-1	Radio-frequency channel arrangements for radio-relay systems in the 1 900-2 300 MHz band	1997 F-series, Part 1
Recommendation ITU-R F.1243	Radio-frequency channel arrangements for digital radio systems operating in the range 2 290-2 670 MHz	1997 F-series, Part 1
Recommendation ITU-R F.283-5	Radio-frequency channel arrangements for low and medium capacity analogue or digital radio-relay systems operating in the 2 GHz band	1997 F-series, Part 1
Recommendation ITU-R F.382-7	Radio-frequency channel arrangements for radio-relay systems operating in the 2 and 4 GHz bands	1997 F-series, Part 1
Recommendation ITU-R F.701-2	Radio-frequency channel arrangements for analogue and digital point-to-multipoint radio systems operating in the frequency bands in the range 1 350 to 2 690 GHz (1.5, 1.8, 2.0, 2.2, 2.4 and 2.6 GHz)	1997 F-series, Part 1
Recommendation ITU-R F.759	Use of frequencies in the bands 500 to 3 000 MHz for radio-relay systems	1997 F-series, Part 2
Recommendation ITU-R F.389-2	Preferred characteristics of auxiliary radio-relay systems operating in the 2, 4, 6 or 11 GHz bands	1990 CCIR Volume IX, Part 1
Recommendation ITU-R F.755-1	Point-to-multipoint systems used in the fixed service	1997 F-series, Part 1
Recommendation ITU-R F.758-1	Considerations in the development of criteria for sharing between the terrestrial fixed service and other services	1997 F-series, Part 2

Recommendation ITU-R F.1334	Protection criteria for systems in the fixed service sharing the same frequency band in the 1 to 3 GHz range with the land mobile service	1997 F-series, Part 2
Recommendation ITU-R F.1094-1	Maximum allowable error performance and availability degradations to digital radio-relay systems arising from interference from emissions and radiations from other sources	1997 F-series, Part 1
Recommendation ITU-R F.1241	Performance degradation due to interference from other services sharing the same frequency bands on a primary basis with digital radio-relay systems operating at or above the primary rate and which may form part of the international portion of a 27 500 km hypothetical reference path	1997 F-series, Part 1
Recommendation ITU-R F.1331	Performance degradation due to interference from other services sharing the same frequency bands on a primary basis with analogue radio-relay systems for television	1997 F-series, Part 1
Recommendation ITU-R F.1245	Mathematical model of average radiation patterns for line-of-sight point-to-point radio-relay system antennas for use in certain coordination studies and interference assessment in the frequency range from 1 to about 40 GHz	1997 F-series, Part 2
Recommendation ITU-R F.1336	Reference radiation patterns of omnidirectional and other antennas in point-to-multipoint systems for use in sharing studies	1997 F-series, Part 2
Recommendation ITU-R F.699-4	Reference radiation patterns for line-of-sight radio-relay system antennas for use in coordination studies and interference assessment in the frequency range from 1 to about 40 GHz	1997 F-series, Part 2
Recommendation ITU-R BT.1368-1	Planning criteria for digital terrestrial television services in the VHF/UHF television bands	1997 BT-series, Supplement 2
Recommendation ITU-R BT.417-4	Minimum field strengths for which protection may be sought in planning a television service	1997 BT-series
Recommendation ITU-R BT.798-1	Digital television terrestrial broadcasting in the VHF/UHF bands	1997 BT-series
Recommendation ITU-R IS.851-1	Sharing between the broadcasting service and the fixed and/or mobile services in the VHF and UHF bands	1997 IS-series
Recommendation ITU-R BO.1130-1	Systems for digital sound broadcasting to vehicular, portable and fixed receivers for broadcasting-satellite service (sound) bands in the frequency range 1 400-2 700 MHz	1997 BO-series
Recommendation ITU-R M.1040	Public mobile telecommunication service with aircraft using the bands 1 670-1 675 MHz and 1 800-1 805 MHz	1997 M-series, Part 3
DNR ITU-R M.[8B/XA]	Protection criteria for telemetry systems in the aeronautical mobile service and mitigation techniques to facilitate sharing with geostationary broadcasting-satellite and mobile-satellite services in the bands 1 452-1 525 MHz and 2 310-2 360 MHz	Doc. 8/73
Recommendation ITU-R M.1044-1	Frequency sharing criteria in the amateur and amateur-satellite services	1997 M-series, Part 6
Recommendation ITU-R SA.1016	Sharing considerations relating to deep-space research	1997 SA-series
Recommendation ITU-R SA.1027-3	Sharing and coordination criteria for space-to-earth data transmission systems in the earth exploration-satellite and meteorological-satellite services using satellites in low-Earth orbit	Doc. 7/BL/6
Recommendation ITU-R SA.1157	Protection criteria for deep-space research	1997 SA-series
Recommendation ITU-R M.1313	Technical characteristics of maritime radionavigation radars	1997 M-series, Part 4

Recommendation ITU-R M.629	Use for the radionavigation service of the frequency bands 2 900-3 100 MHz, 5 470-5 650 MHz, 9 200-9 300 MHz, 9 300-9 500 MHz and 9 500-9 800 MHz	1997 M-series, Part 4
DNR ITU-R M.[RAD.CHAR2]	Characteristics of radionavigation and meteorological radars and protection criteria in the frequency band 2 700-2 900 MHz	Doc. 8/68
DNR ITU-R M.[RAD.CHAR3]	Technical and operational characteristics and protection criteria of radiodetermination and meteorological radars in the 2 900-3 100 MHz band	Doc. 8/56
DNR ITU-R M.[RAD.CHAR4]	Characteristics of and protection criteria for radars operating in the radiodetermination service in the frequency band 3 100-3 700 MHz	Doc. 8/69
DNR ITU-R M.[RAD.PROC]	Procedures for determining the potential for interference between radars operating in the radiodetermination service and systems in other services	Doc. 8/67
Recommendation ITU-R M.1141-1	Sharing in the 1-3 GHz frequency range between non-geostationary space stations operating in the mobile-satellite service and stations in the fixed service	1997 M-series, Part 5
Recommendation ITU-R M.1142-1	Sharing in the 1-3 GHz frequency range between geostationary space stations operating in the mobile-satellite service and stations in the fixed service	1997 M-series, Part 5
Recommendation ITU-R M.1084-3	Interim solutions for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service	1997 M-series, Part 3, Sup.1
Recommendation ITU-R M.1308	Evolution of land mobile systems towards IMT-2000	1997 M-series, Part 2
Recommendation ITU-R M.1312	A long-term solution for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service	1997 M-series, Part 3
Chapter 2 - Mobile-satellite and radionavigation-satellite services		
Recommendation ITU-R M.1089	Technical considerations for the coordination of mobile-satellite systems supporting the aeronautical mobile-satellite (R) service (AMS(R)S)	1997 M-series, Part 5
Recommendation ITU-R M.1180	Availability of communication circuits in the aeronautical mobile-satellite (R) services (AMS(R)S)	1997 M-series, Part 5
Recommendation ITU-R M.1229	Performance objectives for the digital aeronautical mobile-satellite service (AMSS) channels operating in the bands 1 525 to 1 559 MHz and 1 626.5 to 1 660.5 MHz not forming part of the ISDN	1997 M-series, Part 5
Recommendation ITU-R M.1233	Technical considerations for sharing satellite network resources between the mobile-satellite service (MSS) (other than the aeronautical mobile-satellite (R) service (AMS(R)S)) and AMS(R)S	1997 M-series, Part 5
Recommendation ITU-R M.1234	Permissible level of interference in a digital channel of a geostationary satellite network in the aeronautical mobile-satellite (R) service (AMS(R)S) in the bands 1 545 to 1 555 MHz and 1 646.5 to 1 656.5 MHz and its associated feeder links caused by other networks of this service and the fixed-satellite service	1997 M-series, Part 5
Recommendation ITU-R M.1088	Considerations for sharing with systems of other services operating in the bands allocated to the radionavigation-satellite service	1997 M-series, Part 5
Recommendation ITU-R M.1317	Considerations for sharing between systems of other services operating in bands allocated to the radionavigation-satellite and aeronautical radionavigation services and the global navigation satellite system (GLONASS-M)	1997 M-series, Part 5
Recommendation ITU-R M.1318	Interference protection evaluation model for the radionavigation-satellite service in the 1 559-1 610 MHz band	1997 M-series, Part 5

Recommendation ITU-R F.759	Use of frequencies in the band 500 to 3 000 MHz for radio-relay systems	1997 F-series, Part 2
DNR ITU-R [RNSS.CHAR]	Technical and performance characteristics of current and planned RNSS (space-to-earth) and ARNS receivers to be considered in interference studies in the band 1 559-1 610 MHz	Doc. 8/83
DRR ITU-R M.1184	Technical characteristics of mobile satellite systems in the frequency bands below 3 GHz for use in developing criteria for sharing between the mobile-satellite service (MSS) and other services	Doc. 8/47
Recommendation ITU-R M.1343	Essential technical requirements of mobile earth stations for global non-geostationary mobile-satellite service systems in the bands 1-3 GHz	1997 M-series, Part 5
Recommendation ITU-R M.1389	Methods for achieving coordinated use of multiple non-GSO MSS systems below 1 GHz and sharing with other services in existing MSS allocations	1997 M-series, Part 5, Sup.1
DNR ITU-R M.[RNSS.ISS]	Technical characteristics and performance requirements of current and planned RNSS (space-to-space) receivers to be considered in interference studies in the bands 1 215-1 260 MHz and 1 559-1 610 MHz	Doc. 8/85
DRR ITU-R SA.1158-2	Sharing of the 1 675-1 710 MHz band between the meteorological-satellite service (space-to-Earth) and the mobile-satellite service (Earth-to-space)	Doc. 7/BL/10
Recommendation ITU-R SA.1262	Sharing and coordination criteria for meteorological aids in the 400.15-406 MHz and 1 668.4-1 700 MHz bands	1997 SA-series
DNR ITU-R M.[8D.SARP]	Protection criteria for Cospas-Sarsat search and rescue processors (SARP) in the band 406-406.1 MHz	Doc. 8/84
DNR ITU-R M. [RAD.CHAR1]	Characteristics of and protection criteria for radars operating in the radiodetermination service in the frequency band 1 215-1 400 MHz	Doc. 8/66
DRR ITU-R M.1184	Technical characteristics of mobile satellite systems in the frequency bands below 3 GHz for use in developing criteria for sharing between the mobile-satellite service (MSS) and other services	Doc. 8/47
DRR ITU-R M.1039-1	Co-frequency sharing between stations in the mobile service below 1 GHz and FDMA non-geostationary-satellite orbit (non-GSO) mobile earth stations	Doc. 8/53
DRR ITU-R SA.1258-1	Sharing of the frequency band 401-403 MHz between the meteorological-satellite service, earth exploration-satellite service and meteorological aids service	Doc. 7/BL/5
Recommendation ITU-R SA.1165-1	Technical characteristics and performance criteria for radiosonde systems in the meteorological aids service	1997 SA-series
Recommendation ITU-R RA.769-1	Protection criteria used for radioastronomical measurements	1997 RA-series
Recommendation ITU-R P.531-4	Ionospheric propagation data and prediction methods required for the design of satellite services and systems	1997 P-series, Part 2
Recommendation ITU-R S.1342	Method for determining coordination distances, in the 5 GHz band, between the international standard microwave landing system and non-geostationary mobile-satellite service stations providing feeder uplink services	1997 S-series

Chapter 3 - Non-GSO FSS issues		
DNR ITU-R S. [Doc. 4/60(Rev.1)]	Determination of the coordination area for earth stations operating with non-geostationary space stations with respect to earth stations operating in the reverse direction in frequency bands allocated bidirectionally to the fixed-satellite service	Doc. 4/BL/17
DNR ITU-R S.[Doc. 4/65]	Methods to enhance sharing between non-GSO FSS systems (except MSS feeder links) in the frequency bands between 10-30 GHz	Doc. 4/BL/20
DRR ITU-R S.1323 [4/69]	Maximum permissible levels of interference in a satellite network (GSO/FSS; non-GSO/FSS; non-GSO/MSS feeder links) in the fixed-satellite service caused by other codirectional networks below 30 GHz	Doc. 4/BL/23
Recommendation ITU-R S.1328	Satellite system characteristics to be considered in frequency sharing analyses between GSO and non-GSO satellite systems in the fixed-satellite service including feeder links for the mobile-satellite service	1997 S-series
DNR ITU-R S.[Doc. 4/57]	Reference FSS earth-station radiation patterns for use in interference assessment involving non-GSO satellites in frequency bands between 10.7 GHz and 30 GHz	Doc. 4/BL/14
Recommendation ITU-R S.672-4	Satellite antenna radiation pattern for use as a design objective in the fixed-satellite service employing geostationary satellites	1997 S-series
DRR ITU-R S.524-5 [4/66]	Maximum permissible levels of off-axis e.i.r.p. density from earth stations in GSO network operating in the fixed-satellite service transmitting in the 6, 14 and 30 GHz frequency bands	Doc. 4/66
DNR ITU-R BO.[11/138]	Protection of the broadcasting-satellite service in the 12 GHz band and associated feeder links in the 17 GHz band from interference caused by non-GSO FSS systems	Doc. 11/BL/30
DNR ITU-R BO.[11/137]	Reference BSS earth station antenna patterns for use in interference assessment involving non-geostationary satellites in frequency bands covered by Appendix **S30**	Doc. 11/BL/29
Recommendation ITU-R F.1245	Mathematical model of average radiation patterns for line-of-sight point-to-point radio-relay system antennas for use in certain coordination studies and interference assessment in the frequency range from 1 to about 40 GHz	1997 SF-series, Part 2
Recommendation ITU-R SF.1395	Minimum propagation attenuation due to atmospheric gases for use in frequency sharing studies between the fixed-satellite service and the fixed service	Doc. 4-9/BL/1
DNR ITU-R F.[9/1011]	Interference criteria to protect the fixed service from aggregate interference from other services sharing the 10.7-12.75 GHz band on a co-primary basis	Doc. 9/1011
Rec. ITU-R F.[9/1012]	Interference criteria to protect the fixed service from aggregate interference from other services sharing the 17.7-19.3 GHz band on a co-primary basis	Doc. 9/1012
Recommendation ITU-R F.1108-2	Determination of the criteria to protect fixed service receivers from the emissions of space stations operating in non-geostationary orbits in shared frequency bands	1997 F-series, Part 2
Rec. ITU-R SF.[4-9/1007]	Maximum allowable values of power flux-density produced at the Earth's surface by non-geostationary satellites in the fixed-satellite service operating in the 17.7-19.3 GHz band	Doc. 4-9/1007

Recommendation ITU-R SF.406-8	Maximum equivalent isotropically radiated power of radio-relay system transmitters operating in the frequency bands shared with the fixed-satellite service	1997 SF-series
Recommendation ITU-R S.1068	Fixed-satellite and radiolocation/radionavigation services sharing in the band 13.75 to 14 GHz	1997 S-series
Recommendation ITU-R SA.1155	Protection criteria related to the operation of data relay satellite systems	1997 SA-series
DNR ITU-R BO.[11/136]	Functional description to be used in developing software tools for determining conformity of non-GSO FSS networks with limits contained in Article **S22** of the Radio Regulations	Doc. 11/153
Recommendation ITU-R S.672-4	Satellite antenna radiation pattern for use as a design objective in the fixed-satellite service employing geostationary satellites	1997 S-series
DNR ITU-R SF.[Doc. 4-9S/AI]	Maximum allowable values of power flux-density produced at the Earth's surface by non-geostationary satellites in the fixed-satellite service operating in the 10.7-12.75 GHz band	Doc. 4-9/1006
	Chapter 4 - Space science services and radio astronomy	
Recommendation ITU-R RA.314-8	Preferred frequency bands for radioastronomical measurements	1997 RA-series
Recommendation ITU-R RA.769-1	Protection criteria used for radioastronomical measurements	1997 RA-series
Recommendation ITU-R RA.1031-1	Protection of the radio astronomy service in frequency bands shared with other services	1997 RA-series
Recommendation ITU-R RA.1272	Protection of radio astronomy measurements above 60 GHz from ground based interference	1997 RA-series
Recommendation ITU-R SA.515-3	Frequency bands and bandwidths used for satellite passive sensing	1997 SA-series
Recommendation ITU-R SA.1028-1	Performance criteria for satellite passive remote sensing	1997 SA-series
Recommendation ITU-R SA.1029-1	Interference criteria for satellite passive remote sensing	1997 SA-series
Recommendation ITU-R SA.1416	Sharing between spaceborne passive sensors and the inter-satellite service operating near 118 and 183 GHz	Doc. 7/BL/18
Recommendation ITU-R RA.611-2	Protection of the radio astronomy service from spurious emissions	1997 RA-series
Recommendation ITU-R F.761	Frequency sharing between the fixed service and passive sensors in the band 18.6 to 18.8 GHz	1997 F-series, Part 2
Recommendation ITU-R F.699-4	Reference radiation patterns for line-of-sight radio-relay system antennas for use in coordination studies and interference assessment in the frequency range from 1 to about 40 GHz	1997 F-series, Part 2
Recommendation ITU-R S.465-5	Reference earth-station radiation pattern for use in coordination and interference assessment in the frequency range from 2 to about 30 GHz	1997 S-series
Recommendation ITU-R S.580-5	Radiation diagrams for use as design objectives for antennas of earth stations operating with geostationary satellites	1997 S-series
Recommendation ITU-R S.1328	Satellite system characteristics to be considered in frequency sharing analyses between GSO and non-GSO satellite systems in the fixed-satellite service including feeder links for the mobile-satellite service	Doc. 4/BL/3 + 4/BL/15

Chapter 5 - Appendices S30 and S30A		
DRR ITU-R BO.1293	Protection masks and associated calculation methods for interference into broadcast satellite systems involving digital emissions	Doc. 11/109 (Rev.1)
DNR ITU-R BO. [Doc. 11/116]	Improved patterns for fast roll-off satellite transmit antenna of the Regions 1 and 3 BSS Plan of Appendix **S30**	Doc. 11/BL/31
DNR 11/155		Doc. 11/155

Chapter 6 - Fixed and fixed-satellite services		
Recommendation ITU-R F.697-2	Error performance and availability objectives for the local-grade portion at each end of an ISDN connection at a bit rate below the primary rate utilizing digital radio-relay systems	1997 F-series, Part 1
Recommendation ITU-R F.755-1	Point-to-multipoint systems used in the fixed service	1997 F-series, Part 1
DRR ITU-R F.758-1	Considerations in the development of criteria for sharing between the terrestrial fixed service and other services	Doc. 9/1022
Recommendation ITU-R F.1189-1	Error-performance objectives for constant bit rate digital paths at or above the primary rate carried by digital radio-relay systems which may form part or all of the national portion of a 27 500 km hypothetical reference path	1997 F-series, Part 1
Recommendation ITU-R F.1102	Characteristics of radio-relay systems operating in frequency bands above about 17 GHz	1997 F-series, Part 1
Recommendation ITU-R F.1400	Performance and availability requirements and objectives for fixed wireless access (FWA) to PSTN	Doc. 9/BL/13
Recommendation ITU-R F.699-4	Reference radiation patterns for line-of-sight radio-relay system antennas for use in coordination studies and interference assessment in the frequency range from 1 to about 40 GHz	1997 F-series, Part 2
Recommendation ITU-R F.1245	Mathematical model of average radiation patterns for line-of-sight point-to-point radio-relay system antennas for use in certain coordination studies and interference assessment in the frequency range from 1 to about 40 GHz	1997 F-series, Part 2
Recommendation ITU-R F.1336	Reference radiation patterns of omnidirectional and other antennas in point-to-multipoint systems for use in sharing studies	1997 F-series, Part 2
DRR ITU-R F.1097	Interference mitigation options to enhance compatibility between radar systems and digital radio-relay systems	Doc. 9/1020
Recommendation ITU-R F.1333	Estimation of the actual elevation angle from a station in the fixed service towards a space station taking into account atmospheric refraction	1997 F-series, Part 2
Recommendation ITU-R SA.1157	Protection criteria for deep-space research	1997 SA-series
Recommendation ITU-R SA.509-2	Generalized space research earth station antenna radiation pattern for use in interference calculations, including coordination procedures	1997 SA-series, Supplement 1
Recommendation ITU-R SA.609-1	Protection criteria for telecommunication links for manned and unmanned near-Earth research satellites	1997 SA-series
Recommendation ITU-R IS.847-1	Determination of the coordination area of an earth station operating with a geostationary space station and using the same frequency band as a system in a terrestrial service	1997 IS-series

Recommendation ITU-R P.452-8	Prediction procedure for the evaluation of microwave interference between stations on the surface of the Earth at frequencies above about 0.7 GHz	1997 P-series, Part 2
Recommendation ITU-R P.618-5	Propagation data and prediction methods required for the design of Earth-space telecommunication systems	1997 P-series, Part 2
DRR ITU-R P.620-3	Propagation data required for the evaluation of coordination distances in the frequency range 100 MHz to 105 MHz	Doc. 3/BL/36
Recommendation ITU-R P.676-3	Attenuation by atmospheric gases	1997 P-series, Part 1
Recommendation ITU-R RA.769-1	Protection criteria used for radioastronomical measurements	1997 RA-series
Recommendation ITU-R SA.1029-1	Interference criteria for satellite passive remote sensing	1997 SA-series
Recommendation ITU-R S.672-4	Satellite antenna radiation pattern for use as a design objective in the fixed-satellite service employing geostationary satellites	1997 S-series
DNR F.[Doc. 9/1015]	Deployment characteristics of fixed service systems in the band 37-40 GHz for use in sharing studies	Doc. 9/1015
Recommendation ITU-R SA.1344	Preferred frequency bands and bandwidths for the transmission of space VLBI data	1997 SA-series, Supplement 1
Recommendation ITU-R SA.1015	Bandwidth requirements for deep-space research	1997 SA-series
Recommendation ITU-R M.1316	Principles and a methodology for frequency sharing in the 1 610.6-1 613.8 and 1 660-1 660.5 MHz bands between the mobile-satellite service (Earth-to-space) and the radio astronomy service	1997 M-series, Part 5
DNR ITU-R SF.[Doc. 4-9/1008]	Maximum allowable values of power flux-density at the surface of the Earth produced by non-geostationary satellites in the fixed-satellite service operating in the 37.5-40.5 GHz and 40.5-42.5 GHz bands to protect the fixed service	Doc. 4-9/1008
Recommendation ITU-R SA.1259	Feasibility of sharing between spaceborne passive sensors and the fixed service from 50 to 60 GHz	1997 SA-series
Recommendation ITU-R SA.515-3	Frequency bands and bandwidths used for satellite passive sensing	1997 SA-series
DNR ITU-R F.[Doc. 9/1013]	Radio-frequency channel arrangement for radio-relay systems in the fixed service in the band 51.4-52.6 GHz	Doc. 9/1013
DNR ITU-R F.[Doc. 9/1014]	Radio-frequency channel arrangements for systems in the fixed service in the band 55.78-59 GHz	Doc. 9/1014
Recommendation ITU-R RA.517-2	Protection of the radio astronomy service from transmitters in adjacent bands	1997 RA-series
Recommendation ITU-R RA.611-2	Protection of the radio astronomy service from spurious emissions	1997 RA-series
Recommendation ITU-R RA.1237	Protection of the radio astronomy service from unwanted emissions resulting from applications of wideband digital modulation	1997 RA-series
Recommendation ITU-R RA.314-8	Preferred frequency bands for radio astronomical measurements	1997 RA-series
Recommendation ITU-R SM.329-7	Spurious emissions	Doc. 1/BL/11
Recommendation ITU-R SA.1344	Preferred frequency bands and bandwidths for the transmission of space VLBI data	1997 SA-series, Supplement 1

Recommendation ITU-R SA.1396	Protection criteria for the space research service in the 37-38 and 40-40.5 GHz bands	Doc. 7/BL/2
Recommendation ITU-R SA.1015	Bandwidth requirements for deep-space research	1997 SA-series
Recommendation ITU-R M.1316	Principles and a methodology for frequency sharing in the 1 610.6-1 613.8 and 1 660-1 660.5 MHz bands between the mobile-satellite service (Earth-to-space) and the radio astronomy service	1997 M-series, Part 5
DNR ITU-R F.[Doc. 9/1017]	Preferred characteristics of systems in the fixed service using high altitude platforms operating in the 47.2-48.2 GHz band	Doc. 9/1017
DNR ITU-R F.[Doc. 9/1018]	Coordination distance for systems in the fixed service involving high-altitude platform stations sharing the same frequency band with other systems in fixed service	Doc. 9/1018
DNR ITU-R SF.[Doc. 4-9/1005]	Frequency sharing between systems in the fixed service using high-altitude platform stations and satellite systems in the geostationary orbit in the fixed-satellite service in the bands 47.2-47.5 and 47.9-48.2 GHz	Doc. 4-9/1005
DNR ITU-R S. [Doc. 4/42]	Interference mitigation techniques to facilitate coordination between NGSO MSS feeder links and GSO FSS networks in the bands 19.3-19.7 GHz and 29.1-29.5 GHz	Doc. 4/BL/5
Recommendation ITU-R S.1255	Use of adaptive uplink power control to mitigate codirectional interference between geostationary satellite orbit/fixed-satellite service (GSO/FSS) networks and feeder links of non-geostationary satellite orbit/mobile-satellite service (non-GSO/FSS) networks and between GSO/FSS networks and non-GSO/FSS networks	1997 S-series
Recommendation ITU-R S.1328	Satellite system characteristics to be considered in frequency sharing analyses between GSO and non-GSO satellite systems in the fixed-satellite service including feeder links for the mobile-satellite service	1997 S-series
Recommendation ITU-R SA.1028-1	Performance criteria for satellite passive remote sensing	1997 SA-series
ITU-T Rec. G.821	Error performance of an international digital connection operating at a bit rate below the primary rate and forming part of an integrated services digital network	Version 8/1996
ITU-T Rec. G.826	Error performance parameters and objectives for international, constant bit rate digital paths at or above the primary rate	Version 2/1999 to be published
ITU-T Rec. G.827	Availability parameters and objectives for path elements of international constant bit rate digital paths at or above the primary rate	Version 8/1996
Chapter 7 - Other matters		
Recommendation ITU-R SM.329-7	Spurious emissions	Doc. 1/BL/11
DRR ITU-R M.1177-1	Techniques for measurement of unwanted emissions of radar systems	Doc. 8/77
DRR ITU-R P.620-4	Propagation data required for the evaluation of coordination distances in the frequency range 100 MHz to 105 MHz	Doc. 3/BL/36
Recommendation ITU-R IS.847-1	Determination of the coordination area of an earth station operating with a geostationary space station and using the same frequency band as a system in a terrestrial service	1997 IS-series
Recommendation ITU-R IS.848-1	Determination of the coordination area of a transmitting earth station using the same frequency band as receiving earth stations in	1997 IS-series

	bidirectionally allocated frequency bands	
Recommendation ITU-R IS.849-1	Determination of coordination area for earth stations operating with non-geostationary spacecraft in bands shared with terrestrial services	1997 IS-series
Recommendation ITU-R IS.850-1	Coordination areas using predetermined coordination distances	1997 IS-series
DNR ITU-R SM.[XX]	Determination of the coordination area around an earth station in frequency bands between 100 MHz and 105 GHz	Doc. 1/1004
Recommendation ITU-R S.1340	Sharing between feeder links for the mobile-satellite service and the aeronautical radionavigation service in the Earth-to-space direction in the band 15.4-15.7 GHz	1997 S-series
Recommendation ITU-R S.1341	Sharing between feeder links for the mobile-satellite service and the aeronautical radionavigation service in the space-to-Earth direction in the band 15.4-15.7 GHz and the protection of the radio astronomy service in the band 15.35-15.4 GHz	1997 S-series

DRR = Draft revised Recommendation
DNR = Draft new Recommendation

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 1 to
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Original: English

COMMITTEE 5

Note by the Secretary-General

ICAO POSITION FOR THE CONFERENCE

I have the honour to bring to the attention of the Conference, at the request of the Secretary-General of the International Civil Aviation Organization (ICAO), the annexed information paper.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

Derivation of the pfd to protect ARNS (DME) in the 960-1 215 MHz band

TABLE 1

Aggregate interference pfd limit to protect DME interrogator

	Parameter	Value	Reference
1	DME CW interference threshold (at antenna port)	–129 dBW	MOPS DO-189 2.2.16
2	Maximum antenna gain towards interference	2 dB	MOPS
3	Interference threshold, free space	–131 dBW	Combine 1 and 2
4	Effective area of 0 dBi antenna at 1 176 MHz	–22.8 dB-m^2	Formula ITU
5	Aggregate interference in DME BW	–108.2 dBW/m^2	Combine 3 and 4
6	Conversion to MHz (assumes a 650 kHz bandwidth)	1.8 dB	10 log (1 MHz/DME BW) Industry reference
7	Aggregate interference in 1 MHz	–106.4 dBW/m^2	Combine 5 and 6
8	Safety margin	6 dB	ITU
9	**Maximum allowed pfd**	**–112.4 dBW/m^2/MHz**	**Combine 7 and 8**

TABLE 2

Aggregate interference pfd limit for RNSS (s-E) interference

	Item	Value	Ref
1	Maximum allowed pfd	–112.4 dBW/m^2/MHz	Table 1
2	Single/Multiple entry factor	(–6) to (–10) dB	ITU Recommendation
3	Max allowable single entry interference of antenna surface	(–118.4) to (–122.4) dBW/m^2/MHz	Combine 1 and 2
4	Antenna gain reduction for RNSS (s-E) including polarization mismatch	3.4 dB	Offset from Line 2 of Table 1 to reflect –1.4 dBi aggregate gain
5	**Aggregate RNSS (s-E) interference limit at antenna surface**	**(–115) to (–119) dBW/m^2/MHz**	**Combine 3 and 4**

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Note by the Secretary-General

ICAO POSITION FOR THE CONFERENCE

I have the honour to bring to the attention of the Conference, at the request of the Secretary-General of the International Civil Aviation Organization (ICAO), the annexed information paper.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

Introduction of radionavigation-satellite service (RNSS) in the band 960-1 215 MHz

Agenda *resolves* 1.15.1: to consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments

1 Introduction

1.1 Proposals have been developed to introduce in the frequency range 960-1 215 MHz an allocation to the radionavigation-satellite service (RNSS) in the space-to-Earth direction. This portion of the band is used for the ICAO standardized distance measuring equipment (DME) system on a global basis. DME provides the main means for navigation of aircraft operating in the *en route* and approach phase of flight. DME/P (where the “P” stands for precise distance measurement) is used in conjunction with the microwave landing system (MLS) during the final approach and landing phase of flight.

2 Protection

2.1 Protection of DME is a necessary condition for the introduction of RNSS. An allocation to RNSS needs to satisfy the following regulatory provisions:

a) that RNSS shall not cause harmful interference to any aeronautical radionavigation service (ARNS) system operating in the band 960-1 215 MHz;

b) that RNSS shall not claim protection from any current and future ARNS system operating in the band 960-1 215 MHz; and

c) that a provisional power flux-density (pfd) limit at the Earth’s surface shall be established to secure protection of DME until the results of further studies enable a definitive figure to be agreed.

2.2 In addition, in order to minimize any adverse effect that the use of part of the band 1 151-1 215 MHz by the RNSS can have on the current operations in the ARNS, the allocation to RNSS should be made in the smallest band required, and in any case, not more than 48 MHz.

2.3 The results of a preliminary analysis by ICAO have shown that the final value for the maximum aggregate pfd level in the band allocated to RNSS should be in the order of –115 to –119 dBW/m^2/MHz. A final value can be established only after an in-depth analysis of the various sources of interference to which the DME is subject.

2.4 The pfd limits indicated in paragraph 2.3 represent the aggregate level of interference of all RNSS systems sharing the same spectrum. As an example, in the case of three satellite constellations operating in the same frequency band, the pfd per system would have to be 5 dB lower than the aggregate pfd limit referred to in Section 2.3 above.

2.5 Should more DME/P channels be required in the future, in addition to those currently assigned, additional protection margin would be required for the protection of the new channels. The receiver sensitivity threshold for DME/P is 3 dB lower than that for a DME and the receiver bandwidth is in the order of 1 to 3 MHz. This would add in total about –4.8 dB to –9.8 dB to the pfd limits referred to in Sections 2.3 and 2.4 above.

3 Conclusion

3.1 As a result of the preliminary work in ICAO to ensure protection of current operations of DME in the band 960-1 215 MHz, a provisional pfd limit for an RNSS allocation in this band should be in the range of –115 to –119 dBW/m^2/MHz for the aggregate interference from all RNSS systems operating in the same spectrum.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 2 to
Document 4-E
1 May 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Note by the Secretary-General

ICAO POSITION FOR THE CONFERENCE

I have the honour to bring to the attention of the Conference, at the request of the Secretary-General of the International Civil Aviation Organization (ICAO), the annexed information paper.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

Use of the band 2 700-2 900 MHz by the aeronautical radionavigation service

Agenda item 1.6.1 - review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

1 Introduction

1.1 This paper addresses issues concerning the introduction of a mobile service in the band 2 700-2 900 MHz. This band is allocated to the aeronautical radionavigation service on a primary basis and used for terminal approach radar (airport radar) and radars for meteorological purposes. In addition, in Canada, this band is allocated to the maritime radionavigation service for use by shore-based radar (RR S5.424 refers).

2 Current use of the band 2 700-2 900 MHz

2.1 The band 2 700-2 900 MHz is heavily used for air traffic control (surveillance) purposes by primary radar systems on a global basis. In addition, this band is used for meteorological radar, providing meteorological information for aeronautical and other services.

2.2 Most of today’s radars utilize two discrete frequencies to provide for frequency diversity in order to improve the performance of the system. Normally, radar stations are equipped with dual systems and each system is tuned to one of these frequencies. Furthermore, in order to satisfy requirements for adequate near and far detection of aircraft, many of these radar systems provide for more than one set of frequencies, thus increasing the bandwidth required for one single radar system accordingly.

2.3 Technical requirements for radar stations are normally determined on a national basis and it is difficult and speculative to agree on a model of a typical radar station which, when applied in interference assessment activities, can be used to provide for a typical sharing scenario.

2.4 The aeronautical use of the band 2 700-2 900 MHz is expected to increase significantly over the next ten years and to continue well beyond 2010. It is of paramount importance to aviation that the currently available spectrum for radar stations is maintained and that no additional restrictions be placed on future frequency assignments for radar stations. It has been considered extremely difficult, if not impossible, to relocate radar stations from the band 2 700-2 900 MHz to other frequency bands. Such relocation would also involve considerable costs for administrations providing air traffic control facilities. Typically, these radar stations are installed on busy airports, which are normally situated in areas of high population density. The operational range extends to 60-100 nautical miles.

3 Conclusions

3.1 Studies in ICAO show that sharing of aeronautical spectrum, used by radar systems, with (non-aeronautical) mobile systems is not feasible. One important reason for this position is the fact that the widespread and constantly growing use of mobile stations cannot be adequately controlled while maintaining the protection of aeronautical radar stations with the availability, reliability and continuity required for aviation.

3.2 ITU-R Study Group 8 has recently adopted Recommendation ITU-R M.[RAD.CHAR2] containing characteristics of radionavigation and meteorological radars and protection criteria in the frequency band 2 700-2 900 MHz. Also relevant to the protection of radar systems is Recommendation ITU-R M.[RAD.PROC] containing procedures for determining the potential for interference between radars operating in the radiodetermination service and systems in other services which was also adopted by Study Group 8. These Recommendations have to be used when assessing compatibility with other systems, taking into consideration adequate safety margins.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Note by the Secretary-General

ICAO POSITION FOR THE CONFERENCE

I have the honour to bring to the attention of the Conference, at the request of the Secretary-General of the International Civil Aviation Organization (ICAO), the annexed information paper.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

Aeronautical access to the satellite bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz

Agenda item 1.10 - to consider results of ITU-R studies carried out in accordance with Resolution 218 (WRC-97) and take appropriate action on this subject

1 Introduction

1.1 The ICAO position on WRC-2000 agenda *resolves* 1.10 is stated in Document WRC2000/4, paragraph 3.11.6. The purpose of this addendum is to provide additional supporting material on the issues to be discussed by the Conference.

2 Background

2.1 WRC-97 replaced the exclusive allocation to the AMS(R)S in the bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz with a “generic” allocation to the MSS and with footnote S5.357A. It was then recognized by WRC-97 (Resolution 218 refers) that the potential consequences of the new allocation needed to be assessed, and that further action would need to be taken.

2.2 The consequences have now become clear. A number of MSS systems that do not provide AMS(R)S are using spectrum in the former AMS(R)S band. It is expected that the potential growth of AMS(R)S could be compromised due to the lack of guarantees about the long-term availability of the bands. Urgent action is therefore required in order to develop a suitable regulatory framework to support further development of the service.

3 AMS(R)S spectrum requirements

3.1 Today, AMS(R)S is in operational use worldwide for such applications as automatic dependent surveillance (ADS) and controller-pilot data link communications (CPDLC), and the level of implementation is growing. This growth trend is in line with the projected spectrum requirements identified by the International Air Transport Association (IATA) and ICAO and submitted to ITU-R during the preparation to the WRC-2000. However, the full extent of the planned future expansion of AMS(R)S may be stifled due to the increasing congestion being experienced in the bands.

4 Results of the ITU studies

4.1 The ITU studies carried out in accordance with Resolution 218 have been unable to agree on a definitive approach to address the potentially serious problems ahead. They have assumed that the current approach (see section 5) may be acceptable in the short to medium time-frame. The investigation of longer term solutions has been deferred to further studies. The problem with these conclusions is twofold:

a) the current approach has a number of difficulties which will make it ineffective to deal with all but today's immediate needs; and

b) longer term solutions need to be defined now, in order for them to be implemented in time to meet the need when it arises.

5 Difficulties with the current approach

5.1 The approach currently followed to cater for AMS(R)S spectrum requirements has been termed "capacity planning". It is reported that the process consists of periodical reviews of current spectrum sharing arrangements in the band, performed by some satellite system operators, assisted by the respective administrations.

5.2 The current approach does succeed in accommodating today's relatively modest AMS(R)S spectrum requirements.

5.3 Nevertheless, difficulties with the current approach will arise as soon as spectrum congestion will increase and additional AMS(R)S spectrum will be required to accommodate the growth of the service. In such a situation, footnote S5.357A implies that current non-AMS(R)S operators may need to vacate spectrum already coordinated (and possibly in operational use) to satisfy new AMS(R)S requirements. However, no regulatory procedure or mechanism has been defined so far to provide a positive assurance that this action can be implemented as required.

5.4 The current approach also lacks transparency. The results of the periodical coordination process which takes place among a limited number of administrations and system operators are not made available to ITU and are not in the public domain. The organizations invited by Resolution 218 to participate in the related ITU-R studies on the issue (ICAO, IMO and the International Association of Lighthouse Authorities (IALA)) are not allowed to participate in the process as observers, and are not informed of the results.

5.5 It is felt that a documented record of the results of the process needs to be maintained (preferably within ITU). Access to the record should be possible for any administration or concerned international organization.

5.6 The difficulties discussed in this section severely undermine the confidence that the international civil aviation community has in the current approach, and justify the need for urgent action on the matter.

6 Comments on WRC-2000 proposals

6.1 A number of proposals have been presented to this Conference on this agenda item. None of them supports what is obviously the most effective approach to meet the requirements of the AMS(R)S (albeit not necessarily the most efficient in the short to medium term), i.e. the reinstatement of an exclusive allocation.

6.2 Within the constraints of the existing "generic" allocation, some proposals focus only on a procedural approach, whereby the coordination process is strengthened and accommodation of the needs of the AMS(R)S is attempted through periodic coordination exercises.

6.3 Other proposals focus only on technical solutions, whereby inter-system prioritization and pre-emption techniques are developed to enable dynamic spectrum reassignment among operators to cater for the needs of AMS(R)S on a real-time basis.

6.4 It is considered that each of these two approaches is incomplete if followed in isolation.

6.5 Strengthening the current coordination process to address the concerns expressed in section 5 could achieve some results in the short to medium time-frame. It is, however, unlikely that, in the longer term, the requirements of the AMS(R)S could be met with the necessary reliability and availability in the absence of technical means to ensure that a more flexible use of spectrum is implemented among the various MSS and AMS(R)S systems operating in the band.

6.6 Conversely, the study of techniques allowing dynamic spectrum reassignment among operators, in the absence of effective measures to strengthen the coordination process in the short to medium term, would be unlikely to result in the development of a timely solution. The burden of implementation of a novel and complex technical solution involving close cooperation between competing satellite network operators in such a critical domain as frequency management could only be justified in practical terms if all procedural avenues have been fully exploited.

6.7 Instead, it is considered that the two approaches are complementary and need to be pursued in parallel. Such a parallel approach has been proposed to the Conference in Document WRC2000/20 (APT common proposals for the work of the Conference), and is supported by ICAO as the one that most closely approximates the requirements of the international civil aviation community, in the absence of proposals to reinstate the exclusive allocation.

7 Conclusion

7.1 The perceived “lack of efficiency” of the pre-WRC-97 regulatory regime, has merely been replaced by the “lack of effectiveness” of the current regime, which fails to provide a stable framework for the development of the service and jeopardizes the substantial investments made by aviation to foster such development. Unless technical and regulatory measures along the lines of those proposed in Document WRC2000/20 are put in place as a matter of urgency, the growth of AMS(R)S will be stifled and the safety, regularity and efficiency of international civil aviation will be adversely affected.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to Document 4-E
1 May 2000
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PLENARY MEETING

Note by the Secretary-General

ICAO POSITION FOR THE CONFERENCE

I have the honour to bring to the attention of the Conference, at the request of the Secretary-General of the International Civil Aviation Organization (ICAO), Corrigendum 1 to the information paper contained in Document 4.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

1 Update to the ICAO position

1.1 In the light of progress made by administrations and regional telecommunication organizations on the development of proposals for WRC-2000, ICAO has made the following updates to the ICAO position with respect to ITU WRC-2000.

Please *replace* the text in Section 3.17 of Document WRC2000/4 with the following:

"3.17 **To consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments**

3.17.1 The allocation to the radionavigation-satellite service in the band 1 559-1 610 MHz supports operations of GLONASS and GPS, presently defined elements of the ICAO GNSS. Adequate spectrum for GNSS evolution or to enhance the current use of GNSS is needed.

3.17.2 **Frequency band 960-1 215 MHz**

3.17.2.1 Adequate spectrum for the radionavigation-satellite service (RNSS) in this band should be made available with provisions which protect the current usage of this band by the aeronautical radionavigation service (ARNS), such as ACAS, DME and SSR. RNSS systems should neither cause harmful interference to the ARNS nor claim protection from the ARNS. Studies in ITU should be undertaken to assess compatibility between the ARNS and the RNSS. Any allocation to the RNSS in this band should be limited to the smallest portion necessary.

3.17.3 **Frequency band 5 000-5 150 MHz**

3.17.3.1 There are no objections to introducing an allocation to the RNSS in the band 5 000-5 030 MHz, as this band is not planned for future use by the ARNS.

3.17.3.2 As studies have shown that MLS and RNSS cannot share the same spectrum, an allocation to the RNSS in the band 5 030-5 150 MHz needs to be opposed in order to safeguard spectrum requirements for MLS which are subject to review in ITU in 2003.

3.17.4 **ICAO position**

3.17.4.1 Introduction of the RNSS in the band 960-1 215 MHz can be supported subject to the introduction of regulatory provisions in the Radio Regulations which protect the aeronautical radionavigation service. ITU studies on technical requirements to obtain compatibility are required.

3.17.4.2 Introduction of RNSS in the band 5 000-5 030 MHz is acceptable. Introduction of RNSS in the band 5 030-5 150 MHz cannot be supported."

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PLENARY MEETING

Note by the Secretary-General

ICAO INFORMATION PAPER

I have the honour to bring to the attention of the Conference, at the request of the Secretary-General of the International Civil Aviation Organization (ICAO), the annexed information paper.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

ICAO POSITION FOR THE ITU WRC-2000

SUMMARY

This document reviews the agenda for the ITU WRC-2000, discusses points of aeronautical interest and provides the ICAO position for each.

CONTENTS

1. INTRODUCTION

1.1 This document addresses the ICAO position on issues of interest to international civil aviation to be decided at the ITU World Radiocommunication Conference (2000) (WRC-2000).

2. SPECTRUM REQUIREMENTS FOR INTERNATIONAL CIVIL AVIATION

2.1 The safety of air operations is vitally dependent on the availability of communications and navigation services that are reliable and free from harmful interference. Continuous contact between pilot and ground with a safety message every few minutes in high-traffic density conditions is necessary to provide an air traffic service and to avoid collision in the air. Systems for navigation must be available for all phases of flight. Satellite systems for use in aircraft are now a fully mature technology and are foreseen to provide practical and realizable benefits, which can materially contribute to operational enhancements. Future strategies, based on an increased use of space-based systems, have been agreed as international civil aviation policy through the principles established in the ICAO communications, navigation, and surveillance/air traffic management (CNS/ATM) systems. The associated high reliability and availability requirements demand special conditions to avoid harmful interference to these systems.

2.2 For the future, the radio frequency spectrum needs for civil aviation arising from the increased growth in air transport is stable, and no major adjustments in the current allocations are foreseen, as these appear capable of meeting currently known requirements for the future. In recent World Radiocommunication Conferences, however, the spectrum allocated to aeronautical services has been reduced in some bands; in other bands, sharing with non-aeronautical services was adopted notwithstanding strong aviation opposition. As a consequence of these measures, the remaining allocations will need to be fully utilized in order to accommodate the expected traffic growth. Modern technology, better modulation methods and the use of satellites will all contribute to achieve the objective of satisfying demands.

2.3 The introduction of the above-mentioned sharing scenarios must be considered with extreme care. In cases of high operational criticality (such as precision approach and landing), they must be thoroughly proven in real life before the implementation. This may be difficult and risky when expensive satellite systems are being considered and when real-time tests are normally impractical. As a consequence of these difficulties, the international civil aviation community retains the firm opinion that high critical operational systems, such as those used for low visibility approach and landing, should always operate in exclusive frequency bands.

3. ASPECTS ON THE AGENDA FOR WRC-2000

Note.- All of the items appearing in the agenda for WRC-2000 are mentioned below together with a comment. Where the item contains matters of concern to aeronautical radio services, a statement of the ICAO position is also given.

3.1 WRC-2000 Agenda Resolves 1.1 - Requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution 26 (Rev.WRC-97)

3.1.1 Allocations to the aeronautical mobile service and the aeronautical radionavigation service are generally made for all world regions and normally on an exclusive basis. These principles reflect the global process of standardization within ICAO for the promotion of safety and to support the global interoperability of radiocommunication and radionavigation equipment used in transport aircraft. In many cases, country footnotes allocate spectrum to radio services other than those identified in the table of allocations, normally in limited geographical areas. Such allocation can be made on a primary or secondary basis. In circumstances where the country footnote allocation in an aeronautical band is to a service other than the aeronautical, such use generally precludes full and unrestrained use of the band by the aeronautical allocation identified. In highly utilized aviation bands, which have to cope with future increased demands, the presence of country footnotes allocating spectrum to another service is undesirable. In many cases, such practice leads to an inefficient use of available frequencies by both services, notably when the systems have different technical characteristics. For these reasons, the following footnotes should be deleted:

a) **S5.181, S5.197, S5.259**

This family of similar footnotes, covering the bands used for ILS localizer and VOR (108 - 117.975 MHz), glide path (328.6 - 335.4 MHz) and marker beacons (75 MHz), was inserted by the ITU World Administrative Radio Conference 1987 (WARC-87), in the expectation of a release, or reduction, of the use of these bands by the aeronautical radionavigation service. At that time, it was expected, in view of the plans to replace ILS with MLS by 1998, that ILS would be withdrawn. These bands were earmarked by the WARC-87 for re-allocation to the mobile service, in principle for non-aeronautical usage. The plans for replacing ILS with MLS have changed and it is now very unlikely that the mobile service will, in the foreseeable future, be able to get access to these bands. In addition, recently, the need to use the band 108 - 117.975 for global navigation satellite system (GNSS) ground-based augmentation systems (GBAS) has emerged and relevant frequency planning criteria are under development by the GNSS Panel. These country footnotes should now be deleted since they no longer represent a realistic expectation, and additionally create an undesirable precedent for introducing a new service in spectrum that will be used for safety critical operations and will not be vacated in the future; and

b) **S5.355, S5.359**

These footnotes allow the operation of fixed services in the band 1 559 - 1 610 MHz. This band is allocated, on a worldwide basis, to the aeronautical radionavigation service and the radionavigation satellite service and it accommodates various significant elements of the GNSS. Studies undertaken in some Contracting States indicate that a geographical separation exceeding line of sight (in the order of 400 km) is required to ensure safe operation of GNSS. This is a very severe restriction, which will prohibit the use of GNSS over a wide area of the Earth’s surface, including a greater part of Europe, Middle East and Africa. To compensate for these restrictions, retention of terrestrial radionavigation systems may be needed, leading to further inefficient use of available spectrum. More importantly, harmful interference situations can arise leading to disruption to GNSS, affecting the safety of aircraft in flight.

3.1.2 **ICAO POSITION**

3.1.2.1 **To support deletion of footnotes S5.181, S5.197 and S5.259 on the grounds that they no longer represent a realistic possibility to introduce the mobile service in the relevant bands**.

3.1.2.2 **To support deletion of footnotes S5.355 and S5.359 from the band 1 559 - 1 610 MHz, or establish a closing date, not later than 2005, after which the fixed service would cease to operate in this band.**

3.2 **WRC-2000 Agenda Resolves 1.2 - To finalize remaining issues in the review of Appendix S3 to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation 66 (Rev.WRC-97) and the decisions of WRC-97 on adoption of new values, due to take effect at a future time, of spurious emissions for space services**

3.2.1 Spurious emission limits for all radio transmitters have been specified in Section 1 of Appendix S3 of the Radio Regulations. Appendix S3 stipulates that these limits will apply to all transmitters installed on or before 1 January 2003 and would include all existing radar transmitters. Conformance with these provisions will require expensive modification. Furthermore, difficulties are expected with the adoption of the method for the measurement of spurious emissions of ATC radar stations.

3.2.2 **ICAO POSITION**

3.2.2.1 **To support measures intended to clarify that radar stations installed on or before 1 January 2003 remain exempt from spurious emission limits.**

3.3 **WRC-2000 Agenda Resolves 1.3 - To consider the results of ITU-R studies in respect of Appendix S7/28 on the method for the determination of the coordination area around an earth station in frequency bands shared among space services and terrestrial radiocommunication services, and take the appropriate decisions to revise this appendix**

3.3.1 No impact on aeronautical radio services has been identified.

3.4 **WRC-2000 Agenda Resolves 1.4 - To consider issues concerning allocations and regulatory aspects related to Resolutions 126 (WRC-97), 128 (WRC-97), 129 (WRC-97), 133 (WRC-97), 134 (WRC-97) and 726 (WRC-97)**

3.4.1 No impact on aeronautical radio services has been identified.

3.5 **WRC-2000 Agenda Resolves 1.5 - To consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution 122 (WRC-97)**

3.5.1 No impact on aeronautical radio services has been identified.

3.6 **WRC-2000 Agenda Resolves 1.6.1 - Review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary**

3.6.1 Proposals may be developed aimed at accommodating the mobile service providing the terrestrial elements of IMT-2000 in bands currently allocated to the aeronautical radionavigation and radiolocation service between 2 700 MHz and 3 400 MHz. These bands are heavily used for air traffic control radar surveillance functions and to meet other important national requirements. Some operational functions carried out with these systems cannot be replaced with any other present or expected future system. A full study on the present use of this band by radar stations and on future requirements is necessary to determine whether any removal of these to higher frequency bands is possible. There is no possibility for practical sharing arrangements between these aeronautical radar stations and terrestrial (land) mobile services, hence any proposal of this type is not acceptable.

3.6.1.1 The requirement for airport and TMA primary radar coverage is foreseen to remain. Removal of radar stations from the band 2 700 - 2 900 MHz into the band 2 900 - 3 400 MHz would be extremely difficult if not impossible due to the requirements for large bandwidth for modern radar stations. It would also require major design and reconstruction effort to make the required frequency changes to many radar systems.

3.6.1.2 In the ASIA/PACIFIC region, a number of administrations have indicated that the band 2 700 - 2 900 MHz is the preferred band for primary ATC and airport surveillance radar.

3.6.2 **ICAO POSITION**

3.6.2.1 **To oppose any proposed new allocation to the mobile service, in bands between 2 700 and 3 400 MHz allocated or used by aeronautical services as no compatibility studies have been undertaken yet. Support action for a full study of the present use of these bands by radar stations, and of the feasibility of solutions to allow access by mobile services to provide a basis for an eventual future allocation.**

3.7 **WRC-2000 Agenda Resolves 1.6.2 - Identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000**

3.7.1 No impact on aeronautical radio services has been identified.

3.8 **WRC-2000 Agenda Resolves 1.7 - Review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting operational, distress and safety communications, taking into account Resolution 346 (WRC-97)**

3.8.1 Resolution 346 addresses the use of specific frequencies by the maritime mobile service in the HF bands allocated to the maritime mobile service.

3.8.2 The aeronautical mobile (R) frequencies of 3 023 kHz and 5 680 kHz are designated for use by aeronautical and maritime services, and by manned space vehicles for search and rescue operations. Furthermore, all frequencies in the HF bands allocated exclusively to the aeronautical mobile (R) service are used to communicate operational safety messages in accordance with RR S43.1. Unauthorized use by other services in contravention of the requirements of the ITU Radio Regulations, and particularly with the provisions of Appendix S27, is increasing and causing serious degradations to safety communications. Special measures to eradicate unauthorized use are therefore necessary.

3.8.3 The frequencies used by the aeronautical mobile (R) service and the conditions for their utilization are contained in Appendix S27 to the ITU Radio Regulations. Conformity with ITU Radio Regulation S1.33 requires only Ccommunications relating to safety and regularity of flight, primarily along national or international civil air routes- to be passed on frequencies assigned to the aeronautical mobile (R) service. In addition, the aeronautical frequencies 3 023 kHz and 5 680 kHz have been designated in S5.115 and in Articles S31 and Appendix S13 for use by ships and aircraft engaged in coordinated search and rescue operations. These uses are ongoing for the foreseeable future.

3.8.4 Presently, HF bands are nearly saturated by the use of analog voice communications. ICAO is implementing a new digital HF data link (HFDL) communications system that will provide a capability for the transfer of air traffic control data to and from pilots operating over oceanic airspace, on polar routes, and in airspace over sparsely populated or developing countries where other communication systems are not practical. The data link communications being implemented worldwide will reduce the burden on voice communications between pilots and controllers by using the data link for routine communications and freeing voice communications for more critical communications. HFDL will not replace voice communications.

3.8.5 **ICAO POSITION**

3.8.5.1 **To support measures that can lead to a removal of all unauthorized use of the frequencies allocated to the aeronautical mobile (R) service between 2 850 and 22 000 kHz.**

3.9 WRC-2000 Agenda Resolves 1.8 - To consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700 - 4 200 MHz and 5 925 - 6 425 MHz, including their coordination with other services allocated in these bands

3.9.1 No impact on aeronautical radio services has been identified.

3.10 WRC-2000 Agenda Resolves 1.9 - To take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service (MSS) in a portion of the 1 559 - 1 567 MHz frequency range, in response to Resolutions 213 (WRC-97) and 220 (WRC-97)

3.10.1 The band 1 559 - 1 610 MHz is allocated, on a primary basis, to the aeronautical radionavigation service and the radionavigation satellite service. Two GNSS elements, GLONASS and GPS, are currently in operation in this band. The GNSS has been chosen as a core navigation technology of the ICAO CNS/ATM systems. The ICAO GNSS Panel is developing worldwide Standards and Recommended Practices (SARPs) for incorporation in ICAO Annexes. Navigation capability for all types of aircraft for en-route, terminal, precision approach and aerodrome surface operations is envisaged, involving use of the band for augmentation systems such as pseudolites, operating in the band 1 559 - 1 575 MHz and for future satellite navigation systems. As a ground-based emitter, the pseudolite augments the availability of the GNSS by providing an additional ranging signal for the approach phase of flight.

3.10.2 Any sharing of this band with other systems has the potential to cause harmful interference to safety critical aeronautical services and is intrinsically unacceptable. The protection of a radionavigation service requires special treatment under the ITU Radio Regulations, effectively creating a situation of rights to be observed by any other services that may cause harmful interference.

3.10.3 In the case of the GNSS, an array of measures, both administrative and technical, is necessary to assure complete protection at all times. These measures would include adequate coordination and control, enabling immediate remedial action when harmful interference occurs. Technical provisions are an essential part of the protection structure and will require continuation of study in ITU-R and in ICAO, taking account of all the necessary operational features envisaged.

3.10.4 Resolution 220 (WRC-97), which addresses the study on the feasibility of operating a mobile-satellite service (space-to-Earth), includes technical criteria and operational and safety requirements for the aeronautical radionavigation service.

3.10.5 Studies on the feasibility of sharing are being progressed in various fora, including the GNSS Panel. The results indicate that practical and safe sharing conditions cannot be established. In particular, it has been concluded that, in order to protect GNSS systems, MSS space-to-Earth transmissions must be limited to minus 138 dBW/m^2/MHz for wideband signals, and minus 148 dBW/m^2/MHz for narrowband signals. With the current state of the art, MSS systems limited to these low power flux densities are not feasible. Apart from aviation safety considerations, restrictions which constrain the aeronautical use or further development of existing and envisaged systems are not acceptable to aviation.

3.10.6 It is essential to ensure that, in the future, the total band for GNSS (1 559 - 1 610 MHz) remain free from interference from non-aeronautical sources. In particular, no allocation to the mobile-satellite service should be made. Resolution 220 (WRC-97) should be deleted from the Radio Regulations as studies on this issue of sharing GNSS with MSS have concluded that such sharing is not feasible.

3.10.7 **ICAO POSITION**

3.10.7.1 a) **no allocation should be made to the MSS service in the band 1 559 - 1 567 MHz; and**

b) **delete Resolution 220**

3.11 **WRC-2000 Agenda Resolves 1.10 - To consider results of ITU-R studies carried out in accordance with Resolution 218 (WRC-97) and take appropriate action on this subject**

3.11.1 At the WRC-97, strong reservations were expressed by the aeronautical and maritime community on the feasibility of introducing an allocation to the mobile satellite service (generic) in respect of a number of important technical and operational points affecting the aeronautical and maritime mobile-satellite services. Principally, these reservations relate to the need to assure that adequate access to the radio frequency spectrum is available as and when it is needed. Also, concern was expressed with respect to the feasibility of preemption between networks. WRC-97 agreed to a generic allocation to the mobile-satellite service at 1.5/1.6 GHz. Footnote S5.357A was established with the intention of providing access in the future to the AMS(R)S and gives priority to AMS(R)S when coordinating spectrum. There are now serious concerns that footnote S5.357A is ineffective in the situation where all of the allocation is in use, and no release can be agreed. This would appear to negate the intention of the provision, and create the situation of no access as referred to in the ICAO input to WRC-97. Also the introduction of a priority and pre-emption mechanism within and between satellite systems, is becoming questionable. These mechanisms add extra cost and complexity to the systems. This situation must be revisited at WRC-2000 and a more positive mechanism put in place. A number of other aspects of concern to aviation were included in the request to ITU-R study groups to consider and to report to WRC-2000.

3.11.2 The results of ICAO studies of future spectrum requirements are now available. In respect of spectrum estimates, the long-term requirement for AMS(R)S for the various world areas are: 10.8 MHz up to 2 010 and 18 MHz beyond that time frame. These are for safety purposes only and do not include requirements for public correspondence.

3.11.3 The preemption type solution to secure aviation access to the RF spectrum solution has been considered recently in ITU and it has been concluded that this solution is expected to add additional cost and operational complexity in network control systems and network operations, in comparison to systems without full pre-emption capabilities. Further studies on the possibility to provide priority and pre-emption between different services operating within a single system, as well as between systems, are required. Therefore, it is expected that these options might only be implemented in satellite systems in the longer term.

3.11.4 The ITU considered also that the current of capacity planning, where on a regular basis spectrum is reserved for exclusive aeronautical communications, may satisfy the spectrum requirements for AMS(R)S in the near future, due to the low growth rate of AMS(R)S communications. The cooperation of MSS operators is an important element in the process of capacity planning.

3.11.5 There are in aviation considerable doubts on the capability of the present generic allocation to satisfy aeronautical spectrum requirements to meet the future needs of the AMS(R)S.

3.11.6 **ICAO POSITION**

3.11.6.1 **a) to support the spectrum requirements of 10.8 MHz up to 2 010 and 18 MHz beyond 2010;**

b) to recover the exclusive allocation of the bands 1 545 - 1 555 MHz and 1 646.5 - 1 656.5 MHz to AMS(R)S, unless

c) adequate technical and regulatory provisions are agreed to:

1) guarantee the availability of spectrum for aeronautical communications as required; and

2) ensure that aeronautical communications in Categories 1 to 6 of Article S.44 are given priority and immediate access at all times.

3.12 **WRC-2000 Agenda Resolves 1.11 - To consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions 214 (Rev.WRC-97) and 219 (WRC-97)**

3.12.1 The spectrum below 1 GHz contains a number of important aeronautical and radionavigation bands, where the main aeronautical terrestrial radio services supporting air operations are located. All of these bands are under considerable pressure to provide for the future growth of air traffic in the years ahead.

3.12.2 The main VHF communications band at 117.975 - 137 MHz supports all of the short- and medium-range communications over continental airspace and will continue for the foreseeable future to provide this function. Radionavigation systems operate at 75 MHz, 108 to 117 975 MHz, 324.6 to 335.4 MHz, and 960 to 1 215 MHz. They will be required well into the next century.

3.12.3 **ICAO POSITION**

3.12.3.1 **Maintain all aeronautical allocations below 1 GHz without change and taking account of the ICAO position on Agenda Item 1.1 in regard to S5.181, S5.197 and S5.259.**

3.13 **WRC-2000 Agenda Resolves 1.12 - To consider the progress of studies on sharing between feeder links of non-GSO MSS networks and GSO FSS networks in the bands 19.3 - 19.7 GHz and 29.1 - 29.5 GHz, taking into account Resolution 121 (Rev.WRC-97)**

3.13.1 No impact on aeronautical radio services has been identified.

3.14 **WRC-2000 Agenda Resolves 1.13.1 - To review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services**

3.14.1 No impact on aeronautical radio services has been identified.

3.15 **WRC-2000 Agenda Resolves 1.13.2 - To consider the inclusion in other frequency bands of similar limits in Articles S21 and S22, or other regulatory approaches to be applied in relation to sharing situations**

3.15.1 No impact on aeronautical radio services has been identified.

3.16 WRC-2000 Agenda Resolves 1.14 - To review the results of the studies on the feasibility of implementing non-GSO MSS feeder links in the 15.43 - 15.63 GHz in accordance with Resolution 123 (WRC-97)

3.16.1 The report of CPM-97 to WRC-97 proposed a sharing methodology between the aeronautical radionavigation systems presently in operation in this band, and the proposed Earth-to-space and space-to-Earth transmissions of the fixed-satellite service in the same band. Although international civil aviation had to accept the present allocation in Article S5, together with the safeguards for both services contained in the relevant ITU-R Resolutions, as a basis for sharing, it should be noted that this has been achieved by placing restrictions on several radionavigation systems, both ground-based and onboard aircraft.

3.16.2 The submission to WRC-97 for the FSS allocation mentioned the limited nature of the requirement. Aviation is advised that changes to these plans have now taken place. Also the constraints on the FSS placed by the WRC-97 further limit the use of this band by the FSS. In the interest of spectrum efficiency, it is argued that the allocation to the fixed-satellite service should be removed if it is anticipated that the allocation will not in fact be used. It is further proposed that any limited use should be covered by a footnote.

3.16.3 **ICAO POSITION**

3.16.3.1 **No further restrictions to the aeronautical radionavigation service are acceptable. Support action for removal of the fixed-satellite service, in particular, if under the current conditions the band cannot be efficiently used by the fixed-satellite service.**

3.16.3.2 **Support limitation to the footnote allocation to the FSS indicating that the band is used for the fixed satellite service and that no more assignments should be made to the FSS after the closure date of the WRC-2000.**

3.17 WRC-2000 Agenda Resolves 1.15.1 - To consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments

3.17.1 The allocation to the radionavigation service in the band 1 559 - 1 610 MHz supports operations of GLONASS and GPS, the two radionavigation satellite systems which, together with supporting augmentation systems, are the presently identified elements of the ICAO GNSS system. The availability of adequate spectrum to support second generation systems or to enhance the current use of GNSS is fully supported. Due account must be given to the effect of additional allocations on the current usage of frequency bands where additional RNSS allocations are proposed. No requirements are foreseen for RNSS systems in the band above 5 GHz. With respect to the possible use of the band 1 164 - 1 188 MHz by an additional GNSS frequency, ICAO is considering compatibility aspects to secure protection of the current aeronautical users of this band.

3.17.2 Support the availability of adequate spectrum for GNSS systems taking into account the result of studies assessing the compatibility between RNSS and the current allocation to the band being considered. Protection needs to be given to ensure that current users of the band are not affected by these allocations.

3.17.3 **ICAO POSITION**

3.17.3.1 **To support the availability of adequate spectrum for GNSS systems.**

3.18 **WRC-2000 Agenda Resolves 1.15.2 - To consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the bands 1 215 - 1 260 MHz and 1 559 - 1 610 MHz**

3.18.1 Introduction of an allocation enabling space-to-space operations of GLONASS and GPS does not affect aviation. As such allocation will not interfere with the projected aeronautical use of GNSS, proposals for this allocation can be permitted.

3.18.2 **ICAO POSITION**

3.18.2.1 **No objections to a space-to-space allocation to the radionavigation satellite service in the bands 1 215 - 1 260 MHz and 1 559 - 1 610 MHz.**

3.19 **WRC-2000 Agenda Resolves 1.15.3 - To consider the status of allocations to services other than the radionavigation-satellite service (Nos. S5.355 and S5.359) in the band 1 559 - 1 610 MHz**

3.19.1 For more information on this subject, see paragraph 3.11.

3.19.2 **ICAO POSITION**

3.19.2.1 **The operation of fixed service on the frequencies between 1 559 and 1 610 MHz should be discouraged and ceased.**

3.20 **WRC-2000 Agenda Resolves 1.16 - To consider allocation of frequency bands above 71 GHz to the earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution 723 (WRC-97)**

3.20.1 No impact on aeronautical radio services has been identified.

3.21 **WRC-2000 Agenda Resolves 1.17 - To consider possible worldwide allocation for the earth exploration-satellite (passive) and space research (passive) services in the band 18.6 - 18.8 GHz, taking into account the results of the ITU-R studies**

3.21.1 No impact on aeronautical radio services has been identified.

3.22 **WRC-2000 Agenda Resolves 1.18 - To consider the use of new digital technology for the maritime mobile service in the band 156 - 174 MHz and consequential revision of Appendix 18/S18, taking into account Resolution 342 (WRC-97)**

3.22.1 No impact on aeronautical radio services has been identified.

3.23 **WRC-2000 Agenda Resolves 1.19 - To consider the report of the inter-conference representative group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system**

3.23.1 No impact on aeronautical radio services has been identified.

3.24 **WRC-2000 Agenda Resolves 1.19 bis - In accordance with Article S14, to consider objections expressed by administrations with respect to the Radio Regulations Board’s Rules of Procedure relating to the application of RR 2674/S23.13 in order for the Bureau to modify its findings in accordance with the conclusions of the Conference**

3.24.1 No impact on aeronautical radio services has been identified.

3.25 **WRC-2000 Agenda Resolves 1.20 - To consider the issues related to the application of Nos. S9.8, S9.9 and S9.17 and the corresponding parts of Appendix S5 with respect to Appendices S30 and S30A, with a view to possible deletion of Articles 6 and 7 of Appendices S30 and S30A, also taking into consideration Recommendation 35 (WRC-95)**

3.25.1 No impact on aeronautical radio services has been identified.

3.26 **WRC-2000 Agenda Resolves 1.21 - To consider the report from the Radiocommunication Bureau on results of the analysis in accordance with Resolution 53 (WRC-97) and take appropriate actions**

3.26.1 No items have been identified at this point in time.

3.27 **WRC-2000 Agenda Resolves 2 - To examine the revised ITU-R recommendations 28 (WRC-95); and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution 27 (Rev.WRC-97)**

3.27.1 At this point, no ITU-R recommendations referring exclusively to aeronautical radio services and incorporated by reference in the ITU Radio Regulations have been identified.

3.27.2 Provision RR S34.1 of the ITU Radio Regulations specifies that ELT signals on 406.0 MHz or in the band 1 645.5 - 1 646.5 MHz shall be in accordance with relevant ITU-R Recommendations (see Resolution 27 (WRC-95)).

3.27.3 **ICAO POSITION**

3.27.3.1 **To support the policy of linked reference in respect of RR S34.1 for ELTs.**

3.28 **WRC-2000 Agenda Resolves 3 - To consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the Conference**

3.28.1 No items have been identified at this point in time.

3.29 **WRC-2000 Agenda Resolves 4 - In accordance with Resolution 95 (WRC-97), to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation**

3.29.1 No items have been identified at this time.

3.30 **WRC-2000 Agenda Resolves 5 - To review, and take appropriate action on, the report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the Convention (Geneva, 1992)**

3.30.1 To be addressed when the further material is available.

3.31 **WRC-2000 Agenda Resolves 6 - To identify those items requiring urgent action by the radiocommunication study groups in preparation for the next world radiocommunication conference**

3.31.1 No items have been identified at this point in time.

3.32 WRC-2000 Agenda Resolves 7.1 - To consider and approve the report of the Director of the Radiocommunication Bureau on the activities of the Radiocommunication Sector since WRC-97

3.32.1 No items have been identified at this point in time.

3.33 WRC-2000 Agenda Resolves 7.2 - To recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent Conference and on possible agenda items for future conferences

3.33.1 No items for inclusion in the agenda for the next WRC have been identified.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

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PLENARY MEETING

Note by the Secretary-General

INFORMATION ON THE OCCUPANCY BY THE FIXED AND MOBILE SERVICES IN THE ADDITIONAL HF BANDS ALLOCATED BY WARC-92 TO THE BROADCASTING SERVICES

This document contains the report of the Director of the Radiocommunication Bureau which was prepared in response to Resolution 29 (WRC-97).

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

Director, Radiocommunication Bureau

REPORT ON THE ISSUES REFERRED TO IN RESOLUTION 29 (WRC-97)

1 Introduction

By its Resolution 29, WRC-97 resolved to instruct the Director, BR,

> *"1 to present a report to the 1999 Conference Preparatory Meeting (CPM-99) and WRC-99, providing information gathered by means of consultation with administrations, on the occupancy by fixed and mobile services in each of the additional HF bands allocated by WARC-92 to the broadcasting service;*
>
> *2 to provide to CPM-99 and WRC-99 any new information with regard to possible sharing between broadcasting and other services in the HF bands, together with the information already provided to WARC-92".*

An interim report on these subjects was presented to CPM-99. Following that meeting, the Bureau updated the information on the occupancy by the fixed and mobile services in the bands referred to in No. S5.134 (Section 2 of this report). Section 3 of this report, including the associated attachments, which deal with information on the possible sharing between broadcasting and other services in the HF bands, is identical with the information already presented to CPM-99.

2 Information on the occupancy by the fixed and mobile services in some HF bands

In April 1999, the Radiocommunication Bureau initiated the consultation procedure referred to in *resolves 1* of Resolution 29 (WRC-97). A questionnaire was addressed to all ITU Member States and the administrations were requested to indicate the current use of the frequency bands referred to in No. **S5.134**, which were allocated to the broadcasting service by WARC-92 and which would become available for the broadcasting service on 1 April 2007, as indicated in provision Nos. **S5.136**, **S5.143**, **S5.146** and **S5.151**. In a parallel activity, the Bureau sent extracts from the Master Register to 166 administrations that have recorded frequency assignments to the fixed and mobile services in the bands subject to consultation and asked them to review the extracts with a view to update the information recorded in the Master Register.

By 2 December 1999, 66 administrations replied to the questionnaire. The summary of these replies is given in Table 1, for each specific band. The symbols used in Table 1 are explained in the auxiliary Table which follows Table 1.

TABLE 1

Current and intended occupancy of some HF bands by fixed and mobile services (as indicated by administrations)

Frequency band (kHz)	XX	U2	U5	U7	UU
5 900-5 950	BTN, CBG, CVA, EST, FIN, HRV, ISL, ISR, LTU, MKD, MNG, MWI, POL, SUI, TON	DNK, ERI, TJK, UZB,	ARM, MOZ, TZA,	B, BEL, BLR, D, ETH, J, KOR, LBY, LSO, NCG, S, THA, YEM	ARG, AUS, AUT, BDI, BFA, BGD, BOT, CAN, CHN, EGY, GHA, GNE, HNG, IND, IRN, MLD, MLI, MRC, NMB, SLV, TUR, UAE, UKR, USA, VTN, ZMB
7 300-7 350	BTN, CVA, ERI, EST, FIN, HRV, ISL, LTU, MKD, MWI, POL, SLV, SUI, TON	DNK, MNG, TJK, UZB,	ARM, BFA, ISR, MOZ, TZA, YEM	B, BEL, BLR, D, ETH, J, KOR, LBY, LSO, NCG, S, THA	ARG, AUS, AUT, BDI, BGD, BLZ, BOT, CAN, CHN, EGY, GHA, GNE, HNG, IND, IRN, MLD, MLI, MRC, NMB, TUR, UAE, UKR, USA, VTN, ZMB
9 400-9 500	BTN, CVA, DNK, EST, FIN, GNE, ISL, LSO, LTU, MKD, MWI, POL, SLV, SUI, TJK, TON	HNG, UZB,	ARM, BFA, ISR, MOZ, TZA, YEM	AUT, B, D, ERI, ETH, HRV, J, KOR, LBY, NCG, MNG, S, THA, UAE	ARG, AUS, BDI, BEL, BLR, BLZ, BGD, BOT, CAN, CHN, EGY, GHA, IND, IRN, MLD, MLI, MRC, NMB, TUR, UKR, USA, VTN
11 600-11 650	AUT, BLR, BTN, CVA, EST, GNE, HRV, ISL, J, LSO, LTU, MKD, MLD, MOZ, MWI, POL, SLV, SUI, TJK, TON	DNK, ERI, HNG, MNG, UZB, YEM	ARM, BFA, ISR	B, BEL, BOT, D, ETH, KOR, LBY, NCG, NMB, S, THA, TZA,	ARG, AUS, BDI, BGD, BLZ, CAN, CHN, EGY, FIN, GHA, IND, IRN, MLI, MRC, TUR, UAE, UKR, USA, VTN
12 050-12 100	BFA, BTN, CVA, EST, ETH, FIN, GNE, HNG, HRV, ISL, ISR, J, LSO, LTU, MKD, MOZ, MWI, POL, SLV, SUI, TJK, TON	DNK, ERI, MNG, TUR, UZB, YEM	ARM, MLI	B, BEL, BLR, D, AUT, KOR, LBY, NCG, S, THA, TZA, UAE	ARG, AUS, BDI, BGD, BLZ, BOT, CAN, CHN, EGY, GHA, IND, IRN, MLD, MRC, NMB, UKR, USA, VTN
13 570-13 600	AUT, BFA, BOT, BTN, CVA, DNK, EST, ETH, FIN, GNE, HRV, ISL, ISR, LSO, LTU, MKD, MLD, MOZ, MWI, POL, POR, SLV, SUI, TJK, TON, UAE	ERI, MNG, TUR, UZB, YEM	ARM, MLI	B, BEL, D, HNG, J, KOR, LBY, NCG, S, THA, TZA,	ARG, AUS, BDI, BGD, BLR, BLZ, CAN, CHN, EGY, GHA, IND, IRN, MRC, NMB, UKR, USA, VTN, ZMB

13 800-13 870	BFA, BOT, BTN, CVA, D, ERI, EST, GNE, ISL, LSO, LTU, LUX, MKD, MOZ, MWI, POL, SLV, SUI, TJK, TON, UAE	MNG, UZB, YEM	ARM, DNK, ISR, MLI	AUT, B, BEL, ETH , HRV, J, KOR, LBY, NCG, S, THA, TZA,	ARG, AUS, BDI, BGD, BLR, BLZ, CAN, CHN, EGY, FIN, GHA, HNG, IND, IRN, MLD, MRC, NMB, TUR, UKR, USA, VTN, ZMB
15 600-15 800	BFA, BTN, CVA, DNK, ERI, EST, GNE, HRV, ISL, LSO, LTU, LUX, MKD, MLD, MOZ, MWI, SLV, SUI, TJK, TON, YEM, ZMB	HNG, MLI, MNG, POL, UZB,	ARM, ISR	ARG, AUT, B, D, ETH, J, KOR, LBY, NCG, NMB, S, THA, TZA,	AUS, BDI, BEL, BGD, BLR, BLZ, BOT, CAN, CHN, EGY, FIN, GHA, IND, IRN, MRC, POR, TUR, UAE, USA, VTN
17 480-17 550	AUT, BLR, BTN, CBG, CVA, EGY, ERI, EST, ETH, FIN, GNE, HRV, ISL, ISR, J, LSO, LTU, MKD, MLI, MOZ, MWI, POL, SLV, SUI, TJK, TON, YEM	ARG, TUR, UZB,	ARM, BFA, DNK	NCG, B, D, HNG, KOR, LBY, MNG, NMB, S, THA, TZA,	AUS, BDI, BEL, BGD, BLZ, BOT, CAN, CHN, GHA, IND, IRN, MLD, MRC, POR, UAE, UKR, USA, VTN
18 900-19 020	ARG, B, BFA, BTN, CVA, DNK, EST, ETH, FIN, GNE, HNG, HRV, ISL, ISR, LSO, LTU, MKD, MLD, MLI, MOZ, MWI, POR, SLV, SUI, TJK, TON, YEM, ZMB	POL, UZB,	ARM, MNG	AUT, D, J, KOR, LBY, NCG, NMB, S, THA, TZA,	AUS, BDI, BEL, BGD, BLR, BLZ, BOT, CAN, CHN, EGY, ERI, GHA, IND, IRN, MRC, TUR, UAE, UKR, USA, VTN

Symbol	Meaning
XX	This band is not used for the fixed and mobile services and there are no intentions for such an use
U2	This band is currently used for the fixed and mobile services; however, there are no intentions for such a use ***after 1 January 2002***
U5	This band is currently used for the fixed and mobile services; however, there are no intentions for such a use ***after 1 January 2005***
U7	This band is currently used for the fixed and mobile services; however, there are no intentions for such a use ***after 1 January 2007***
UU	This band is currently used for the fixed and mobile services and there are intentions for such a use ***beyond 1 January 2007***

In a parallel activity, several administrations updated the information in the Master Register on their frequency assignments to stations in the fixed and mobile services in the bands which were subject to consultation. In general, this action resulted in a deletion of the unused assignments from the Master Register, although several administrations notified new frequency assignments. The comparative situation of the number of frequency assignments, in each of the bands referred to in No. **S5.134**, before the consultation procedure (on 1 April 1999), at the time of preparation of the interim report to CPM-99 (6 September 1999) and at the time of preparation of this report (2 December 1999) is given in Table 2.

TABLE 2

Occupancy of some HF bands (situation in the MIFR)

Frequency band (kHz)	**No. of assignments (1.4.99)**	**No. of assignments (6.9.99)**	**No. of assignments (2.12.99)**
5 900-5 950	2 409	2 156	2 147
7 300-7 350	2 238	2 131	2 137
9 400-9 500	2 511	2 229	2 236
11 600-11 650	842	754	752
12 050-12 100	682	604	601
13 570-13 600	350	274	273
13 800-13 870	710	649	645
15 600-15 800	1 275	1 144	1 141
17 480-17 550	532	478	469
18 900-19 020	262	237	228
Total	**11 811**	**10 656**	**10 629**

3 Information on possible sharing between broadcasting and other services in the HF bands

3.1 General considerations

The CCIR Report to WARC-92 in its Section 5 (see *Attachment 1* to this document) deals with compatibility considerations arising from the allocation of spectrum to HF broadcasting. Work carried out since 1992 on this subject has not significantly modified the above-mentioned considerations. The following sections indicate changes and updates in the ITU-R texts relevant to sharing between broadcasting and other services in the HF bands.

3.2 Status of the work

Since WARC-92 results of studies on sharing have been included in the following revised texts:

a) Recommendation ITU-R F.240-6 (Signal-to-interference protection ratios for various classes of emission in the fixed service below about 30 MHz): Table 1 to this Recommendation (see *Attachment 2* to this document) has been updated and complemented. The CCIR Report to WARC-92 indicated this text as the most suitable to provide a satisfactory set of protection criteria applicable to sharing of frequencies by fixed and mobile stations.

b) Recommendation ITU-R BS.560-4 (Radio-frequency protection ratios in LF, MF and HF broadcasting): Annex 4 to this Recommendation has been updated to include the planning parameters adopted by HFBC-87.

c) Recommendation ITU-R BS.640-3 (Single-sideband (SSB) system for HF broadcasting): The text includes now an improved specification of the suppression of the unwanted sideband and the noise-limited sensitivity of SSB receivers.

d) Recommendation ITU-R P.1060 (Propagation factors affecting frequency sharing in HF terrestrial systems): This text identifies the propagation factors and conditions that may facilitate sharing in the HF bands.

e) Recommendation ITU-R M.831 (Frequency sharing between services in the band 4-30 MHz): This text refers to sharing between fixed, mobile and broadcasting services at HF. It includes a list of technical and operational characteristics pertinent to the various services which should be taken into account when defining sharing criteria.

An updated list of related ITU-R texts is to be found in *Attachment 3*.

It should be finally noted that an increasing activity is now addressed to the development of digital sound broadcasting systems operating at frequencies below 30 MHz, in the framework of ITU-R Q.217-1/10. It is anticipated that the implementation of such systems will facilitate sharing with other services. A recommendation concerning such systems is foreseen during the year 2000.

Attachments: 3

ATTACHMENT 1

Extracts from the CCIR Report to WARC-92 (Doc. 3, Section 5)[1]

5 Compatibility considerations arising from the allocation of spectrum to HF broadcasting

(Resolves 2.2.2 of Resolution No. 995 of the ITU Administrative Council)

5.1 General considerations

The agenda of the WARC-92 calls for the possible extension of the frequency spectrum allocated exclusively to HF broadcasting, as indicated in Recommendation 511 (HFBC-87)[2]. This may extend the HF broadcasting allocations into spectrum at present allocated to other services. Existing assignments would need to be displaced to make room for the new broadcasting allocations. This displacement of existing assignments to other parts of the spectrum should be organized in an orderly manner and should not harmfully affect the quality of operations for the stations concerned. The implementation of techniques such as reduced carrier single-sideband modulation for the HF broadcasting service should be considered in the interests of enhanced spectrum efficiency and access to the HF bands.

5.2 Sharing considerations service-by-service

5.2.1 Amateur and amateur-satellite services

Sharing arrangements exist now between the amateur service and:

– the amateur-satellite service, in exclusive amateur and amateur-satellite service HF bands;

– the fixed service in six bands (3.5, 7, 10.1, 14.25, 18.068 and 24.89 MHz);

– the mobile services in two bands (3.5 and 24.89 MHz);

– the meteorological aids service (24.89 MHz).

The amateur-satellite service can only share the HF bands with the amateur service and, under certain circumstances, with the meteorological aids service.

Reason – low signal level service.

The sharing of frequency bands by the amateur and broadcasting services is undesirable and should be avoided.

Reason – system incompatibility between broadcasting and amateur services.
(See RR Resolution 641 (Rev. HFBC-87)).

[1] In order to facilitate the reading of this Attachment, the Bureau introduced also the new references to the provisions of Radio Regulations, as they appear in the 1998 edition of the RR.

[2] Note by the Bureau: this Recommendation was suppressed by WARC-92.

5.2.2 Standard frequency and time signal service

This service cannot share on an equal basis with any other service. It has a primary status in currently assigned bands (5, 10, 15, 20 and 25 MHz). It accepts the space research service on a secondary basis.

Reason – standard frequency and time service signals operate in narrow frequency bands and are used on a high priority basis by all other services; therefore they require a high degree of protection.

5.2.3 Space research

This service operates on a secondary basis in the bands (5, 10, 15, 20 and 25 MHz) designated for primary use by the standard frequency and time signals service.

5.2.4 Radioastronomy

This service cannot share the HF band with any other service except after special coordination or procedures (13.36 and 25.55 MHz, No. **S5.149**/RR533, 545).

Reason – service operates at extremely low signal levels (near or below noise level).

5.2.5 Meteorological aids

This service is now sharing at 27.5 MHz with mobile and fixed services. Under some circumstances it can also share with the amateur and amateur-satellite services (24.89 MHz).

Reason – existing sharing situation with mobile and fixed services. Sharing with the amateur service is possible where meteorological aids do not operate continuously.

5.2.6 Aeronautical mobile (R)

This service cannot share with other services within a Region.

Reason – contains safety of life communications.

5.2.7 Aeronautical mobile (OR)

Below 6 MHz, this service is now sharing with land mobile, maritime mobile (except international distress and calling frequencies), fixed, amateur services, with tropical broadcasting and with ISM applications.

Above 6 MHz, this service operates to a Plan and cannot share with other services.

Reason – contains safety of life communications.

5.2.8 Maritime mobile

Maritime mobile international distress and calling frequencies cannot be shared with other services except for search and rescue operations (e.g., concerning manned space vehicles).

Reason – contains safety of life communications.

Below 4 063 kHz, the maritime mobile service (except international distress and calling frequencies) is now sharing with the land mobile, fixed, and amateur services, with tropical broadcasting and with ISM applications.

Above 4 063 kHz, this service operates to a Plan[3] and does not share with any other service except fixed in the band 8 100 to 8 195 kHz.

Reason – contains safety of life communications.

5.2.9 Land mobile

This service is now sharing with the maritime (except international calling and distress frequencies), fixed and amateur services, with tropical broadcasting below 6 MHz (but see § 5.7), and with ISM applications.

5.2.10 Fixed

This service is now sharing with the land mobile, maritime mobile (except international calling and distress frequencies) and amateur services, with tropical broadcasting below 6 MHz (but see § 5.7), and with ISM applications. Some sharing with the broadcasting service has been adopted within the broadcasting band extensions agreed by WARC-79. (See **S5.147**/RR 530).

5.2.11 ISM applications

These applications are now sharing relatively narrow HF bands with the land mobile and fixed services subject to special authorization by the administration concerned or provided that radiocommunication services operating within the band accept harmful interference which may be caused by these applications. (See **S5.138**/RR 524 and **S5.150**/RR 534, 546.)

5.3 Protection ratios

Sharing is facilitated by choice of a protection ratio less than that for the highest quality, e.g., use of a ratio that produces a median or acceptable quality.

Protection criteria related to sharing of frequencies by fixed stations are contained within CCIR Recommendation 240. Although it was developed for use by the fixed service only, this Recommendation has also been found useful for the mobile services. CCIR Recommendation 240 provides the most current and satisfactory set of protection criteria applicable to this sharing problem.

Protection ratios relative to some sharing situations are given in Table V-I which has been taken from CCIR Recommendation 240. The Table contains a choice of three protection ratio values, relating to different quality grades for telephony services only.

[3] Note by the Bureau: as a matter of fact, only some sub-bands are subject to a Plan, notably those parts that are reserved for duplex radiotelephony, see Appendix S25 to the RR.

TABLE V-I - Minimum required protection ratios in dB

Class of emission of wanted signal		Class of emission of interfering signal																		
		A1A	A1B (1) 50 baud	A1B 100 baud	A2A A2B	F1B (1)	F7B	R3C	F3C	A3E (5) (7) (9)	H3E (7)	R3E (7)	J3E (7)	B8E (7)	J2B	H2A H2B	J7B	R7B	(15) non-diversity	(15) diversity
A1A/A1B			13			13	3			5	5	10	11	5	13	7				27(12)
A2A/A2B										5	11	16	17	11						
F1B(3)			1	3(2)		7	2(2)			-3	3	8	9	3	3	-3				27(12)
F7B			4(4)				4(4)								4	-2				12(13)
R3C			16			16	16								16	10			20	
F3C			15			15	15								15	9			20	
A3E(5)(6)	JU (16)		13		1	21	17	19	20	6	12	17	18	12	13	7	20	19		
	MC		29		17	33	35	34	35	18	24	29	30	24	29	23	34	33		
	GC		56		44	60	66	64	65	39	45	50	51	45	56	50	56	55	17(14)	
H3E(5)(6)(7)	JU (16)		7		-5	15	11	13	14	0	6	11	12	6	7	1	14	13		
	MC		23		11	27	29	28	29	12	18	23	24	18	23	17	28	27		
	GC		50		38	54	60	58	59	33	39	44	45	39	50	44	50	49		
R3E(5)(6)(7)	JU (16)		2		-10	10	6	8	9	-5	1	6	7	1	2	-4	9	8		
	MC		18		6	22	24	23	24	7	13	18	19	13	18	12	23	22		
	GC		45		33	49	55	53	54	28	34	39	40	34	45	39	45	44	17(14)	
J3E(5)(6)(7)	JU (16)		1		-11	9	5	7	8	-6	0	5	6	0	1	-5	8	7		
	MC		17		5	21	23	22	23	6	12	17	18	12	7	11	22	21		
	GC		44		32	48	54	52	53	27	33	38	39	33	44	38	44	43	17(14)	
B8E(5)(6)(7)	JU (16)		7		-5	15	11	13	14	0	6	11	12	6	7	1	14	13		
	MC		23		11	27	29	28	29	12	18	23	24	18	23	17	28	27		
	GC		50		38	54	60	58	59	33	39	44	45	39	50	44	50	49		
J2B										5										
H2A/H2B										-1										
J7B(8)			17.5			20.5	20.5								17.5	11.5				
R7B			18.5			21.5	21.5								18.5	12.5				

( ) : See notes on next page.

Notes to Table V-I:

(1) Bandwidth of interfering signals limited to 500 Hz.

(2) For a probability of character error $P_c = 0.0001$.

(3) For a probability of character error $P_c = 0.001$.

(4) For a traffic efficiency of 90%.

(5) For telephony the values of protection ratios for stable conditions have been derived from information contained in Report 989 and 990. The figures for A3E telephony are valid only for reception with an SSB receiver.

(6) With the use of a noise reducer for the wanted signal, the figures in column 1 are reduced by ... dB (to be determined).

(7) With the use of Lincompex terminals for the wanted signal, the figures in column 1 are reduced by ... dB (to be determined). When the interfering signal is a telephony transmission using Lincompex terminals, the figures in column 1 are increased by ... dB (to be determined).

(8) Values derived from information contained in Report 991.

(9) Average degree of modulation 70%; sideband components extended to ± 3 kHz.

(10) Combined allowances for fading safety factor and intensity fluctuation factor.

(11) The probability distribution of the radio of two signals fading independently has been applied in accordance with Doc. [CCIR, 1953]. The combined intensity fluctuation allowance for two signals has been taken as 7 dB, which represents a compromise between the 0 dB allowance, appropriate to perfectly correlated intensity fluctuations of the two signals, and the 14 dB allowance appropriate to uncorrelated intensity fluctuations of the two signals.

(12) For protection 99.99% of the time.

(13) Based on 90% traffic efficiency.

(14) Based on 90% protection.

(15) Provisional total fading allowances (10) for the protection of a fading signal against an interfering signal subject to fading and day-to-day intensity fluctuations. (See (11)). (dB to be added to values in columns).

(16) JU: just usable; MC: marginally commercial; GC: good commercial.

5.4 Dynamic frequency sharing

Dynamic frequency sharing or real time frequency management is a useful tool for providing communication circuits that are not otherwise possible because of interference constraints. Dynamic sharing implies operation on a secondary basis where there is no possibility of a claim for interference-free communication. This type of sharing is possible with frequency-agile transmitting and receiving equipment made feasible by modern technology. Dynamic frequency sharing is enhanced when one service operates with high power on known or published frequencies, such as the broadcasting service and the dynamic service operates with low power involving two-way communications such as in the fixed, mobile and amateur services. No. **S5.147**/RR 530 gives an example of bands in which dynamic sharing is possible.

5.5 Noise

Using the most accurate noise data will facilitate prudent management and efficient utilization of the frequency spectrum. The use of data on radio noise is addressed in CCIR Recommendation 372.

5.6 Encouraging the introduction of single-sideband (SSB) modulation

The use of SSB in the HF bands allocated to the broadcasting service will reduce overall interference levels and contribute to HF spectrum efficiency. Implementation of SSB in accordance with Appendix **S11**/45 to the Radio Regulations should, therefore, be encouraged. Consideration should also be given to limiting HF broadcasting to reduced carrier SSB, initially in any band extensions agreed at the WARC-92 as this would maximize spectrum efficiency. As new HF transmitters currently being installed are capable of SSB operation, the emphasis should be on early manufacture and sale of low-cost receivers and consideration should be given to advancing the date of the final transition to SSB and cessation of HF double-sideband broadcasting.

5.7 Existing undesirable compatibility situations

There are some existing sharing situations which have been found in practice to create unacceptable levels of interference under certain conditions.

5.7.1 Amateur and broadcasting services

The 7 100-7 300 kHz band is allocated exclusively to the broadcasting service in Regions 1 and 3 and exclusively to the amateur service in Region 2. In general this geographical sharing works despite the large disparity in signal levels between the two services. However, during periods of good propagation between Regions 1 and 2, the broadcasting transmissions can produce signal strengths in Region 2 sufficiently high to cause serious interference to the sensitive receivers used in the amateur service. The degree of interference experienced in Region 2 varies with time-of-day, season, solar activity and distance from Region 1.

5.7.2 Broadcasting and fixed services

Below 6 MHz, the broadcasting and fixed services are allocated to the same frequency bands in some parts of the HF spectrum. In general, a narrow-bandwidth fixed service transmission can operate successfully within the service area of a normal-bandwidth broadcasting signal provided the fixed service transmission is not coincident with the broadcasting carrier. However, if such a fixed service is a continuous transmission, it can seriously degrade the reception of the broadcasting transmission by producing a heterodyne whistle in the broadcasting receiver.

5.8 Band adjacency

In any discussions regarding band extensions for HF broadcasting, account should be taken of the provisions of No. **S4.5**/RR 343.

5.9 Channel adjacency

Any HF spectrum re-allocation should take into account, where appropriate, the differing power-levels of adjacent channel services.

REFERENCES

CCIR Documents

[1990-1994]: Document JIWP 10-3-6-8/1-18 (JIWP 10-3-6-8/1).

APPENDIX TO § 5

List of CCIR texts relating to § 5

Volume VI (Düsseldorf, 1990)

Recommendation 372-5	Use of data on radio noise
Recommendation 533-2	Estimating sky-wave field-strength at frequencies between 2 and 30 MHz

Annex to Volume VI (Düsseldorf, 1990)

Report 266-7	Ionospheric propagation and noise characteristics pertinent to terrestrial radiocommunication systems design and service planning

Volume X.1 (Düsseldorf, 1990)

Recommendation 560-3	Radio-frequency protection ratios in LF, MF and HF broadcasting
Recommendation 411-4	Fading allowances in HF broadcasting
Recommendation 639	Necessary bandwidth of emission in LF, MF and HF broadcasting
Recommendation 597-1	Channel spacing for sound broadcasting in band 7 (HF)
Recommendation 702	Synchronization and multiple frequency use per programme in HF broadcasting
Recommendation 640-1	Single-sideband (SSB) system for HF broadcasting
Recommendation 48-2	Choice of frequency for sound broadcasting in the Tropical Zone
Recommendation 216-2	Protection ratio for sound broadcasting in the Tropical Zone

Annex to Volume X.1 (Düsseldorf, 1990)

Report 1058	Minimum AF and RF signal-to-noise ratio required for broadcasting in band 7 (HF)
Report 1201	Number of HF sound broadcasting transmitters using a single channel
Report 458-5	Characteristics of systems in LF, MF and HF broadcasting
Report 1059-1	Characteristics of single-sideband systems in HF broadcasting
Report 302-1	Interference to sound broadcasting in the shared bands in the Tropical Zone
Report 303-3	Determination of the effects of atmospheric noise on the grade of reception in the Tropical Zone
Report 304-3	Fading characteristics for sound broadcasting in the Tropical Zone

ATTACHMENT 2

TABLE 1 (FROM RECOMMENDATION ITU-R 240-6)

Minimum required protection ratios and frequency separations*

WANTED SIGNAL		CLASS OF EMISSION OF INTERFERING SIGNAL																											
		Telegraphy												Telegraphy								Telegraphy							
Class of emission		A1A Manual				A1B 50 baud (1)				A1B 100 baud				A2A Manual				A2B 24 baud				F1B 50 baud 2D = 200 Hz (1)				F1B 50 baud 2D = 280 Hz (1)			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
		dB	kHz			dB	kHz			dB	kHz			dB	kHz			dB	kHz			dB	kHz			dB	kHz		
A1A telegraphy aural reception		13				13				13												13				13			
A1B telegraphy 50 baud printer B = 500 Hz		13				11	0.36	0.44	1.41	(2) 12	(2) 0.25	(2) 0.35										13				13	0.46	0.54	1.24
A1B telegraphy 100 and 120 baud recorder B = ...		13				13				13												13				13			
A2A telegraphy aural reception																													
A2B telegraphy, 24 baud																													
F1B telegraphy (3) 50 baud, printer 2D = 280 Hz: B = 500 Hz						1.0	0.2	0.28	0.6	3												7				7.0	0.32	0.39	0.67
F1B telegraphy 50 baud, printer 2D = 400 Hz: B = 500 Hz						1.0				(2) 3	(2) 0.35	(2) 0.50										7				7			
F7B telegraphy 200 baud, printer ARQ 2D = ... B = ...		4				4				4																			
F7B telegraphy 200 baud, printer ARQ 2D = 400 Hz: B = 500 Hz		4				4				(4) 4	(4) 0.40	(4) 0.55																	
F7B (2), 50 baud printer 2D = 1 200 Hz B = 1 200 Hz	Channel 1																					8				8			
	Channel 2																					18				18			
R3C phototelegraphy		16				16				16												16				16			
F3C phototelegraphy 60 rpm, B = 1 000 Hz		15				15				15	1.00	1.20										15				15			
A3E telephony Double sideband (5) (6)	just usable	13				13				13				1				1				21				21			
	marginally commercial	29				29				29				17				17				33				33			
	good commercial	56				56				56				44				44				60				60			
H3E telephony Single sideband full carrier (5) (6) (7)	just usable	7				7				7				–5				–5				15				15			
	marginally commercial	23				23				23				11				11				27				27			
	good commercial	50				50				50				38				38				54				54			
R3E telephony Single-sideband reduced carrier (5) (6) (7)	just usable	2				2				2				–10				–10				10				10			
	marginally commercial	18				18				18				6				6				22				22			
	good commercial	45				45				45				33				33				49				49			
J3E telephony Single-sideband suppressed carrier (5) (6) (7)	just usable	1				1				1				–11				–11				9				9			
	marginally commercial	17				17				17				5				5				21				21			
	good commercial	44				44				44				32				32				48				48			
R8E telephony Two independent sideband reduced or suppressed carrier (5) (6) (7)	just usable	7				7				7				–5				–5				15				15			
	marginally commercial	23				23				23				11				11				27				27			
	good commercial	50				50				50				38				38				54				54			
J2B																													
H2A/H2B																													
J7B multichannel V.F. telegraphy 250-3 000 Hz		17.5				17.5				17.5												20.5				20.5			
J7B multichannel V.F. telegraphy 300-3 400 Hz (8)		17.5				17.5	1.7	1.7	8.0	17.5	1.7	1.8	9.1									20.5	1.9	1.9	2.0	20.5			
R7B multichannel V.F. telegraphy reduced carrier		18.5				18.5				18.5												21.5				21.5			

TABLE 1 *(CONTINUED)*

WANTED SIGNAL	CLASS OF EMISSION OF INTERFERING SIGNAL																											
	Telegraphy																Telegraphy											
Class of emission	F1B 50 baud 2*D* = 400 Hz (1)				F1B 100 bauds 2*D* = 400 Hz				F1B 100 baud 2*D* = 500 Hz				F1B 200 baud 2*D* = 500 Hz				F7B 100 baud 2*D* = 400 Hz				F7B 100 baud 2*D* = 1500 Hz				F7B 200 baud 2*D* = 600 Hz			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	dB	kHz			dB	kHz			dB	kHz			dB	kHz			dB	kHz			dB	kHz			dB	kHz		
A1A telegraphy aural reception	13				13				13				13				3				3				3			
A1B telegraphy 50 baud printer *B* = 500 Hz	13				13				13				13				(2) 3	(2) 0.40	(2) 0.55		3				3			
A1B telegraphy 100 and 120 baud recorder *B* = ...	13				13				13				13				3				3				3			
A2A telegraphy aural reception																												
A2B telegraphy. 24 baud																												
F1B telegraphy (3) 50 baud. printer 2*D* = 280 Hz: *B* = 500 Hz	7				7				7				7				2				2				2			
F1B telegraphy 50 baud. printer 2*D* = 400 Hz: *B* = 500 Hz	7				7				7				7				(2) 2	(2) 0.45	(2) 0.60		2				2			
F7B telegraphy 100 baud. printer ARQ 2*D* = ... *B* = ...																	4				4				4			
F7B telegraphy 200 baud. printer ARQ 2*D* = 400 Hz: *B* = 500 Hz																	(4) 4	(4) 0.50	(4) 0.70		4				4			
F7B (3), 50 baud printer 2*D* = 1 200 Hz *B* = 1 200 Hz — Channel 1	8	0.85	0.95	1.51	8				8				8				8				8				8			
F7B (3), 50 baud printer 2*D* = 1 200 Hz *B* = 1 200 Hz — Channel 2	18	0.98	1.1	2.06	18				18				18				18				18				18			
R3C phototelegraphy	16				16				16				16				16				16				16			
F3C phototelegraphy 60 rpm, *B* = 1 000 Hz	15				15				15				15				15	1.10	1.20		15				15			
A3E telephony Double sideband (5) (6) — just usable	21				21				21				21				17				17				17			
A3E telephony Double sideband (5) (6) — marginally commercial	33				33				33				33				35				35				35			
A3E telephony Double sideband (5) (6) — good commercial	60				60				60				60				66				66				66			
H3E telephony Single sideband full carrier (5) (6) (7) — just usable	15				15				15				15				11				11				11			
H3E telephony Single sideband full carrier (5) (6) (7) — marginally commercial	27				27				27				27				29				29				29			
H3E telephony Single sideband full carrier (5) (6) (7) — good commercial	54				54				54				54				60				60				60			
R3E telephony Single-sideband reduced carrier (5) (6) (7) — just usable	10				10				10				10				6				6				6			
R3E telephony Single-sideband reduced carrier (5) (6) (7) — marginally commercial	22				22				22				22				24				24				24			
R3E telephony Single-sideband reduced carrier (5) (6) (7) — good commercial	49				49				49				49				55				55				55			
J3E telephony Single-sideband suppressed carrier (5) (6) (7) — just usable	9				9				9				9				5				5				5			
J3E telephony Single-sideband suppressed carrier (5) (6) (7) — marginally commercial	21				21				21				21				23				23				23			
J3E telephony Single-sideband suppressed carrier (5) (6) (7) — good commercial	48				48				48				48				54				54				54			
R8E telephony Two independent sideband reduced or suppressed carrier (5) (6) (7) — just usable	15				15				15				15				11				11				11			
R8E telephony Two independent sideband reduced or suppressed carrier (5) (6) (7) — marginally commercial	27				27				27				27				29				29				29			
R8E telephony Two independent sideband reduced or suppressed carrier (5) (6) (7) — good commercial	54				54				54				54				60				60				60			
J2B																												
H2A/H2B																												
J7B multichannel V.F. telegraphy 250-3 000 Hz	20.5				20.5				20.5				20.5				20.5				20.5				20.5			
J7B multichannel V.F. telegraphy 300-3 400 Hz (6)	20.5	1.9	1.9	2.1	20.5	1.9	1.9	2.8	20.5	2.0	2.0	2.9	20.5	1.9	2.0	3.1	20.5				20.5	2.4	2.5	3.5	20.5			
R7B multichannel V.F. telegraphy reduced carrier	21.5				21.5				21.5				21.5				21.5				21.5				21.5			

TABLE 1 *(CONTINUED)*

WANTED SIGNAL		CLASS OF EMISSION OF INTERFERING SIGNAL																											
		Telegraphy								Phototelegraphy								Telephony (7)											
Class of emission		F7B 200 baud 2*D* = 3 000 Hz				A1B 200 baud 2*D* = 1 200 Hz				R3C				F3C				A3E DSB (5) (9)				H3E full carrier				R3E reduced carrier			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
		dB	kHz			dB	kHz			dB	kHz			dB	kHz			dB	kHz			dB	kHz			dB	kHz		
A1A telegraphy aural reception		3				3												5				5				10			
A1B telegraphy 50 baud, printer *B* = 500 Hz		3				3												5				5				10			
A1B telegraphy 100 and 120 baud recorder *B* = ...		3				3												5				5				10			
A2A telegraphy aural reception																		5				11				16			
A2B telegraphy, 24 baud																		5				11				16			
F1B telegraphy (3) 50 baud, printer 2*D* = 280 Hz: *B* = 500 Hz		2				2												–3				3				8			
F1B telegraphy 50 baud, printer 2*D* = 400 Hz: *B* = 500 Hz		2				2												–3				3				8			
F7B telegraphy 100 baud, printer ARQ 2*D* = ... *B* = ...		4				4																							
F7B telegraphy 200 baud, printer ARQ 2*D* = 400 Hz: *B* = 500 Hz		4				4																							
F7B (3), 50 baud printer 2*D* = 1 200 Hz *B* = 1 200 Hz	Channel 1	8				8	1.24	1.33	2.32																				
	Channel 2	18				18	1.33	1.51	3.08																				
R3C phototelegraphy		16				16																							
F3C phototelegraphy 60 rpm, *B* = 1 000 Hz		15				15																							
A3E telephony Double sideband (5) (6)	just usable	17				17				19				20				6				12				17			
	marginally commercial	35				35				34				35				18				24				29			
	good commercial	66				66				64				65				39				45				50			
H3E telephony Single sideband full carrier (5) (6) (7)	just usable	11				11				13				14				0				6				11			
	marginally commercial	29				29				28				29				12				18				23			
	good commercial	60				60				58				59				33				39				44			
R3E telephony Single-sideband reduced carrier (5) (6) (7)	just usable	6				6				8				9				–5				1				6			
	marginally commercial	24				24				23				24				7				13				18			
	good commercial	55				55				53				54				28				34				39			
J3E telephony Single-sideband suppressed carrier (5) (6) (7)	just usable	5				5				7				8				–6				0				5			
	marginally commercial	23				23				22				23				6				12				17			
	good commercial	54				54				52				53				27				33				38			
R8E telephony Two independent sideband reduced or suppressed carrier (5) (6) (7)	just usable	11				11				13				14				0				6				11			
	marginally commercial	29				29				28				29				12				18				23			
	good commercial	60				60				58				59				33				39				44			
J2B																		5											
H2A/H2B																		–1											
J7B multichannel V.F. telegraphy 250-3 000 Hz		20.5				20.5																							
J7B multichannel V.F. telegraphy 300-3 400 Hz (8)		20.5	3.2	3.3	5.1	20.5																							
R7B multichannel V.F. telegraphy reduced carrier		21.5				21.5																							

TABLE 1 *(CONTINUED)*

CLASS OF EMISSION OF INTERFERING SIGNAL																												Provisional total fading allowances([10]) for the protection of a fading signal against an interfering signal subject to fading and day-to-day intensity fluctuations. (See ([11])) (dB to be added to values in columns numbered 1)	
Telephony								Telegraphy								Multichannel V.F. telegrapghy													
J3E suppressed carrier				B8E reduced or suppressed carrier				J2B				H2A/H2B				J7B suppressed carrier 250-3 000 Hz				J7B suppressed carrier 300-3 400 Hz				R7B reduced carrier					
1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
dB	kHz			dB	kHz			dB	kHz			dB	kHz			dB	kHz			dB	kHz			dB	kHz			non-diversity	diversity
11				5				13				7																	
11				5				13				7																	27 ([12])
11				5				13				7																	
17				11																									
17				11																									
9				3				3				–3																	
9				3				3				–3																	27 ([12])
								4				–2																	
								4				–2																	12 ([13])
								16				10																20	
								15				9																20	
18				12				13				7				20				20				19					
30				24				29				23				34				34				33					
51				45				56				50				56				56				55				17 ([14])	
12				6				7				1				14				14				13					
24				18				23				17				28				28				27					
45				39				50				44				50				50				49					
7				1				2				–4				9				9				8					
19				13				18				12				23				23				22					
40				34				45				39				45				45				44				17 ([14])	
6				0				1				–5				8				8				7					
18				12				7				11				22				22				21					
39				33				44				38				44				44				43				17 ([14])	
12				6				7				1				14				14				13					
24				18				23				17				28				28				27					
45				39				50				44				50				50				49					
								17.5				11.5																	
								17.5				11.5																	
								18.5				12.5																	

Notes to Table 1:

* Under “class of emission”, *B* represents the receiver bandwidth and 2*D* represents the total frequency shift.

(1) Bandwidth of interfering signals limited to 500 Hz.

(2) For a probability of character error $P_c = 0.0001$.

(3) For a probability of character error $P_c = 0.001$.

(4) For a traffic efficiency of 90%.

(5) For telephony the values of protection ratios for stable conditions have been derived from information contained in Annexes 1 and 2. The figures for A3E telephony are valid only for reception with an SSB receiver.

(6) With the use of a noise reducer for the wanted signal, the figures in column 1 are reduced by ... dB (to be determined).

(7) With the use of Lincompex terminals for the wanted signal, the figures in column 1 are reduced by ... dB (to be determined). When the interfering signal is a telephony transmission using Lincompex terminals, the figures in column 1 are increased by ... dB (to be determined).

(8) Values derived from information contained in Annex 3.

(9) Average degree of modulation 70%; sideband components extended to ± 3 kHz.

(10) Combined allowances for fading safety factor and intensity fluctuation factor.

(11) The probability distribution of the radio of two signals fading independently has been applied. The combined intensity fluctuation allowance for two signals has been taken as 7 dB, which represents a compromise between the 0 dB allowance, appropriate to perfectly correlated intensity fluctuations of the two signals, and the 14 dB allowance appropriate to uncorrelated intensity fluctuations of the two signals.

(12) For protection 99.99% of the time.

(13) Based on 90% traffic efficiency.

(14) Based on 90% protection.

ATTACHMENT 3

ITU-R texts relating to sharing between broadcasting and other services in the HF bands

ITU-R Recommendations Volume 1997 P-Series	
Rec. ITU-R P.372-6	Use of data on radio noise
Rec. ITU-R P.533-5	HF propagation prediction method
Rec. ITU-R P.1060	Propagation factors affecting frequency sharing in HF terrestrial systems
Rec. ITU-R P.842-1	Computation of reliability and compatibility of HF radio systems
ITU-R Recommendations Volume 1997 BS-Series	
Rec. ITU-R BS.560-4	Radio-frequency protection ratios in LF, MF and HF broadcasting
Rec. ITU-R BS.411-4	Fading allowances in HF broadcasting
Rec. ITU-R BS.639	Necessary bandwidth of emission in LF, MF and HF broadcasting
Rec. ITU-R BS.597-1	Channel spacing for sound broadcasting in band 7 (HF)
Rec. ITU-R BS.702-1	Synchronization and multiple frequency use per programme in HF broadcasting
Rec. ITU-R BS.640-3	Single-sideband (SSB) system for HF broadcasting
Rec. ITU-R BS.48-2	Choice of frequency for sound broadcasting in the Tropical Zone
Rec. ITU-R BS.216-2	Protection ratio for sound broadcasting in the Tropical Zone
Annex to Volume X.I (Düsseldorf, 1990)	
Report 1058	Minimum AF and RF signal-to-noise ratio required for broadcasting in band 7 (HF)
Report 1201	Number of HF sound broadcasting transmitters using a single channel
Report 458-5	Characteristics of systems in LF, MF and HF broadcasting
Report 1059-1	Characteristics of single-sideband systems in HF broadcasting
Report 302-1	Interference to sound broadcasting in the shared bands in the Tropical Zone
Report 303-3	Determination of the effects of atmospheric noise on the grade of reception in the Tropical Zone
Report 304-3	Fading characteristics for sound broadcasting in the Tropical Zone

ITU-R Recommendations Volume 1997 F-Series	
Rec. ITU-R F.240-6	Signal-to-interference protection ratios for various classes of emission in the fixed service below about 30 MHz
ITU-R Recommendations Volume 1997 M-Series	
Rec. ITU-R M.831	Frequency sharing between services in the band 4-30 MHz

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Document 6-E*[*]
10 January 2000
Original: English

PLENARY MEETING

Saudi Arabia (Kingdom of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

The Administration of Saudi Arabia carefully considered the various agenda items for the World Radiocommunication Conference (Istanbul, 2000). The proposals of Saudi Arabia relating to various agenda items will be presented to the Conference. However, a proposal related to one agenda item is included in this document for consideration by the Conference. The proposed modification is based on pressing service demands on the national level.

Agenda item 1.1

MOD ARS/6/1

S5.316 *Additional allocation*: in Germany, Saudi Arabia, Bosnia and Herzegovina, Burkina Faso, Cameroon, Côte d'Ivoire, Croatia, Denmark, Egypt, Finland, Israel, Kenya, the Former Yugoslav Republic of Macedonia, Libya, Liechtenstein, Monaco, Norway, the Netherlands, Portugal, Syria, Sweden, Switzerland and Yugoslavia, the band 790-830 MHz, and in these same countries and in Spain, France, Gabon and Malta, the band 830-862 MHz, are also allocated to the mobile, except aeronautical mobile, service on a primary basis. However, stations of the mobile service in the countries mentioned in connection with each band referred to in this footnote shall not cause harmful interference to, or claim protection from, stations of services operating in accordance with the Table in countries other than those mentioned in connection with the band.

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[*] Pursuant to Resolution 26 (Rev.WRC-97), the secretariat notes that this contribution was received on 4 January 2000.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 7-E
20 January 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Estonia (Republic of)

PROPOSAL FOR WORK OF THE CONFERENCE

The Republic of Estonia would like to make the following proposal for the work of the World Radiocommunication Conference (Istanbul, 2000) under agenda item 1.1 with respect to a footnote contained in Article S5:

MOD EST/7/1

S5.262 *Additional allocation:* in Saudi Arabia, Armenia, Azerbaijan, Bahrain, Belarus, Bosnia and Herzegovina, Bulgaria, Colombia, Costa Rica, Cuba, Egypt, the United Arab Emirates, Ecuador, ~~Estonia,~~ Georgia, Hungary, Indonesia, the Islamic Republic of Iran, Iraq, Israel, Jordan, Kazakstan, Kuwait, Liberia, Malaysia, Moldova, Nigeria, Uzbekistan, Pakistan, the Philippines, Qatar, Syria, Kyrgyzstan, Slovakia, Romania, Russian Federation, Singapore, Somalia, Sri Lanka, Tajikistan, Turkmenistan, Ukraine and Yugoslavia, the band 400.05-401 MHz is also allocated to the fixed and mobile services on a primary basis.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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24 January 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Czech Republic

PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.1

Introduction

Item 1.1 of the Conference agenda refers to the deletion of country names from the footnotes to the Table of Frequency Allocations in cases where the corresponding allocations are no longer required.

The Czech Republic submits the following proposals for deletion of its country name from the footnotes indicated below, based on the text of the Radio Regulations adopted by the World Radiocommunication Conference (Geneva, 1997).

MOD CZE/8/1

S5.290 *Different category of service:* in Afghanistan, Armenia, Azerbaijan, Belarus, China, Japan, Kazakstan, Mongolia, Uzbekistan, Kyrgyzstan, Slovakia~~, the Czech Republic,~~ Russian Federation, Tajikistan, Turkmenistan and Ukraine, the allocation of the band 460-470 MHz to the meteorological-satellite service (space-to-Earth) is on a primary basis (see No. **S5.33**), subject to agreement obtained under No. **S9.21**.

MOD CZE/8/2

S5.387 *Additional allocation:* in Armenia, Azerbaijan, Belarus, Georgia, Kazakstan, Mali, Mongolia, Uzbekistan, Kyrgyzstan, Slovakia,~~ the Czech Republic,~~ Romania, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the band 1 770-1 790 MHz is also allocated to the meteorological-satellite service on a primary basis, subject to agreement obtained under No. **S9.21**.

MOD CZE/8/3

S5.521 *Alternative allocation:* in Germany, Denmark, the United Arab Emirates, Greece~~,~~ and Slovakia~~ and the Czech Republic~~, the band 18.1-18.4 GHz is allocated to the fixed, fixed-satellite (space-to-Earth) and mobile services on a primary basis (see No. **S5.33**). The provisions of No. **S5.519** also apply.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 9-E
7 January 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Pakistan (Islamic Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

The Administration of Pakistan wishes to make the following proposals for the work of the Conference:

MOD PAK/9/1

S5.65 *Different category of service:* in Bangladesh~~,~~ and the Islamic Republic of Iran ~~and Pakistan~~, the allocation of the bands 112-117.6 kHz and 126-129 kHz to the fixed and maritime mobile services is on a primary basis (see No. **S5.33**).

MOD PAK/9/2

S5.277 *Additional allocation:* in Angola, Armenia, Azerbaijan, Belarus, Cameroon, the Congo, Djibouti, Gabon, Georgia, Hungary, Kazakstan, Latvia, Mali, Moldova, Mongolia, Uzbekistan, ~~Pakistan,~~ Poland, Kyrgyzstan, Slovakia, the Czech Republic, Romania, Russian Federation, Rwanda, Tajikistan, Chad, Turkmenistan and Ukraine, the band 430-440 MHz is also allocated to the fixed service on a primary basis.

MOD PAK/9/3

S5.331 *Additional allocation:* in Algeria, Germany, Austria, Bahrain, Belgium, Benin, Bosnia and Herzegovina, Burundi, Cameroon, China, Croatia, Denmark, the United Arab Emirates, France, Greece, India, the Islamic Republic of Iran, Iraq, Kenya, The Former Yugoslav Republic of Macedonia, Liechtenstein, Luxembourg, Mali, Mauritania, Norway, Oman, ~~Pakistan,~~ the Netherlands, Portugal, Qatar, Senegal, Slovenia, Somalia, Sudan, Sri Lanka, Sweden, Switzerland, Turkey and Yugoslavia, the band 1 215-1 300 MHz is also allocated to the radionavigation service on a primary basis.

MOD PAK/9/4

S5.483 *Additional allocation:* in Saudi Arabia, Armenia, Azerbaijan, Bahrain, Belarus, Bosnia and Herzegovina, China, Colombia, the Republic of Korea, Costa Rica, Egypt, the United Arab Emirates, Georgia, the Islamic Republic of Iran, Iraq, Israel, Japan, Jordan, Kazakstan, Kuwait, Latvia, Lebanon, Moldova, Mongolia, Uzbekistan, ~~Pakistan,~~ Qatar, Kyrgyzstan, Democratic People's Republic of Korea, Romania, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Yemen and Yugoslavia, the band 10.68-10.7 GHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis. Such use is limited to equipment in operation by 1 January 1985.

MOD PAK/9/5

S5.509 *Additional allocation:* in Japan ~~and Pakistan~~ the band 14.25-14.3 GHz is also allocated to the mobile, except aeronautical mobile, service on a primary basis.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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6 January 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Angola (Republic of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

The Administration of Angola wishes to put forward the following proposal for the work of the Conference:

ADD AGL/10/1

S5.316A *Additional allocation*: in Angola, the band 806-862 MHz is also allocated to the land mobile service on a primary basis.

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* Pursuant to Resolution 26 (Rev.WRC-97) the secretariat notes that this contribution was received on 6 January 2000.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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7 January 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Hungary (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

The Administration of Hungary wishes to make the following proposals for the work of the Conference:

MOD HNG/11/1

S5.155A In Armenia, Azerbaijan, Belarus, Bulgaria, Georgia, ~~Hungary,~~ Kazakstan, Moldova, Mongolia, Uzbekistan, Kyrgyzstan, Slovakia, the Czech Republic, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the use of the band 21 850-21 870 kHz by the fixed service is limited to provision of services related to aircraft flight safety.

MOD HNG/11/2

S5.206 *Different category of service:* in Armenia, Austria, Azerbaijan, Belarus, Bulgaria, Egypt, Finland, France, Georgia, Greece, ~~Hungary,~~ Kazakstan, Lebanon, Moldova, Mongolia, Uzbekistan, Poland, Kyrgyzstan, Syria, Slovakia, the Czech Republic, Romania, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the allocation of the band 137-138 MHz to the aeronautical mobile (OR) service is on a primary basis (see No. **S5.33**).

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Corrigendum 1 to Addendum 17 to Document 12-E
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ISTANBUL, 8 MAY – 2 JUNE 2000

WORKING GROUP 2 OF THE PLENARY

United States of America

PROPOSALS FOR AGENDA ITEM 7.2

TO RECOMMEND TO COUNCIL ITEMS FOR INCLUSION IN THE AGENDA FOR THE NEXT WRC, AND TO GIVE ITS VIEWS ON THE PRELIMINARY AGENDA FOR THE SUBSEQUENT CONFERENCE AND ON POSSIBLE AGENDA ITEMS FOR FUTURE CONFERENCES

Proposal for the agenda for the 2003 World Radiocommunication Conference

Please add *resolves* 2.14 through 2.16 to Resolution [WRC-03].

ADD USA/12/311

resolves

2.14 to consider additional allocations on a worldwide basis for the non-GSO MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to MOD Resolution **214 (Rev.WRC-2000)**;

2.15 to consider additional allocations in the bands near 1.4 GHz for the non-GSO MSS with service links below 1 GHz, taking into account the results of ITU-R studies conducted in response to MOD Resolution **127 (Rev.WRC-2000)**;

2.16 to consider primary allocations between 10 and 30 GHz for the space research service (space-to-Earth) to accommodate wideband downlink requirements;

Reasons: Draft resolution for the next WRC.

Proposal for the preliminary agenda for the 2005/6 World Radiocommunication Conference

In Resolution [WRC-05/06], please replace *resolves* 2.2 and renumber 2.2.3 to 2.3 and replace with the following text:

MOD USA/12/312

2.2 to review studies related to allocations to the non-GSO MSS below 1 GHz in the 470-862 MHz band (Resolution **728 (WRC-97)**);

2.3 to review studies and consider allocations if appropriate to the non-GSO MSS below 1 GHz in the 405-406 MHz band (Resolution **219 (WRC-97)**);

Add *resolves* 2.4 to Resolution [WRC-05/06].

ADD USA/12/313

2.4 to review studies and consider allocations in the frequency bands above approximately 3 000 GHz;

Reasons: Draft resolution for the next-but-one WRC.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 17 to Document 12-E
6 May 2000
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WORKING GROUP 2 OF THE PLENARY

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

PROPOSALS FOR AGENDA ITEM 7.2

to recommend to Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences

1 Proposal for the agenda for the 2003 World Radiocommunication Conference

Background information

The United States proposal for the agenda of WRC-03 is contained in Resolution [WRC-03].

ADD USA/12/309

RESOLUTION [WRC-03] (WRC-2000)

Agenda for the 2003 World Radiocommunication Conference

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that, in accordance with Nos. **118** and **126** of the Convention (Geneva, 1992), the general scope of the agenda for a world radiocommunication conference should be established four years in advance and a final agenda shall be established two years before the conference;

b) Article 13 of the Constitution (Geneva, 1992) regarding the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention (Geneva, 1992) regarding their agendas;

c) the relevant Resolutions and Recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

recognizing

a) that this Conference has identified a number of urgent issues requiring further examination by WRC-03;

b) that in preparing this agenda, many proposals from administrations could not be included and have had to be deferred to future conference agendas,

resolves

to recommend to Council that a world radiocommunication conference be held in early 2003 for a period of three or four weeks, with the following agenda:

1 to take appropriate action in respect of those urgent issues that were specifically requested by the 2000 World Radiocommunication Conference (WRC-2000);

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-2000, to consider and take appropriate action in respect of the following topics:

2.1 requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution **26 (Rev.WRC-97)**;

2.2 to consider the upgrade of allocations to the radiolocation service in the bands around 3 GHz and around 5.5 GHz;

2.3 to consider spectrum requirements for wideband aeronautical telemetry in the band between 3 GHz and 30 GHz;

2.4 to consider moving the existing additional allocation of the 7 145-7 235 MHz band on a primary basis pursuant to No. **S5.460** to within the frame of the Table of Frequency Allocations;

2.5 to consider inclusion in the Radio Regulations of power flux-density limits, in accordance with ITU-R Recommendation S.[Doc. 4/54], to protect the feeder uplinks of non-geostationary mobile-satellite service systems operating in the fixed-satellite service at 5 GHz pursuant to No. **S5.447A**;

2.6 examination of the adequacy of the frequency allocations for HF broadcasting from about 4 MHz to 10 MHz, taking into account the seasonal planning procedures adopted by WRC-97, and to consider bringing forward the date of availability of the HF bands allocated by WARC-92 to the broadcasting service in response to Resolution **29 (WRC-97)** and Resolution **537 (WRC-97)**;

2.7 to consider realignment of the allocations to the amateur, amateur-satellite, and broadcasting services around 7 MHz on a worldwide basis, taking into account Recommendation **718 (WARC-92)**;

2.8 possible allocations to passive services in the frequency bands above 275 GHz;

2.9 to consider an extension to the upper end of the current allocations to the EESS (active) and space research (active) from 5 460 MHz up to 5 570 MHz for the purpose of providing additional spectrum for spaceborne radio-altimetry and synthetic aperture radar imaging;

2.10 to consider the regulatory and technical provisions for satellite networks using highly elliptical orbits;

2.11 review allocations to the space research service (deep space) (space-to-Earth) and the inter-satellite service in the frequency range 32-32.3 GHz with a view to improving the sharing conditions between these services;

2.12 to consider possible extension of the allocation to the mobile-satellite service (Earth-to-space) on a secondary basis in the band 14-14.5 GHz to permit the aeronautical mobile-satellite service as stipulated in Resolution **216 (Rev.WRC-2000)**;

2.13 to examine the spectrum requirements for telemetry, tracking, and telecommand of FSS networks operating with service links in the frequency bands above 17 GHz;

3 to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations which have been communicated by the 2003 Radiocommunication Assembly, in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in the Annex to Resolution **27 (Rev.WRC-97)**;

4 to take actions consequential to resolutions of the Plenipotentiary Conferences, including review of procedures for satellite networks under Resolution **86** (Minneapolis, 1998);

5 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the Conference;

6 in accordance with Resolution **95 (WRC-97)**, to review the Resolutions and Recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

7 to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. **135** and **136** of the Convention (Geneva, 1992);

8 to identify those items requiring urgent action by the radiocommunication study groups;

9 in accordance with Article 7 of the Convention (Geneva, 1992):

9.1 to consider and approve the Report of the Director of the Radiocommunication Bureau on the activities of the Radiocommunication Sector since WRC-2000;

9.2 to recommend to Council items for inclusion in the agenda for the 2005/6 World Radiocommunication Conference,

invites Council

to finalize the agenda and arrange for the convening of WRC-03 and to initiate as soon as possible the necessary consultation with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a Report to WRC-03,

instructs the Secretary-General

to communicate this Resolution to concerned international and regional organizations.

Reasons: Draft resolution for the next WRC.

2 Proposal for the preliminary agenda for the 2005/6 World Radiocommunication Conference

Background information

The United States proposal for the preliminary agenda for WRC-2005/6 is contained in Resolution [WRC-05/06].

ADD USA/12/310

DRAFT RESOLUTION [WRC-05/06] (WRC-2000)

Preliminary agenda for the 2005/6 World Radiocommunication Conference

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that, in accordance with Nos. **118** and **126** of the Convention of the International Telecommunication Union (Geneva, 1992), the general scope of the agenda for the 2005/6 World Radiocommunication Conference (WRC-05/06) should be established six years in advance;

b) Article 13 of the Constitution of the International Telecommunication Union (Geneva, 1992) regarding the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention (Geneva, 1992) regarding their agendas;

c) the relevant Resolutions and Recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

resolves to give the view

that the following items should be included in the preliminary agenda of WRC-06, to be held in 2005/6:

1 to take appropriate action in respect of those urgent issues that were specifically requested by the 2003 World Radiocommunication Conference (WRC-03);

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-2000, to consider and take appropriate action in respect of the following topics:

2.1 to consider Appendix **S13** and Resolution **331 (Rev.WRC-97)** with a view to their deletion and, if appropriate, consider related changes to Chapter SVII and other provisions of the Radio Regulations as necessary, taking into account the continued transition to the Global Maritime Distress and Safety System (GMDSS).

2.2 to consider the results of studies, and take necessary actions relating to shore-to-ship distress communication priorities (Resolution **348 (WRC-97)**);

2.2.1 to consider primary allocations to space research (passive) in existing primary radio astronomy bands below 10 GHz, excluding 322-328.6 MHz;

2.2.2 to review studies and related allocations if appropriate to the non-GSO MSS < 1 GHz in the 470-862 MHz band (Resolution **728 (WRC-97)**);

2.2.3 to review studies and related allocations if appropriate to the non-GSO MSS < 1 GHz in the 405-406 MHz band (Resolution **219 (WRC-97)**);

3 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the Conference;

4 in accordance with Resolution **95 (WRC-97)**, to review the Resolutions and Recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

5 to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. **135** and **136** of the Convention (Geneva, 1992);

6 to identify those items requiring urgent action by the radiocommunication study groups;

7 in accordance with Article 7 of the Convention (Geneva, 1992):

7.1 to consider and approve the Report of the Director of the Radiocommunication Bureau on the activities of the Radiocommunication Sector since WRC-03;

7.2 to recommend to Council items for inclusion in the agenda for the 2009 World Radiocommunication Conference,

invites Council

to consider the views given in this Resolution,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-05/06,

instructs the Secretary-General

to communicate this Resolution to concerned international and regional organizations.

Reasons: United States proposed agenda items for WRC-05/06.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 16 to
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1 May 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

PROTECTION OF THE FIXED SERVICE FROM GSO FSS OPERATIONS IN THE 11.7 TO 12.2 GHz BAND (REGION 2)

Background information

The 11.7-12.2 GHz band is allocated to the fixed-satellite service (FSS) on a primary basis in Region 2, and the 11.7-12.1 GHz band is allocated to the fixed service (FS) on a primary basis in certain countries within Region 2 (See No. S5.486). The use of the 11.7-12.2 GHz band by FSS in Region 2 is subject to No. S5.488.

Recent modifications to No. S5.488 (previously RR No. 839) removed the explicit reference to No. S9.21 (previously Article 14). Consequently, at its 13th meeting in July 1998, the ITU Radio Regulations Board revised its Rule of Procedure for No. S5.488, stating that there is "no longer a need for the specific procedures of No. S9.21, in addition to the normally applicable coordination/agreement procedures of Article S9". The Board and certain administrations expressed the view that the omission of specific reference to No. S9.21 in No. S5.488 removed the regulatory mechanism available for protection of terrestrial services from GSO FSS downlinks. Notwithstanding, the requirement that FSS systems in the 11.7-12.2 GHz band (Region 2) obtain prior agreement with those "administrations concerned and those having services, operating or planned to operate in accordance with the Table, which may be affected" remains.

Section 7.6.3 of the CPM Report identifies three possible approaches for protection of terrestrial services from GSO FSS operations in the 11.7-12.2 GHz band (Region 2): 1) hard power flux-density (pfd) limits for GSO FSS networks in Region 2; 2) use of power flux-density levels as threshold values which, if exceeded, would require the agreement of affected administrations; 3) explicit reference to No. S9.21 in No. S5.488 consistent with the regulatory regime that was applied to the 11.7-12.2 GHz band in Region 2 for many years.

Although GSO FSS and fixed-service systems have successfully co-existed in the 11.7-12.2 GHz band (Region 2) for many years under Article 14/S9.21 consistent with approach 3), concerns have been expressed that application of the former S9.21 approach implements only a limited time period for comments in the regulatory process. This proposal is responsive to these concerns.

In support of approach 2) above, pfd thresholds are proposed because they provide the required flexibility for administrations implementing GSO FSS systems, while still affording protection to fixed service systems. Under certain circumstances it is necessary for GSO FSS operators to operate at an increased satellite downlink power in order to serve a particular geographic location (e.g. extreme latitudes served at lower elevation angles) or to provide certain types of carriers (e.g. analogue television, 16-QAM). Such power increases, however, will be minimized because satellite operators have a financial incentive to use only the minimum power required to close a link. Pfd thresholds allow for these types of GSO FSS operations, as necessary, provided that agreement is reached with any affected terrestrial administration. Pfd thresholds also allow for the advancement of satellite technology including the use of smaller antennas and higher/more efficient modulation schemes, particularly into under-served areas.

This document proposes to include in Appendix S5 of the Radio Regulations pfd levels to be used as thresholds for coordination of GSO FSS systems with fixed-service systems. These coordination thresholds would be applicable to GSO FSS systems in the 11.7-12.2 GHz band in Region 2. Under this approach, the requirement for coordination of GSO FSS networks operating in the 11.7-12.2 GHz band (Region 2) with terrestrial systems would be contained in a new provision of Article S9, ADD S9.20. An administration would send its coordination request to the ITU Radiocommunication Bureau (BR) pursuant to MOD S9.30. Upon receipt of the information, BR would identify those administrations with which coordination may need to be effected, based on exceedance of the pfd threshold levels contained in Appendix S5, and publish the names of the administrations in its Weekly Circular.

Because fixed-service systems in this band generally employ digital technologies, it is proposed to specify the pfd in a 1 MHz rather than a 4 kHz reference bandwidth. A 1 MHz reference bandwidth was also found appropriate for pfd limits applicable to non-GSO FSS systems in this frequency band. Therefore, the proposed level of protection to the fixed service from GSO FSS (space-to-Earth, Region 2) is as follows:

–124	dB(W/m^2) in 1 MHz	$\theta \leq 5°$
–124 + 0.5 (θ - 5)	dB(W/m^2) in 1 MHz	$5° \leq \theta \leq 25$
–114	dB(W/m^2) in 1 MHz	$25° \leq \theta \leq 90°$

The above protection levels are equivalent to the following levels in a 4 kHz reference bandwidth:

–148	dB(W/m^2) in 4 kHz	$\theta \leq 5°$
–148 + 0.5 (θ - 5)	dB(W/m^2) in 4 kHz	$5° \leq \theta \leq 25°$
–138	dB(W/m^2) in 4 kHz	$25° \leq \theta \leq 90°$

The proposed coordination threshold pfd levels are 2 dB more relaxed (i.e. higher) than the values contained in ITU-R Recommendation SF.674-1, *Power Flux-Density Values to Facilitate the Application of Article 14 of the Radio Regulations for FSS in Relation to the Fixed-Satellite Service in the 11.7-12.2 GHz Band in Region 2*. This 2 dB relaxation is proposed in order for the Radio Regulations to be more representative of the actual operating conditions in this frequency band.

If hard limits as opposed to coordination thresholds were to be included in Article S21 of the Radio Regulations, the limits would need to be considerably more relaxed (i.e. higher) than the levels above in order to accurately reflect the existing and planned use of the band. It should be noted that ITU-R has not studied the pfd levels that would be appropriate as hard limits in the 11.7-12.2 GHz band segment. Because of the varying satellite and terrestrial system characteristics throughout the 10.7-12.75 GHz band segments, it is not appropriate to extrapolate pfd limits to other frequency band segments.

ARTICLE S5

Frequency allocations

MOD USA/12/303

S5.488 The use of the bands 11.7-12.2 GHz by the fixed-satellite service in Region 2 and 12.2-12.7 GHz by the broadcasting-satellite service in Region 2 is limited to national and subregional systems. The use of the band 11.7-12.2 GHz by geostationary satellite networks in the fixed-satellite service in Region 2 is subject to ~~previous agreement between the administrations concerned and those having services, operating or planned to operate in accordance with the Table, which may be affected (see Articles **S9** and **S11**)~~coordination under No. **S9.20**. For the use of the band 12.2-12.7 GHz by the broadcasting-satellite service in Region 2, see Appendix **S30**.

ARTICLE S9

Section II – Procedure for effecting coordination[8, 9]

Sub-Section IIA – Requirement and request for coordination

ADD USA/12/304

S9.20 i*bis)* for a transmitting space station of the fixed-satellite service using the geostationary-satellite orbit in respect of stations of terrestrial services where the threshold value is exceeded on the territory of another administration;

MOD USA/12/305

S9.30 Requests for coordination made under Nos. **S9.7** to **S9.14**, **S9.20** and **S9.21** shall be sent by the requesting administration to the Bureau, together with the appropriate information listed in Appendix **S4** to these Regulations.

MOD USA/12/306

S9.51 Following its action under No. **S9.50**, the administration with which coordination was sought under Nos. **S9.7** to **S9.9** and **S9.20** shall, within four months of the date of publication of the Weekly Circular under No. **S9.38**, either inform the requesting administration and the Bureau of its agreement or act under No. **S9.52**.

MOD USA/12/307

S9.60 If, within the same four-month period specified in Nos. **S9.51** or **S9.51A**, an administration with which coordination is sought under Nos. **S9.7** to **S9.9** and **S9.15** to ~~**S9.19**~~**S9.20** fails to reply or to give a decision under Nos. **S9.51** or **S9.51A** or, following its disagreement under No. **S9.52**, fails to provide information concerning its own assignments on which its disagreement is based, the requesting administration may seek the assistance of the Bureau.

APPENDIX S5

TABLE S5-1 (*continued*)

MOD USA/12/308

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **ADD S9.20** GSO/terrestrial	For a transmitting space station of the fixed-satellite service using the geostationary-satellite orbit in respect of stations of terrestrial services where the threshold value is exceeded	11.7-12.2 GHz (Region 2)	The power flux-density at the surface of the Earth, for angles or arrival (θ) above the horizontal plane, produced by emissions from a space station, including emissions from a reflecting satellite, exceed limits as follows: -124 dB(W/m^2) in 1 MHz for $\theta \leq 5°$ $-124 + 0.5\ (\theta - 5)$ dB (W/m^2) in 1 MHz for $5° \leq \theta \leq 25°$ -114 dB(W/m^2) in 1 MHz for $25° \leq \theta \leq 90°$	Check for exceedance of the threshold/condition	The limits relate to the power flux-density which would be obtained under assumed free-space propagation conditions

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Reasons: Specific modifications to Articles S5, S9 and Appendix S5 of the Radio Regulations are proposed to include pfd coordination thresholds in the Radio Regulations, as identified in section 7.6.3 of the CPM Report, Approach 2. Pfd thresholds are proposed because they provide the flexibility required for GSO FSS systems to provide analogue TV and higher/more efficient modulation schemes, while still affording protection to fixed-service systems. In response to concerns expressed by terrestrial administrations, the proposed regulatory regime requires administrations to send its coordination requests to the ITU BR. Upon receipt of the information, the BR would identify those administrations with which coordination may need to be effected, based on an exceedance of the pfd threshold levels contained in Appendix S5, and publish the names of the administrations in its Weekly Circular.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 15 to
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PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 4 - in accordance with Resolution 95 (WRC-97), to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation

Proposal to amend Resolution 127

Background information

The proposal herein amends Resolution 127 to take account of the current status of ITU-R studies on the compatibility of non-GSO MSS feeder links in bands around 1.4 GHz with services in the same and nearby bands; and to invite WRC-03 to consider allocations to non-GSO MSS feeder links in bands around 1.4 GHz on the basis of completed studies.

References: ITU-R Document 8D/251, ITU-R WP 8D/317, Attachment 4

Resolution 127, adopted at WRC-97, resolved that studies should be carried out as a matter of urgency on the operational and technical measures required:

i) to facilitate sharing between feeder links for non-GSO MSS systems and existing and currently planned services in portions of the band 1 390-1 400 MHz (Earth-to-space) and 1 427-1 432 MHz (space-to-Earth); and

ii) to protect passive services in the band 1 400-1 427 MHz from unwanted emissions from feeder links for non-GSO MSS systems;

and invited a future competent conference to consider, on the basis of completion of the above-mentioned studies, additional allocations for feeder links on a worldwide basis for non-GSO MSS systems with service links below 1 GHz.

Item 3.5 of Resolution 722, “Preliminary agenda for the 2001 World Radiocommunication Conference”, included an item on consideration of the results of studies related to additional allocations on a worldwide basis for feeder links in bands around 1.4 GHz to the non-geostationary mobile-satellite services with service links operating below 1 GHz, taking into account studies conducted in response to Resolution 127.

This proposal would amend Resolution 127 to have it call for allocations based on completion of studies on the agenda of WRC-03.

The rationale for including consideration of allocations to MSS feeder links near 1.4 GHz in the agenda of WRC-03 is that theoretical studies referred to in Resolution 127 have been completed and accepted, and that the remaining hardware demonstrations are planned for completion prior to the convening of WRC-03.

Therefore, WRC-03 will likely have before it the technical and sharing measures, and sharing and compatibility studies that would enable it to consider additional allocations around 1.4 GHz to non-GSO MSS for feeder links.

The studies performed to date indicate that out-of-band emissions from MSS feeder links at 1 390-1 393 MHz (up), and 1 429-1 432 MHz (down) into the band 1 400-1 427 MHz, which is allocated on a primary basis exclusively to sensitive, passive science services, can be reduced through the use of highly efficient modulation methods such as GMSK, and through careful design, which will keep intermodulation products out of that neighbouring band.

Those studies now have a certain measure of acceptance from the science services themselves (Document ITU-R 8D/251). The current or remaining concerns of these services - radio astronomy, Earth exploration-satellite (passive), and space research (passive) - are whether the results indicated by theory and preliminary measurement and testing can be achieved throughout the life of operational spacecraft. It is these latter tests, among others, that are planned to be available before WRC-03 convenes.

If the additional tests and measurements are persuasive, but the item was not previously put on the agenda of WRC-03 by WRC-2000, then the conference would not be competent to consider those allocations.

If the additional tests and measurements that would be conducted between now and the convening of WRC-03 are not persuasive, and the item is on its agenda, then WRC-03 would not, in its good judgement, make any such allocations, even though it was competent to do so. In other words, putting the item on the preliminary agenda of WRC-03 is both foresighted and “fail-safe”.

Supporting information

A detailed discussion of the compatibility of feeder links around 1.4 GHz with the science services in a nearby band can be found in the Chairman’s Report of the April 1999 WP 8D meeting, ITU-R Document WP 8D/317, Attachment 4.

MOD USA/12/287

RESOLUTION 127 (WRC-2000)

Studies relating to consideration of allocations in bands around 1.4 GHz for feeder links of the non-geostationary-satellite systems in the mobile-satellite service with service links operating below 1 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

MOD USA/12/288

a) that the agenda of WRC-97 included consideration of the adoption of additional allocations for the non-geostationary (non-GSO) mobile-satellite service (MSS);

MOD USA/12/289

b) that the Report of the 1999 Conference Preparatory Meeting (CPM-99) stated that the Radiocommunication Bureau has identified 25 non-GSO MSS networks as of 26 November 1999 at frequencies below 1 GHz, at some stage of coordination under Resolution **46 (Rev.WRC-97)**, and that many of the proposed networks cannot be implemented in the existing allocations because there is not enough spectrum;

c) that CPM-97 stated that due to the extreme sensitivity of radio astronomy observations interference from unwanted (spurious and out-of-band) emissions can be a problem, but also noted that interference to radio astronomy can be avoided using various techniques including low-power transmitter levels, choice of modulation, bit shaping, output filtering and band limiting filters, the use of which can minimize the band separation necessary to meet the recommended interference threshold levels for out-of-band emissions;

SUP USA/12/290

d)

MOD USA/12/291

d) that factors taken into account by post-CPM-97 activities in order to protect the passive services around 1.4 GHz from out-of-band emissions include: the use of narrow-band non-GSO MSS feeder-link transmissions; the use of spectrum-efficient modulation methods, such as Gaussian filtered minimum shift keying, having inherently rapid roll-off of out-of-band emissions; the use, where necessary, of band-pass filters in satellite transmitters and MSS feeder-link transmitting earth stations; and guardbands where necessary;

MOD USA/12/292

e) that factors taken into account by post-CPM-97 activities concerning sharing with the radiolocation service include the use of conventional techniques that may be applied in MSS satellite receivers, such as intermediate frequency limiters and time diversity, which have long been employed to protect radiolocation receivers, and techniques such as transmitted waveforms employing time diversity, which have been employed to protect receivers in other services from high-power pulsed radar transmitters;

MOD USA/12/293

f) that, since CPM-97, ITU studies have been carried out containing theoretical analyses with a view to determining if the operation of non-GSO MSS feeder links in bands around 1.4 GHz would be compatible with the Earth exploration-satellite (passive), radio astronomy and space research (passive) services;

ADD USA/12/294

g) that the theoretical analyses have indicated that sufficient reduction of out-of-band and spurious emissions could be achieved to protect the sensitive science services in nearby bands;

ADD USA/12/295

h) that additional tests and measurements of feeder-link transmissions from systems having the characteristics, performance, and reliability of equipment that would be used in operational systems are necessary;

ADD USA/12/296

i) that such additional tests and measurements will be completed prior to WRC-03,

recognizing

that the bands near 1.4 GHz are extensively used by many other services operating in accordance with the Radio Regulations, including fixed and mobile services,

noting

a) that Resolution **214 (Rev.WRC-97)** states under *resolves* 1. that further studies are urgently required on operational and technical means to facilitate sharing between non-GSO MSS and other radiocommunication services having allocations and operating below 1 GHz;

SUP USA/12/297

b)

c)

MOD USA/12/298

b) that, since WRC-95, ITU-R studies have been carried out on sharing between space and terrestrial services and feeder links near 1.4 GHz for non-GSO MSS systems with service links below 1 GHz,

resolves

MOD USA/12/299

1 to invite ITU-R, as a matter of urgency, to continue studies, and to carry out additional tests and demonstrations to validate the studies on operational and technical measures required to facilitate sharing in portions of the band 1 390-1 393 MHz between existing and currently planned services and feeder links (Earth-to-space) for non-GSO MSS systems with service links operating below 1 GHz;

MOD USA/12/300

2 to invite ITU-R, as a matter of urgency, to carry out additional tests and demonstrations to validate the studies on operational and technical means to facilitate sharing, in portions of the band 1 429-1 432 MHz, between existing and currently planned services and feeder links (space-to-Earth) for non-GSO MSS systems with service links operating below 1 GHz;

MOD USA/12/301

3 to invite ITU-R, as a matter of urgency, to carry out additional studies, including the measurement of emissions from equipment that would be employed in operational systems to protect passive services in the band 1 400-1 427 MHz from unwanted emissions from feeder links near 1.4 GHz for non-GSO MSS systems with service links operating below 1 GHz;

MOD USA/12/302

4 to invite WRC-03 to consider, on the basis of completion of studies referred to in *resolves* 1, 2 and 3, additional allocations for feeder links on a worldwide basis for non-GSO MSS systems with service links below 1 GHz,

urges administrations

to participate actively in such studies, with the involvement of interested parties.

Reasons: To take account of the current status of ITU-R studies on the compatibility of non-GSO MSS feeder links in bands around 1.4 GHz with services in the same and nearby bands, and to invite WRC-03 to include in its agenda consideration of allocations to non-GSO MSS feeder links in bands around 1.4 GHz.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 14 to
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14 April 2000
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PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.11 - to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions 214 (Rev.WRC-97) and 219 (WRC-97)

Proposal to amend Resolution 219

Background information

The proposal herein amends Resolution 219 to take into account the most recent studies supporting the need for additional spectrum for non-GSO MSS, and the possibility of increasing the efficiency of spectrum utilization in the band 401-406 MHz by existing systems. These efficiencies might make it possible for a portion of the band segment 405-406 MHz to be allocated to non-GSO MSS.

Resolution 219, adopted at WRC-97, noted the significant shortfall of spectrum for non-GSO MSS below 1 GHz and that there is an urgent need to make additional spectrum available on a worldwide basis for such systems.

It also noted that the development of more spectrum-efficient meteorological aids systems is continuing in order to minimize the bandwidth required by these systems.

Initial studies conducted under Resolution 219 focused on improving the frequency stability of the narrow-band radiosondes, but it was felt that the cost of this improvement was more than many administrations could support. Additionally, the upgrading of the EES and the meteorological satellite to primary status in the 401-403 MHz portion of the band has incurred a fear that the MetAids (radiosondes) may eventually be forced out of these two MHz of spectrum. As a result, the WMO has stated that it needs to retain the use of 405-406 MHz based on the earlier narrow-band radiosonde improvement studies carried out under Resolution 219.

The proposed modified Resolution carries forward the invitation to ITU-R to study such more spectrum-efficient technologies and operational techniques on an urgent basis.

We propose that WRC-06 should consider the results of these studies in accordance with Resolution 219, and an allocation to the NVNG MSS in the 405-406 MHz band if warranted.

Studies are under way to examine spectrum efficient utilization of this band which might alleviate the WMO concerns about the effects of the EES and MetSat upgrading to primary status in the 401-403 MHz portion of the band. A preliminary study of one such spectrum-efficient technology, based on radiosondes using direct-sequence spread-spectrum (DSSS), was submitted to WP 7C (Document ITU-R WP 7C/201) in January 2000 for its consideration. While several problems and limitations of the DSSS approach have been noted in the United States and elsewhere, the spread-spectrum approach may have potential, and further study is continuing.

MOD USA/12/275

RESOLUTION 219 (Rev.WRC-~~97~~2000)

Studies relating to consideration of the allocation to the non-geostationary mobile-satellite service in the meteorological aids band 405-406 MHz and the impact on primary services allocated in the adjacent bands

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that there is a significant shortfall of spectrum for the non-geostationary (non-GSO) mobile-satellite service (MSS) below 1 GHz, and there is an urgent need to make additional spectrum available on a worldwide basis for such non-GSO MSS systems;

MOD USA/12/276

b) that the Report of the ~~1997~~1999 Conference Preparatory Meeting (CPM-9~~7~~9) to ~~this Conference~~WRC-2000 state~~s~~d that the Radiocommunication Bureau has identified 2~~3~~5 non-GSO MSS networks, at frequencies below 1 GHz, at some state of coordination under Resolution **46 (Rev.WRC-97)**/No. **S9.11A** of the Radio Regulations, that it is likely that a number of these systems may not be implemented for reasons not connected with spectrum availability and that several administrations have indicated in their information submitted to the Bureau that they plan on implementing these non-GSO MSS systems by the year 2002 or earlier. However, CPM also recognized that many of the proposed networks cannot be implemented in the existing allocation;

SUP USA/12/277

c)

ADD USA/12/278

c) that the CPM Report for WRC-2000 identified a need for spectrum beyond the current allocations, identifying a spectrum requirement for service links of about 17 MHz on a shared basis, and an additional 4 MHz of shared spectrum for feeder links; and that recent reports carried out in 1997-1998 support these original 1996 study estimates;

d) that meteorological aids systems are essential to produce the upper air measurements required by the World Meteorological Organization (WMO), as summarized in Recommendation ITU-R SA.1165, and that systems using the band 400.15-406 MHz constitute the majority of the mobile and fixed observation stations worldwide;

e) that meteorological aids systems are also essential to produce the upper air measurements required for civilian and other applications;

f) that the amount of spectrum required by meteorological users, including WMO (station spacing requirement of 250 km), civilian users and other related users, in most geographical areas is about 5 MHz in the band 401-406 MHz using the currently employed technology;

MOD USA/12/279

g) that since ~~this Conference~~WRC-97 upgraded the allocation to the Earth exploration-satellite service and the meteorological-satellite service to primary in the band 401-403 MHz, this is likely to impose constraints on the meteorological aids service in this band in certain geographical areas;

ADD USA/12/280

h) that the CPM Report for WRC-2000 stated that in the long term, improved technology and operational techniques may result in more efficient use of the band 401-406 MHz by the existing services, which may enable future review of requirements for this band;

MOD USA/12/281

~~h~~i) that the development of more spectrum-efficient meteorological aids systems is continuing in order to minimize the bandwidth required by these systems, as outlined in Recommendation ITU-R SA.1165, and that recent development of these related technologies has been rapid;

~~i~~j) that sharing studies to date have shown that co-channel sharing between currently proposed non-GSO MSS systems and meteorological aids in the band 401-406 MHz is not generally feasible, that any sharing would require band segmentation and that the band 405-406 MHz has been named by some administrations as a possible candidate band for such a new allocation;

~~j~~k) that any transition of meteorological aids from the band 405-406 MHz should not increase the operational costs of meteorological aids networks beyond the available financial resources, and should not constrain the future development of the meteorological aids service, while using more spectrum-efficient systems;

~~k~~l) that the COSPAS-SARSAT system operates within an exclusive allocation in the band 406-406.1 MHz, that the radio astronomy service has a primary allocation in the band 406.1-410 MHz and that these services need to be protected from MSS transmissions including unwanted emissions,

noting

a) that the possible use of the band 405-406 MHz by the MSS should be limited to systems using narrow-band modulation techniques until further ITU-R studies conclude that other modulation techniques can protect COSPAS-SARSAT (406-406.1 MHz) and the radio astronomy service (406.1-410 MHz);

b) that Resolution **214 (Rev.WRC-97)** also addresses sharing studies relating to consideration of the allocation of bands below 1 GHz to the non-GSO MSS,

resolves to invite ITU-R

ADD USA/12/282

1 as a matter of urgency, to study improved technology and operational techniques which may result in more efficient use of the band 401-406 MHz by the existing services;

MOD USA/12/283

~~1~~2 as a matter of urgency, upon completion of the studies in *resolves* 1, with the participation of WMO, to assess further the current and future requirements of the meteorological aids service in the band 401-406 MHz, taking into account the requirements of the earth exploration-satellite service and the meteorological-satellite service in the band 401-403 MHz;

~~2~~3 as a matter of urgency, upon completion of the studies in *resolves* 1, with the participation of WMO, to consider the possible transition of the meteorological aids service out of a portion of the band 405-406 MHz, which would minimize the impact on the meteorological aids service, while taking into account requirements for the implementation of non-GSO MSS;

MOD USA/12/284

~~3~~4 to consider, based on the outcome of § 1 and 2 above, a possible transition plan, including a transition date at which time meteorological aids could migrate their operations out of a portion of the band 405-406 MHz and MSS operations could commence;

~~4~~5 as a matter of urgency, to study, with the participation of the Inter-Union Commission on Frequency Allocations for Radio Astronomy and Space Science (IUCAF) and other relevant entities, the impact of unwanted emissions on the COSPAS-SARSAT system in the band 406-406.1 MHz and the radio astronomy service in the band 406.1-410 MHz, and identify appropriate protection measures for these services,

resolves

MOD USA/12/285

that ~~WRC-99~~the World Radiocommunication Conference (WRC-06) be invited to consider, based on the outcome of *resolves to invite ITU-R* above, the possibility of allocating a portion of the band 405-406 MHz to the ~~MSS~~, including any appropriate transition plan,

urges administrations

1 to assess their current and future requirements for meteorological aids systems in the band 401-406 MHz taking into account the requirements of the Earth exploration-satellite service and the meteorological-satellite service in the 401-403 MHz band;

MOD USA/12/286

2 to, either individually or on a subregional or regional basis, report to WMO and ITU-R on whether the whole of the band 401-406 MHz will be needed for meteorological aids, and the possibility of transition out of a portion of the band 405-406 MHz;

3 to submit to ITU-R the most up-to-date information on their plans for possible implementation of non-GSO MSS systems and the associated spectrum requirements,

instructs the Secretary-General

to bring this Resolution to the attention of WMO.

Reasons: To take account of the continuing need for additional spectrum below 1 GHz for non-GSO MSS service links, and to impart a greater sense of urgency to the development of more spectrum-efficient techniques by meteorological aids systems in the band 401-406 MHz.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

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PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Proposal for agenda item 1.11 - to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions 214 (Rev.WRC-97) and 219 (WRC-97)

MODIFICATION OF RESOLUTION 214 (Rev.WRC-97)

Sharing studies relating to consideration of the allocation of bands below 1 GHz to the non-geostationary mobile-satellite service

Background information

The CPM Report to WRC-2000 indicates a requirement of 7 to 17 MHz of additional spectrum required for service links in the non-geostationary mobile-satellite service (non-GSO MSS) below 1 GHz. Additionally, 4 MHz of shared spectrum is identified as the required spectrum for MSS feeder links. These requirements will not likely be met by additional allocations to the non-GSO MSS at WRC-2000. Thus, there remains an urgent need for usable spectrum to be made available on a worldwide basis for non-GSO MSS systems operating below 1 GHz.

In response to Resolution 214 (Rev.WRC-97), ITU-R studies have shown that for specific cases, co-frequency sharing between the non-GSO MSS and the existing services below 1 GHz may be achieved. However, other cases have not been taken into account. Consequently, the operational and technical means to facilitate sharing have not been studied for some systems operating in some parts of the world.

The continued study and development of Recommendations by ITU-R on the performance requirements, sharing criteria and the technical and operational issues relating to sharing between the existing services and non-GSO MSS below 1 GHz can provide the technical basis for consideration at WRC-03 of additional allocations on a worldwide basis for the non-GSO MSS below 1 GHz. Therefore, the United States proposes the continuance of Resolution 214 as modified by this proposal.

Consideration of the technical and regulatory constraints on non-GSO MSS allocations in the bands below 1 GHz was addressed by WRC-2000. Therefore, that aspect is proposed for deletion from Resolution 214.

It is proposed to modify Resolution 214 (Rev.WRC-97):

1) to invite continued ITU-R study of the technical and operational measures to facilitate sharing between the non-GSO MSS and existing services below 1 GHz;

2) to invite WRC-03 consideration of additional allocations to the non-GSO MSS below 1 GHz;

3) to delete from Resolution 214 the consideration of technical and regulatory constraints on the non-GSO MSS allocations in the bands below 1 GHz, which was addressed by WRC-2000.

MOD USA/12/257

RESOLUTION 214 (Rev.WRC-97)

Sharing studies relating to consideration of the allocation of bands below 1 GHz to the non-geostationary mobile-satellite service

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that the agenda of this Conference included consideration of additional allocations on a worldwide basis for the non-geostationary mobile-satellite service (non-GSO MSS) below 1 GHz;

b) that the 199~~7~~9 Conference Preparatory Meeting, in its Report, indicated that for the non-GSO MSS below 1 GHz there is not enough spectrum currently allocated to allow development of all the systems currently in coordination, and that, in order to meet projected MSS requirements below 1 GHz, a range of an additional 7 to 10 MHz will be required in the near future although, as well, it recognized that a number of these systems may not be implemented for reasons not connected with spectrum availability;

Reasons: Editorial.

c) that there is an urgent need to make usable spectrum available on a worldwide basis for non-GSO MSS systems operating below 1 GHz;

d) that some non-GSO MSS systems are already operated by some administrations in existing MSS allocations and are at an advanced stage of consideration for operation in many other administrations, and that studies have been conducted within ITU-R on sharing between non-GSO MSS and certain terrestrial services which demonstrate the feasibility of sharing in the cases studied;

e) that issues concerning the technical and operational means to facilitate sharing between the terrestrial services and non-GSO MSS in the bands below 1 GHz remain to be studied;

f) that the requirements for the introduction of these new technologies have to be balanced with the needs of other services having allocations below 1 GHz;

g) that the bands below 1 GHz are extensively used by administrations for many services, although the extent to which they are used by each administration varies throughout the world,

noting

MOD USA/12/258

a) that additional studies may identify ~~other~~suitable bands below 1 GHz ~~which could also~~and appropriate sharing techniques to be considered ~~suitable~~ for ~~a~~ worldwide allocations to non-GSO MSS;

SUP USA/12/259

b)

MOD USA/12/260

~~e~~b) that constraints on the duration of any single transmission from an individual MSS mobile earth station and constraints on the period between consecutive transmissions from an individual MSS mobile earth station operating on the same frequency may facilitate sharing with terrestrial services;

MOD USA/12/261

~~d~~c) that interference mitigation techniques, such as the dynamic channel activity assignment system described in Recommendation ITU-R M.1039~~-1~~, may be used by non-GSO MSS systems below 1 GHz in the Earth-to-space direction to promote compatibility with terrestrial systems when operating in the same frequency band;

MOD USA/12/262

~~e~~d) that new technologies employed by some radiocommunication services, especially within the terrestrial mobile and broadcasting services, which require spectrum below 1 GHz, may have an impact on the sharing possibilities;

ADD USA/12/263

e) that substantial progress has been made by the completion of ITU-R studies to date of sharing between the non-GSO MSS below 1 GHz and existing specific services, however, studies on some important issues remain to be completed;

MOD USA/12/264

f) that non-GSO MSS systems operating below 1 GHz have undergone advance publication by the Radiocommunication Bureau and that administrations may seek to implement further such systems~~;~~,

SUP USA/12/265

g)

resolves

1 that further studies are urgently required on operational and technical means to facilitate sharing between the non-GSO MSS and other radiocommunication services having allocations and operating below 1 GHz;

MOD USA/12/266

2 that WRC-~~99~~03 be invited to consider, on the basis of the results of the studies conducted within ITU-R and the studies referred to in *resolves* 1 above, additional allocations on a worldwide basis for the non-GSO MSS below 1 GHz;

MOD USA/12/267

3 that relevant entities and organizations be invited to participate in these sharing studies~~;~~,

SUP USA/12/268

4

invites ITU-R

MOD USA/12/269

1 to study and develop Recommendations on, as a matter of urgency, the performance requirements, sharing criteria and technical and operational issues relating to sharing between ~~both~~ existing ~~and planned~~ services and non-GSO MSS below 1 GHz;

SUP USA/12/270

2

MOD USA/12/271

~~3~~2 as a matter of urgency, to carry out studies in preparation for WRC-~~99~~03 with respect to interference mitigation techniques, such as the dynamic channel activity assignment system described in Recommendation ITU-R M.1039~~-1~~, necessary to permit the continued development of all of the services to which the bands are allocated;

SUP USA/12/272

4

MOD USA/12/273

~~5~~3 to bring the results of these studies to the attention of WRC-~~99~~03 and the relevant preparatory meetings,

urges administrations

1 to participate actively in these studies, with the involvement of both terrestrial and satellite interests;

2 to submit to ITU-R reports on their technical studies and on their operational and frequency sharing experience with non-GSO MSS systems operating below 1 GHz,

encourages administrations

MOD USA/12/274

to consider the use of dynamic channel assignment techniques, such as those described in Recommendation ITU-R M.1039~~-1~~.

Reasons: There remains an urgent need for usable spectrum to be made available on a worldwide basis for non-GSO MSS systems operating below 1 GHz. Requirements have been identified for 7 to 17 MHz of additional spectrum for service links in the non-GSO MSS below 1 GHz and an additional 4 MHz for MSS feeder links.

The continued study and development of Recommendations by ITU-R on the performance requirements, sharing criteria and the technical and operational issues relating to sharing between the existing services and non-GSO MSS below 1 GHz can provide the technical basis for consideration at WRC-03 of additional allocations on a worldwide basis for the non-GSO MSS below 1 GHz. Therefore, the United States proposes the continuance of Resolution 214 as modified by this proposal.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 12 to Document 12-E
17 April 2000
Original: English

PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 4 - in accordance with Resolution 95 (WRC-97), to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation

Proposal to amend Resolution 728 (WRC-97)

Background information

The proposal herein amends Resolution 728 to invite additional studies on feasibility of, and techniques to facilitate, sharing between non-GSO MSS (space-to-Earth) transmissions and digital television systems in the band 470-862 MHz; and to invite WRC-06 to consider the results of these studies with a view to including in the agenda of a future conference additional allocations on a worldwide basis in the band 470-862 MHz for the non-GSO MSS in accordance with Resolution 728.

Resolution 728, adopted at WRC-97, resolved in part:

1 to invite ITU-R to carry out studies to determine operational and technical means that may facilitate co-frequency sharing between narrow-band non-GSO MSS (space-to-Earth) transmissions and the services to which the band 470-862 MHz is allocated, including the bands where the broadcasting service is also allocated;

2 to invite a future competent conference to consider, on the basis of the results of the studies referred to in *resolves* 1, the possibility of making additional allocations on a worldwide basis for non-GSO MSS …

Existing Recommendations of ITU-R indicate that operation of narrow-band non-GSO MSS transmissions might be feasible at the edges of analogue television channels where the TV signal is least sensitive to interference. However, ITU-R Recommendations have not identified the protection ratios for digital television systems. To the extent that protection ratios for digital television are similar to those for analogue systems, the same conclusions on the feasibility of sharing would apply.

The proposed revision of Resolution 728 invites additional study of sharing, including consideration of digital television systems.

The existing Resolution does not identify a specific conference at which additional allocations to non-GSO MSS in the band 470-862 MHz could be considered. Therefore, it is foresighted and prudent to designate WRC-06 to review studies to date in order to establish the next conference at which allocations could be considered.

The proposed revision of Resolution 728 invites WRC-06, a conference that would convene six years after the adoption of the revised Resolution calling for additional studies, to review such studies related to additional allocations. In view of the current plans for the rapid design, development, testing, and installation of digital television systems, it is likely that the results of such studies would be available in time for consideration by WRC-06.

The feasibility of MSS sharing with broadcasting and other radiocommunication services in this band requires further study in ITU-R.

MOD USA/12/253

RESOLUTION 728 (Rev.WRC-~~97~~2000)

Studies relating to consideration of allocations in the broadcasting band 470-862 MHz to non-geostationary mobile-satellite services

The World Radiocommunication Conference (~~Geneva~~Istanbul, ~~1997~~2000),

considering

a) that the agenda of ~~WRC-97~~this Conference included consideration of the adoption of additional allocations for non-geostationary mobile-satellite services (non-GSO MSSs);

MOD USA/12/254

b) that the Report of the 199~~7~~9 Conference Preparatory Meeting (CPM-9~~7~~9) stated that the Radiocommunication Bureau has identified at least [~~23~~22] non-GSO MSS networks [as of 28 April 1999] at frequencies below 1 GHz, at some stage of coordination under Resolution **46**, and that many of the proposed networks cannot be implemented in the existing allocations because there is not enough spectrum;

c) that CPM-97 considered the protection requirements for analogue television in the band 470-862 MHz against a narrow-band MSS signal in the most sensitive and least sensitive portions of an analogue television channel and the protection requirements for a digital television channel, based on existing Recommendations ITU-R BT.655-4, ITU-R BT.417-4 and ITU-R IS.851-1;

d) that CPM-97 stated that the protection ratios for a narrow-band interfering signal in the least sensitive parts of an analogue television channel are to be verified by further studies;

e) that CPM-97 stated the region of lower protection requirements and commensurately higher permissible interfering power flux-density levels as being 100 kHz from the band edges of an analogue television channel, at least in some countries;

f) that CPM-97 stated that the interfering effects of a non-GSO MSS transmission will depend on its specific characteristics (e.g. duty-cycle, duration, periodicity, etc.), that interference contributions from sources other than MSS (even those from other broadcasting stations) have to be taken into account, that slightly lower values of field strength to be protected may need to be assumed in countries where television networks are relatively sparse, and that studies on sharing are necessary;

g) that the permissible aggregate interfering power flux-density resulting from these protection requirements, in some portions of an analogue television channel, may be useful in determining the feasibility of sharing with non-GSO MSS transmitter space-to-Earth links;

h) that these bands are also allocated in part to fixed and mobile terrestrial systems and radionavigation systems;

i) that, in many countries, the channels assigned for analogue television may also be used for digital television, and that during the period of parallel operation of analogue and digital television networks the usage of this band for television will increase,

noting

a) that on completion of studies, parts of the bands now allocated to the broadcasting service between 470 MHz and 862 MHz might be considered suitable for worldwide allocation to non-GSO MSS space-to-Earth transmissions;

b) that the bandwidth required in these television channels may be 1-2% of the total band 470-862 MHz to be shared with the above systems;

c) the need to protect the radio astronomy service in the band 608-614 MHz against interference from MSS transmissions, including unwanted emissions,

resolves

MOD USA/12/255

1 to invite ITU-R to carry out additional studies to determine operational and technical means that may facilitate co-frequency sharing between narrow-band non-GSO MSS (space-to-Earth) transmissions and the services to which the band 470-862 MHz is allocated, including the bands where the broadcasting service is also allocated, and including consideration of digital television systems;

MOD USA/12/256

2 to invite ~~a future competent conference~~WRC-06 to consider, on the basis of the results of the studies referred to in *resolves* 1, the possibility of making additional allocations on a worldwide basis for non-GSO MSS, taking into account, in particular, *considering h)* and *i)* above, with a view to considering allocations at a future conference,

urges administrations

to participate actively in such studies, with the involvement of interested parties.

Reasons: To extend the mandate of Resolution 728 to schedule a review of studies related to allocations at WRC-06, by which time studies can be completed based on the additional guidance of WRC-2000, and taking into account the interference and sharing criteria of digital TV broadcasting systems.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.13

Proposed modifications to Resolution 130 (WRC-97)

Background information

In Resolution 130, WRC-97 established the sharing regime for non-GSO FSS and GSO FSS systems in certain frequencies between 10 and 30 GHz, specified provisional power limits for non-GSO FSS systems, and commenced a detailed study programme within ITU-R. After nearly three additional years of study in ITU-R, final power limits are expected to be adopted at WRC-2000. With the adoption of final power limits, many of the transitional provisions of Resolution 130 from WRC-97 can be suppressed, while certain non-transitional provisions are identified for reflection in the body of the Radio Regulations. The Annex containing provisional limits can also be suppressed.

There are elements of Resolution 130 that need to be retained. Indeed, CPM-99 recognized that there is a need to retain a suitably-modified Resolution 130, and provided in Annex 5 to Chapter 3 an example modification to Resolution 130 that forms the basis for these proposals. For example, studies on sharing among non-GSO FSS systems and studies on the appropriate frequency-sharing mechanism to employ in other bands where non-GSO FSS systems have been proposed.

The following proposals identify those elements of Resolution 130 (WRC-97) that are appropriate for suppression, retention, or updating, and present additional elements that have arisen during the 1997-2000 ITU-R study cycle requiring further study. While this proposal includes a request for further study on the aggregate $epfd_{down}$ limits and associated percentages of time for protection of the 3 m and 10 m GSO FSS earth stations, as referenced in the CITEL proposal on Resolution WWW (WRC-2000), the United States does not propose that the single entry validation, operational or additional operational limits be reconsidered.

MOD USA/12/202

RESOLUTION 130 (Rev.WRC-~~97~~2000)

Use of non-geostationary systems in the fixed-satellite service in certain frequency bands

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

Reasons: Editorial.

considering

a) that the International Telecommunication Union has, among its purposes, "to promote the extension of the benefit of the new telecommunication technologies to all the world's inhabitants" (No. 6 of the Constitution of the International Telecommunication Union (Geneva, 1992));

b) that it is desirable, in this respect, to promote systems capable of providing universal service;

c) that new telecommunication services need advanced and reliable networks permitting high-capacity communications;

d) the need to encourage the development and implementation of new technologies;

e) that systems based on the use of new technologies associated with both geostationary (GSO) and non-geostationary (non-GSO) satellite constellations are capable of providing the most isolated regions of the world with high-capacity and low-cost means of communication;

f) that there should be equitable access to the radio-frequency spectrum and orbital resources in a mutually acceptable manner that allows for new entrants in the provision of services;

g) that all Member States [‡] would benefit from the implementation of proposed systems in the allocated spectrum and from avoidance of monopolization or exclusive use of an allocation by a single system;

h) that the operation of such systems requires a suitable amount of spectrum in appropriate frequency bands;

i) that decisions on this matter should permit the operation of as many systems as possible;

MOD USA/12/203

j) that~~, in spite of the urgency attached to the development of such systems,~~ technical, operational and regulatory issues should be studied in order to achieve the most efficient use of the spectrum that may be available for these systems;

k) that there is a need for the provision of services on a competitive basis between GSO fixed-satellite service (FSS) and non-GSO FSS systems as well as between non-GSO FSS and non-GSO FSS systems;

l) that the Radio Regulations must be sufficiently flexible to accommodate the introduction and implementation of innovative technologies as they evolve, and allow the further development and implementation of any proposed system in conformity with their provisions,

considering further

MOD USA/12/204

a) that ~~further~~ITU-R has conducted technical, operational and regulatory studies ~~are required~~ in order to determine ~~further~~ the conditions under which sharing of the frequency bands 10-30 GHz which are allocated to the FSS and where ~~Resolution **46 (Rev.WRC-97)**~~No. **S9.11A** does not apply is feasible between GSO and non-GSO systems, ~~between non-GSO systems~~ and between non-GSO and terrestrial systems and other space systems;

Reasons: All but the deletion proposed in line 4 of *considering further a)* are from the CPM Report; deletion of "between non-GSO systems" is necessary because past-tense reference to non-GSO/non-GSO studies is incorrect.

SUP USA/12/205

~~*b)* that it is likely that non-GSO FSS systems communicated to the Radiocommunication Bureau will not be brought into use before the WRC-99;~~

Reasons: Transitional measure that is no longer required.

MOD USA/12/206

~~c~~b) that the diverging interpretations arising from No. **S22.2** result in an ambiguous regulatory status for both existing and future GSO and non-GSO systems in the FSS in the bands where this provision applies, with consequential risks for both types of systems;

~~d~~c) that the harmonious development of non-GSO and GSO systems in the FSS requires that these ambiguities be resolved ~~with no further delay~~in bands subject to No. **S22.2** where non-GSO FSS systems have been proposed;

Reasons: Clarification.

MOD USA/12/207

~~e~~d) that in resolving these ambiguities in the bands referred to in *resolves* 1 below, the GSO arc must be protected to ensure continued use of existing FSS systems and the development of new GSO technologies and systems in both non-planned bands and bands where plans exist;

SUP USA/12/208

~~*f)* that these ambiguities may be resolved in certain frequency bands by adopting power flux-density (pfd) limits which would apply to non-GSO FSS systems to protect GSO FSS systems, and by including in Article **S22** limits on the power radiated by non-GSO FSS systems in order adequately to protect GSO FSS systems in the frequency bands and sharing situations where Resolution **46 (Rev.WRC-97)** does not apply;~~

Reasons: This aspect has already been addressed in the review of the power limits conducted in advance of WRC-2000, and has not been shown to apply in any other bands. *Considering further f)* below covers the situation.

MOD USA/12/209

~~g~~e) that in certain frequency bands which are currently used or planned to be used extensively by GSO FSS systems, ~~provisional~~ power flux-density limits applicable to non-GSO FSS systems have been developed;

MOD USA/12/210

~~h~~f) that non-GSO FSS systems have been proposed in some of these bands which could meet ~~these limits~~the limits in Tables **S22-1A**, **S22-1B**, **S22-1C**, **S22-2**, **S22-3**, **S22-4A** and **S22-4B** and would not require specific protection from existing and future GSO FSS systems, provided that minimum constraints are applied to GSO FSS systems, such as off-axis earth station e.i.r.p. limits;

Reasons: Clarification of which limits can be met by the proposed non-GSO FSS systems.

MOD USA/12/211

~~i~~g) that in the bands where the limits referred to in *considering further ~~f), g)~~* ~~and~~ *~~h~~* ~~would~~ *e)* and *f)* apply, there ~~would be~~is no need for a coordination procedure between non-GSO FSS and GSO systems, with the exception of coordination between earth stations operating in opposite directions of transmission and coordination with earth stations using very large antennas;

MOD USA/12/212

~~j~~h) that there ~~would be~~is a need for a coordination procedure between non-GSO systems in the FSS and between non-GSO FSS systems and non-GSO systems in other services and for specific sharing criteria associated with this procedure, taking into consideration various types of non-GSO systems, including those in highly elliptical orbits;

SUP USA/12/213

~~*k)* the need to protect other co-primary services having allocations in the frequency bands referred to in *considering further a)* above and the need to assess further the sharing conditions between non-GSO FSS systems and these services;~~

Reasons: This has already been taken care of for the studied 10-30 GHz band, and would not apply with regard to non-GSO/non-GSO FSS studies in those bands.

MOD USA/12/214

~~l~~i) that further studies on sharing conditions in frequency bands other than the 10-30 GHz frequency bands~~,~~, where non-GSO FSS systems have been proposed, where ~~Resolution **46 (Rev.WRC-97)**~~No. **S9.11A** does not apply, and where Article **S22** does not include limits for non-GSO FSS systems, may also be necessary on the basis of the requirements that may emerge,

Reasons: Clarification. With the exception of those *considering/considering further* with reasons below them, all changes other than to numbering are as recommended in Annex 5 to Chapter 3 of the Report of CPM-99-2. In *considering further* with reasons below them, only noted changes are different from what was recommended by the CPM.

noting

1 that information relating to GSO and non-GSO systems in the FSS in the 10-30 GHz bands has been communicated to the Bureau;

2 that some of these systems are in operation and others will be operated in the near future and, consequently, difficulties may be experienced in modifying their characteristics;

3 the need to protect existing and future terrestrial and space services and systems;

4 that No. **S22.2** is an operational provision which is to be applied between administrations, and does not require any specific action or finding by the Bureau,

recognizing

that the geostationary-satellite orbit and its associated spectrum are a uniquely valuable resource and that equitable access to this resource needs to be protected for all countries in the world,

ADD USA/12/215

further recognizing

that methods of calculating aggregate additional operational limits for protection of 3 m and 10 m earth stations in the bands 10.7-12.75 GHz requires further study,

SUP USA/12/216

resolves

~~1 that, as of 22 November 1997, in the frequency bands specified in Tables **S22-3** and **S22-4** of Article **S22**, and in Tables 1 and 2 in Annex 1 to this Resolution, non-GSO FSS systems shall apply the procedures of Section I of Article **S9**, Nos. **S9.17** and **S9.17A**/Sections I and III of Article **11** and the procedures of Article **S11/13**, and the non-GSO FSS systems for which complete notification information has been received by the Bureau after 21 November 1997 shall be subject to the provisional power limits in Article **S22** and in Annex 1 to this Resolution;~~

Reasons: This provision can be suppressed, as it is included within Example Radio Regulation No. **S22.5F** as agreed and included in Annex 1 to Chapter 3 to the Report of CPM-99-2 (see also proposal IAP/14/263).

SUP USA/12/217

~~2 that these limits shall be applied provisionally until the end of WRC-99, and that non-GSO FSS systems for which complete notification information has been received by the Bureau after 21 November 1997 shall be subject to the power limits in Article **S22**, as revised, if appropriate, by WRC-99;~~

Reasons: This provision is a transitional measure that is no longer required after WRC-2000.

SUP USA/12/218

~~3 that, as of 22 November 1997, in applying No. **S22.2,** administrations may consider these provisional power limits as corresponding to permissible levels of interference from a non-GSO system into a GSO system, irrespective of the dates of receipt by the Bureau of the complete notification information relating for the non-GSO system and of the complete coordination information for the GSO network;~~

Reasons: This provision is a transitional measure that is no longer required after WRC-2000.

SUP USA/12/219

~~4 that, as of the end of WRC-99, an administration operating a non-GSO FSS system which is in compliance with the limits in Article **S22**, as revised, if appropriate, by WRC-99, shall be considered as having fulfilled its obligations under No. **S22.2** with respect to any GSO network, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO system and of the complete coordination information for the GSO network;~~

Reasons: This provision can be suppressed, as it is included within Example Radio Regulation No. **S22.5G** as agreed and included in Annex 1 to Chapter 3 to the report of CPM-99-2 (see also Proposal IAP/14/264).

SUP USA/12/220

~~5 that, as of the end of WRC-99, in the frequency bands specified in No. **S22.29** and § 2.4 of Annex 1 to this Resolution, GSO FSS systems for which complete coordination information has been received by the Bureau after the end of WRC-99 shall be subject to the limits in Article **S22** and in § 2.1, 2.2 and 2.3 of Annex 1 to this Resolution, as revised, if appropriate, by WRC-99;~~

Reasons: This provision must be suppressed, as the United States proposal (contained in USA/12/184 to 185) is to modify No. S22.26 and suppress Nos. S22.27 to S22.29, so that there are no off-axis e.i.r.p. density limits for FSS systems contained in S22 as of the end of WRC-2000 under this provision.

MOD USA/12/221

~~6~~1 that, as of 22 November 1997, in the frequency bands specified in ~~No. **S22.29** and Tables 1 and 2 of Annex 1 to this Resolution~~Tables **S22-1A**, **S22-1B**, **S22-1C** and **S22-2**, non-GSO systems shall not claim protection from GSO networks in the FSS operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO FSS systems and of the complete coordination information for the GSO networks;

Reasons: *Resolves* 6 from Resolution 130 (renumbered here as *resolves* 1) is an essential provision that is not dependent on the establishment of minimum constraints on GSO FSS systems. The United States is also proposing to retain this measure permanently in the Radio Regulations (see Document WRC2000/12(Add.11)).

MOD USA/12/222

~~6~~1.1 that, in the case that, between 22 November 1997 and the end of WRC-~~99~~2000, if an administration operating or bringing into use a GSO FSS system before the end of WRC-~~99~~2000, because it consider~~s~~ed that a non-GSO FSS system proposed by another administration might cause unacceptable interference into its GSO system, ~~then:~~

MOD USA/12/223

~~6.1.1 the administration operating the GSO system shall send~~sent to the administration operating the non-GSO FSS system the technical details upon which its disagreement is based~~,~~ and if this is not resolved by the end of WRC-2000, then:

MOD USA/12/224

~~6.1.2~~1.1.1 in the bands from 10.7 GHz to 14.5 GHz, unless the limits adopted by WRC-2000 are met, the administration operating the non-GSO FSS system shall resolve the difficulties,

MOD USA/12/225

~~6.1.3~~1.1.2 in the bands 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space) and 29.5-30.0 GHz (Earth-to-space), unless the limits adopted by WRC-2000 are met, the administrations concerned shall make every possible effort to resolve the difficulties by means of mutually acceptable adjustments to their networks;

Reasons: Although the provisions of *resolves* 6.1 must, by their terms, have been invoked prior to the end of WRC-2000, the actions contemplated by *resolves* 6.1.2 and 6.1.3 could extend beyond the end of WRC-2000. Thus, it is necessary to retain a suitably modified *resolves* 6.1, 6.1.1, 6.1.2, and 6.1.3. If this *resolves* has not been invoked by the end of WRC-2000, WRC-2000 may consider its suppression.

MOD USA/12/226

~~7~~2 that, if an administration bringing into use a GSO FSS system after the end of WRC-~~99~~2000 considers that a non-GSO FSS system proposed by another administration and which complies with the limits in Article **S22**~~, as revised, if appropriate, by WRC-99,~~ might cause unacceptable interference into its GSO system, the administrations concerned shall make every possible effort to resolve the difficulties by means of mutually acceptable adjustments to their networks~~;~~.

Reasons: This *resolves* should be retained to encourage good faith efforts by administrations operating GSO FSS and non-GSO FSS systems with regard to protection of future GSO FSS operations.

SUP USA/12/227

~~8 that, as of 22 November 1997, non-GSO systems in the FSS in the frequency bands referred to in *resolves* 1 above, shall, for coordination with other non-GSO FSS systems, be subject to application of the provisions of § 2.1 of Section II of Resolution **46 (Rev.WRC-97)**/No. **S9.12**,~~

requests ITU-R

MOD USA/12/228

1[1] ~~taking into account *considering further a)*,~~ to conduct and complete, as a matter of urgency, ~~and complete, in time for consideration by WRC-99:~~the studies, in the frequency bands specified in Tables **S22-1A, S22-1B, S22-1C** and **S22-2,** relating to the sharing criteria to be applied during the coordination between non-GSO FSS systems where No. **S9.10** applies, with a view to promoting efficient use of spectrum/orbit resources and equitable access to these resources by all countries;

MOD USA/12/229

[1] See Annex ~~2~~1 for further details concerning specific aspects of these studies in relation to frequency sharing between systems in the non-GSO FSS and the GSO FSS.

SUP USA/12/230

~~1.1 the appropriate technical, operational and regulatory studies to review the regulatory conditions relating to the coexistence of non-GSO and GSO systems in the FSS, in order to ensure that they do not impose undue constraints on the development of non-GSO and GSO FSS systems;~~

SUP USA/12/231

~~1.2 the development of a methodology for calculating the power levels produced by non-GSO FSS systems and the compliance of these levels with the limits referred to in *resolves* 1 and 2 above;~~

1.3 the studies relating to the sharing criteria to be applied for determining the need for coordination between non-GSO FSS systems and the need for coordination between terrestrial services and non-GSO systems in the FSS and in other space services, with a view to promoting efficient use of spectrum/orbit resources and equitable access to these resources by all countries;

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ADD USA/12/232

2 to conduct further study of the aggregate $epfd_{down}$ limits and associated percentages of time for the 3 m and 10 m GSO FSS earth station antennas from Resolution **WWW (WRC-2000)**, Table WWW-1A, to determine whether the aggregate interference caused by all co-frequency non-GSO FSS systems in the subject bands into GSO FSS systems exceeds the maximum interference levels that are necessary to protect these GSO systems (see Annex 2);

ADD USA/12/233

3 to develop methods of calculating aggregate additional operational limits for the protection of 3 m and 10 m earth stations in the bands 10.7-12.75 GHz;

MOD USA/12/234

~~2~~4[1] ~~taking into account *considering further l)*, to undertake the development~~to conduct the appropriate technical, operational and regulatory studies towards the possible development of power limits or other frequency sharing mechanisms among GSO, non-GSO and terrestrial systems in ~~the~~ frequency bands other than those referred to in ~~*resolves*~~*requests ITU-R* 1 above, where No. **S9.11A** does not apply, ~~and~~ where non-GSO FSS systems ~~are likely to be implemented~~have been proposed, and where GSO FSS systems are used or expected to be used ~~extensively~~,

MOD USA/12/229

[1] See Annex ~~2~~1 for further details concerning specific aspects of these studies in relation to frequency sharing between systems in the non-GSO FSS and the GSO FSS.

Reasons: Modifications to *requests ITU-R* 1 are a streamlined version of recommended change from the CPM Report. Certain material from the CPM recommendation has already been addressed in the 10-30 GHz band, and need not be further studied. Modifications to *requests ITU-R* 2 and suppression of *requests ITU-R* 1.1 and 1.2 are slightly modified from that recommended in Annex 5 to Chapter 3 of the Report of CPM-99-2 to focus the scope of the studies that may be conducted in response to *requests ITU-R* 2.

instructs the Radiocommunication Bureau

MOD USA/12/235

1 as of the end of WRC-~~99~~2000, to review and, if appropriate, revise, any finding previously made on the compliance with the limits contained in Article **S22** of a non-GSO FSS system for which complete notification or coordination information, as appropriate, has been received between 22 November 1997 and the end of WRC-~~99~~2000. This review shall be based on the values in Article **S22**, as revised~~, if appropriate,~~ by WRC-~~99.~~2000;

ADD USA/12/236

2 that, between 22 November 1997 and 2 June 2000, non-GSO systems in the FSS in the frequency bands referred to in *resolves* 1 above, shall, for coordination with other non-GSO FSS systems, be subject to application of the provisions of No. **S9.12**;

Reasons: This is consequential to proposing non-GSO/non-GSO FSS coordination pursuant to a new Radio Regulation No. S9.10 as of 2 June 2000 (IAP proposal IAP/14/273 (ADD S9.10)).

ADD USA/12/237

3 to report to WRC-03 the results of studies under *requests ITU-R* 1, 2, 3 and 4.

SUP USA/12/238

~~ANNEX 1 TO RESOLUTION 130 (WRC-97)~~

~~**Provisional limits**~~

Reasons: Suppression of Annex 1 is as recommended in Annex 5 to Chapter 3 of the Report of CPM-99-2.

MOD USA/12/239

ANNEX ~~2~~1 TO RESOLUTION 130 (Rev.WRC-~~97~~2000)

ITU-R studies on frequency sharing between non-GSO FSS and GSO FSS

The following is a list of the studies and related activities required.

SUP USA/12/240

~~1 Characterization of short-duration interference peaks which might exceed equivalent pfd limits set by a world radiocommunication conference for large earth station antennas, in terms of maximum and mean amplitudes, maximum and mean durations, mean time between occurrences, aggregate percentages of time of occurrences and typical amplitude/time profiles.~~

MOD USA/12/241

~~2~~1 Acquisition of data relating to the impact of the interference peaks on the performance of a range of earth station demodulators of various types and origins.~~ Administrations are encouraged to cooperate in this matter by arranging for the appropriate measurements to be carried out, and submitting the results to the appropriate working parties or task groups in time to be included in the ITU-R report to the next conference.~~

MOD USA/12/242

~~3~~2 ~~Carrying out computer simulations to determine the impact on equivalent pfd statistics of multiple non-GSO networks interfering with a GSO downlink, and in particular to discover the percentage-of-time thresholds for which the probability of simultaneous interference peaks from satellites in different non-GSO constellations becomes significant. Both homogeneous and inhomogeneous sets of non-GSO systems should be simulated where the necessary data are available.~~Identify the parameters and appropriate assumptions necessary to calculate pfd statistics from multiple non-GSO FSS systems into a GSO earth station. Calculate and compare aggregate pfd statistics using various modelling options including full simulation, a modified pfd mask (ITU-R Document 11/153), and convolution. Determine the number and location of GSO earth station test points required to accurately characterize the aggregate interference.

SUP USA/12/243

~~4 Conducting investigations to find out whether the emissions from the satellites and earth stations of non-GSO systems would cause problems for the tracking, telemetry and command of GSO (and non-GSO) satellites, during both their launch and operational phases, and the development of methods for avoiding such problems.~~

MOD USA/12/244

~~5~~3 Carrying out computer simulations to derive the time statistics of short-term interference between two or more non-GSO FSS networks, with the objective of determining ~~the approximate number of such networks which could co-exist in the same bands~~how such networks could co-exist.

SUP USA/12/245

~~6 Identification and validation of software which could be used by the Bureau to check whether a system for which an application for spectrum has been made would comply with the equivalent pfd and aggregate pfd limits.~~

MOD USA/12/246

~~7~~4 Carrying out studies to determine the feasibility of frequency sharing between non-GSO FSS networks using circular orbits and ~~networks using slightly-inclined geostationary orbits, and also between~~ non-GSO FSS networks ~~and networks~~ using ~~"quasi-geostationary"~~non-circular orbits.

SUP USA/12/247

~~8 Development, if practicable, of continuous curves of equivalent pfd versus antenna diameter and/or *G/T* of the GSO earth station to be protected. Whilst it may be necessary to limit the compliance checking by the Bureau to a few discrete antenna sizes, administrations will need to know that the protection will be adequate in the case of antennas of other sizes; hence the desirability of continuous curves.~~

MOD USA/12/248

~~9~~5 Continuation of studies on techniques for the mitigation of interference ~~between GSO and non-GSO networks, and between~~amongst non-GSO networks.

SUP USA/12/249

~~10 Refinement of the methodologies in Recommendation ITU-R S.1323 for the derivation of *I/N* limits and their conversion to equivalent pfd and aggregate pfd limits, taking into account propagation fade statistics, the different circumstances of "transparent" and remodulating satellite transponders, and the impact of fade counter-measures such as adaptive power control.~~

SUP USA/12/250

~~11 Consideration of how account can be taken, in studies concerning the definition of uplink limits, of the gain versus off-axis angle characteristics of the receiving spot beams of geostationary satellites.~~

SUP USA/12/251

~~12 Taking into account that the bands allocated to the FSS are used by the fixed, radiolocation and space science services, study of the criteria for sharing between non-GSO FSS and GSO FSS systems and systems in those services.~~

Reasons: Certain of the studies ordered in Annex 2 to Resolution 130 (WRC-97) remain valid in the modified version of Resolution 130 that will be adopted by WRC-2000. Retention of a modified annex will help facilitate the work of ITU-R.

ADD USA/12/252

ANNEX 2 TO RESOLUTION 130 (Rev.WRC-2000)

Further study is required of the aggregate $epfd_{down}$ limits and associated percentages of time for the 3 m and 10 m GSO FSS earth station antennas from Resolution WWW (WRC-2000), Table WWW-1A, to determine whether the aggregate interference caused by all co-frequency non-GSO FSS systems in the subject bands into GSO FSS systems exceeds the maximum interference levels that are necessary to protect these GSO systems.

Reasons: Consequential to the addition of *requests ITU-R* 2. See also *further recognizing* from IAP/14/287 (Resolution **WWW (WRC-2000)**).

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.13.1 - on the basis of the results of the studies in accordance with Resolutions 130 (WRC-97), 131 (WRC-97) and 538 (WRC-97): to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

Incorporation of certain provisions of Resolutions 130 (WRC-97) and 538 (WRC-97) into Article S5

Proposed modifications to Article S5

Background information

The following are proposals to modify footnotes in Article S5 to reflect certain provisions of Resolutions 130 and 538. These proposals are based on Option 1A in Annex 6 to Chapter 3 of the CPM Report.

Proposals

MOD USA/12/197

S5.520 The use of the band 18.1-18.4 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service using the geostationary-satellite orbit.

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Reasons: Since studies have not been undertaken by ITU-R on the potential interference to FSS or fixed service receiving stations from non-GSO FSS (Earth-to-space) operations in the band 18.1-18.4 GHz, the footnote is modified to limit use of the band in the Earth-to-space direction to GSO systems.

MOD USA/12/198

S5.441 The use of the bands 4 500-4 800 MHz (space-to-Earth), 6 725-7 025 MHz (Earth-to-space) by the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by a non-geostationary-satellite system~~s~~ in the fixed-satellite service ~~shall be in accordance with the provisions of Resolution **130 (WRC-97)**~~is subject to the application of the provisions of MOD **S9.10** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. In these bands, non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service. The provisions of Resolution **130 (Rev.WRC-2000)** apply.

MOD USA/12/199

S5.484A The use of the bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 13.75-14.5 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), 29.5-30 GHz (Earth-to-space) by a non-geostationary~~- and geostationary-~~satellite system~~s~~ in the fixed-satellite service is subject to application of the provisions of ~~Resolution **130 (WRC-97)**. The use of the band 17.8-18.1 GHz (space-to-Earth) by non-geostationary fixed-satellite service systems is also subject to the provisions of Resolution **538 (WRC-97)**~~MOD **S9.10** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. In these bands, non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service. The provisions of Resolution 130 **(Rev.WRC-2000)** apply.

MOD USA/12/200

S5.487A *Additional allocation:* in Region 1, the band 11.7-12.5 GHz, in Region 2, the band 12.2-12.7 GHz and, in Region 3, the band 11.7-12.2 GHz, are also allocated to the fixed-satellite service (space-to-Earth) on a primary basis, limited to non-geostationary systems and subject to the application of the provisions of ~~Resolution **538 (WRC-97)**~~MOD **S9.10** for coordination between non-geostationary-satellite systems in the fixed-satellite service. In these bands, non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from GSO networks in the broadcasting-satellite service. The provisions of Resolution **538 (Rev.WRC-2000)** apply.

MOD USA/12/201

S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2 by non-geostationary-satellite systems in the fixed-satellite service is subject to the application of the provisions of ~~Resolution **538 (WRC-97)**~~MOD **S9.10** for coordination between non-geostationary-satellite systems in the fixed-satellite service. In these bands, non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service. The use of the band 17.3-17.8 GHz in Region 2 by systems in the fixed-satellite service (Earth-to-space) is limited to geostationary satellites. The provisions of Resolution **538 (Rev.WRC-2000)** apply.

Reasons: These modifications to Article S5 are to replace the references to Resolutions 130 and 538 with references to MOD S9.10 in Article S9. Additional text on No. S5.516 is needed to clarify the intent that there is no allocation in the band 17.3-17.8 GHz in Region 2 for non-GSO FSS (Earth-to-space). The possibility of an allocation was to be based on sharing studies between the non-GSO FSS and the existing and planned services. Studies show that sharing between radiolocation stations and non-GSO FSS networks and non-GSO FSS networks is not feasible due to severe interference from operational radiolocation stations and these services are not compatible.

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In addition, the band 17.3-17.8 GHz in Region 2 is allocated to BSS beginning 1 April 2007. Studies show that transmit non-GSO FSS earth stations are not compatible with receive BSS earth stations.

In addition, as a result of expected changes to Resolutions 130 and 538 at WRC-2000, these modifications to footnotes contained in Article S5 will be needed to incorporate the appropriate *resolves* of Resolutions 130 (WRC-97) and 538 (WRC-97) into the Radio Regulations.

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Off-axis e.i.r.p. limits applicable to GSO FSS systems in the frequency bands 12.75-13.25 GHz, 13.75-14.50 GHz and 29.5-30 GHz

Proposed modifications to Section VI of Article S22

Background information

WRC-97 adopted, then suspended, FSS earth station off-axis e.i.r.p. density limits in the 12.75-13.25 GHz, 13.75-14.0 GHz and 14.0-14.5 GHz (Earth-to-space) bands to facilitate sharing between non-GSO FSS and GSO FSS systems in these frequency bands. These limits were immediately suspended because it was recognized that they were developed for the GSO/GSO FSS sharing environment and, if applied to the GSO/non-GSO FSS sharing environment, may unduly constrain certain GSO FSS operations. The impact of these limits on older GSO FSS earth stations also needed further study.

ITU-R studied this issue and concluded that some existing or future GSO FSS earth stations may exhibit off-axis e.i.r.p. density levels higher than those specified in Recommendation ITU-R S.524, *Maximum permissible levels of off-axis e.i.r.p. density from earth stations in GSO networks operating in the fixed-satellite service transmitting in the 6, 14 and 30 GHz frequency bands,* in directions beyond ± 3 degrees of the geostationary arc due to off-set feeds and spillover effects. In recognition of this characteristic, it was agreed that Recommendation ITU-R S.524 should be modified to recommend GSO FSS earth station off-axis e.i.r.p. density levels beyond 3 degrees of the geostationary orbit which are 3 dB relaxed from the recommended levels within 3 degrees of the geostationary orbit (see Document 4A/TEMP/234). This would provide co-frequency non-GSO FSS systems with an upper bound to the level of interference that non-GSO FSS systems would need to tolerate from GSO FSS systems. The ITU-R studies did not address whether these maximum e.i.r.p. density levels were appropriate for inclusion in the Radio Regulations.

The CPM Report identified three options for how the revised off-axis e.i.r.p. limits could be considered by the Conference. Under Option 1, the Conference could suppress the current limits in Section VI of Article S22 of the Radio Regulations. Thus, no FSS earth station off-axis e.i.r.p. limits would be included in the Radio Regulations and Section VI of Article S22 could be modified to encourage administrations to use the latest ITU-R Recommendations, which was the case prior to WRC-97. Under Option 2, the Conference could modify Section VI of Article S22 to include the revised off-axis e.i.r.p. limits included in Chapter 3 of the CPM Report or the levels recommended in the most recent modification to Recommendation ITU-R S.524 (Document 4A/TEMP/234). Under Option 3, the Conference could modify Section VI of Article S22 to incorporate by reference off-axis e.i.r.p. limits included in a specific ITU-R Recommendation, e.g. modifications to Recommendation ITU-R S.524 approved at WP 4A meeting in February 2000.

Each of the three options has certain shortcomings. As noted in the CPM Report, the first option would not provide additional protection for non-GSO networks and it would not provide clear guidelines to non-GSO system designers. The second option could inhibit the flexibility of GSO FSS system designers by including in the Radio Regulations off-axis limits that could not be exceeded in the future for any reason. Finally, the third option may not be available to the WRC-2000 because, while ITU-R Working Party 4A has agreed on off-axis limits to be included in a modification to Recommendation ITU-R S.524, these modifications in the 12.75-13.25 GHz and 13.75-14.50 GHz frequency bands will not be finalized in time for consideration by WRC-2000.

ARTICLE S22

Space services[1]

MOD USA/12/183

Section VI – Earth station off-axis power limitations in the fixed-satellite service~~11~~

MOD USA/12/184

S22.26 § 9 ~~The level of equivalent isotropically radiated power (e.i.r.p.) emitted by an earth station shall not exceed the following values for any off-axis angle φ which is 2.5° or more off the main-lobe axis of an earth station antenna:~~The level of equivalent isotropically radiated power (e.i.r.p.) emitted by an earth station at angles in all directions off the main beam axis has a significant impact on interference caused to other geostationary satellite networks and non-geostationary satellite networks. Enhanced utilization and easier coordination would be attained by minimizing such off-axis radiation and administrations are encouraged to achieve the lowest values practicable bearing in mind the latest ITU-R Recommendations. Minimizing such levels is particularly important in intensively used uplink bands.

~~*Off-axis angle*~~	~~*Maximum e.i.r.p.*~~
~~2.5° ≤ φ ≤ 7°~~	~~(39 – 25 log φ) dB(W/40 kHz)~~

~~11 **S22.VI.1** The provisions of this section are suspended pending the review of the values in Nos. **S22.26**, **S22.27** and **S22.28** by WRC-99.~~

~~7° < φ ≤ 9.2°~~	~~18 dB(W/40 kHz)~~
~~9.2° < φ ≤ 48°~~	~~(42 – 25 log φ) dB(W/40 kHz)~~
~~48° < φ ≤ 180°~~	~~0 dB(W/40 kHz)~~

SUP USA/12/185

S22.27 to **S22.29**

Reasons: This proposal is a hybrid of Options 1 and 3 from Annex 7 to Chapter 3 of the CPM Report. Under the hybrid approach, sections S22.27 through S22.29 of Section VI of Article S22 would be suppressed. Additionally, section S22.26 would be modified to indicate that administrations operating GSO FSS networks should comply with the e.i.r.p. density levels contained in the appropriate Recommendation. The advantage to this approach is that, as technology evolves, it allows the ITU-R recommended levels to be assessed and modified within ITU-R in a timely manner. Further, it points administrations to the technical guidelines that have been developed within ITU-R. At the same time, it provides guidance to the non-GSO FSS designer on the level of interference from co-frequency GSO FSS systems that might be present.

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Methodologies for ensuring compliance with operational and additional operational $epfd_{down}$ limits

Background information

CPM-99, to facilitate introduction of non-GSO FSS systems while affording protection to GSO FSS and BSS, agreed to three types of $epfd_{down}$ limits. These are: validation limits, to be verified by the Radiocommunication Bureau using an agreed software tool; operational limits, to provide operational GSO earth stations protection from synchronization loss; and additional operational limits to ensure protection to operational 3 m and 10 m GSO FSS earth stations operating in the 10.7-12.75 GHz bands. The operational limits, which are single values for 100 per cent of the time, provide an opportunity for development of regulatory procedures to be implemented by BR which would afford GSO systems a means of redress in the event such limits are exceeded by non-GSO FSS systems. The additional operational limits are specified values associated with periods of time. Such limits, as with the operational limits, must be met in practice, by each non-GSO FSS system.

With regard to both the operational limits and the additional operational limits, ITU-R has initiated studies on how to ascertain whether these limits are exceeded. At the recent meeting of WP 4A (20-29 February, 2000), a preliminary draft new Recommendation was developed concerning measurement techniques which can be used to determine if the operational limits are exceeded into operating GSO earth stations. As for the additional operational limits, preliminary views of WP 4A are that such limits cannot be measured, but rather, a detailed computer simulation of an non-GSO FSS system, utilizing operational assumptions, including traffic distribution and beam loading is required. Work is continuing in both these areas. The proposed Resolution CEA (WRC-2000) was developed to address subject.

The CPM-99 Report also indicated the need for regulatory procedures to implement the operational and additional operational $epfd_{down}$ limits which identify non-GSO systems exceeding the operational/additional operational limits and ensure immediate reduction of the interference level to the operational/additional operational limits by any non-GSO system exceeding those limits. The proposed Resolution CEA (WRC-2000) and interim procedures were developed in response to this requirement.

ADD USA/12/182

RESOLUTION CEA (WRC-2000)

Development of methodologies for ensuring compliance by non-geostationary satellite systems in the fixed-satellite service in certain frequency bands with the operational $epfd_{down}$ and additional operational $epfd_{down}$limits in Article s22

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-2000 adopted a number of epfd limits that apply to non-geostationary satellite systems in the fixed-satellite service in certain frequency bands between 10.7 and 30.0 GHz;

b) that compliance with the validation epfd limits adopted by WRC-2000 will be verified by the Radiocommunication Bureau before a non-geostationary fixed-satellite service system would be eligible for a favourable finding under the procedures in Article **S11** of the Radio Regulations;

c) that the operational $epfd_{down}$ limits and additional operational $epfd_{down}$ limits adopted by WRC-2000 in No. **S22.5G** of the Radio Regulations and associated Tables **S22-4A** and **S22-4B** and footnote 3 to Table **S22-1D** apply only to operational non-geostationary fixed-satellite service systems, and compliance with these limits is not subject to validation by the Radiocommunication Bureau in order for a non-geostationary fixed-satellite service system to receive a favourable finding under the procedures in Article **S11** of the Radio Regulations;

d) that the operational $epfd_{down}$ limits and the additional operational $epfd_{down}$ limits provide protection from unacceptable interference to operational geostationary fixed-satellite service and broadcasting-satellite service networks from co-frequency non-geostationary fixed-satellite service systems in the subject frequency bands;

e) that administrations operating geostationary fixed-satellite service and/or broadcasting-satellite service networks in frequency bands where operational $epfd_{down}$ limits and/or additional operational $epfd_{down}$ limits have been established require reliable means of ascertaining that operational non-geostationary fixed-satellite service systems are in compliance with the applicable limits;

f) that administrations operating non-geostationary fixed-satellite service systems in frequency bands where operational $epfd_{down}$ limits and/or additional operational $epfd_{down}$ limits have been established require reliable means of ascertaining the validity of assertions from administrations operating geostationary fixed-satellite service and/or broadcasting-satellite service systems that a particular non-geostationary fixed-satellite service system is operating in violation of the applicable limits;

g) that studies within ITU-R are an appropriate means for developing the methodologies and/or associated assessment techniques that administrations may use to ascertain compliance by a non-geostationary fixed-satellite service system with the operational $epfd_{down}$ limits and additional operational $epfd_{down}$ limits,

recognizing

a) that geostationary satellite networks in the fixed-satellite service and broadcasting-satellite service are operational or will be operational in the frequency bands where operational $epfd_{down}$ limits and additional operational $epfd_{down}$ limits apply, and that non-geostationary fixed-satellite service systems subject to the limits are planned for operation in the same bands;

b) that No. **S22.5F** provides that a non-geostationary fixed-satellite service system for which complete notification or coordination information, as appropriate, has been received by the Bureau after 21 November 1997 shall be subject to the power limits in Article **S22,** as adopted by WRC-2000;

c) that pursuant to No. **S22.5G** of the Radio Regulations, any exceedance of the operational $epfd_{down}$ limits or additional operational $epfd_{down}$ limits by a non-geostationary fixed-satellite service system to which the limits apply is a violation of No. **S22.2** of the Radio Regulations;

d) that in view of the importance of the protection that the operational $epfd_{down}$ limits and additional operational $epfd_{down}$ limits are intended to provide to geostationary satellite networks, and because there is to be no validation by the Bureau of compliance with these limits, it is important to discourage violations of the operational $epfd_{down}$ limits and additional operational $epfd_{down}$ limits by a non-geostationary fixed-satellite service system; if a violation nevertheless occurs, it should be corrected in the most expeditious manner,

resolves to instruct ITU-R

1 to study as a matter of urgency, and develop in time for consideration by WRC-02/03, methodologies that will permit administrations operating geostationary fixed-satellite service, geostationary broadcasting-satellite service, or non-geostationary fixed-satellite service networks in the frequency bands to which the operational $epfd_{down}$ limits and/or additional operational $epfd_{down}$ limits in Article **S22** apply:

a) to assess the interference levels (through either measurement or simulation) that would be produced by non-geostationary fixed-satellite service systems in the same bands;

b) to ensure that non-geostationary fixed-satellite service systems comply with the applicable limits; and

c) to develop appropriate methods, such as software tools, to be used by administrations in determining whether a proposed non-geostationary fixed-satellite service system complies with the additional operational limits;

2 to develop, as a matter of urgency, an appropriate recommendation on a mechanism and format for administrations operating non-GSO FSS systems to make available their satellite ephemeris data and update such data on a regular basis.

Reasons: In keeping with the CPM-99 compromise with regard to the adoption of validation, operational, and additional operational limits, the ITU Radiocommunication Bureau (BR) will not check compliance with the operational and the additional operational limits. CPM-99, therefore, agreed that it is essential to develop, as a matter of urgency, Recommendations to permit administrations to check compliance with the operational and the additional operational limits (see section 3.1.2.4.8 of the CPM-99 Report). Resolution CEA (WRC-2000) is proposed in response to this requirement. This Resolution is intended to focus the studies carried out by ITU-R in order to assist administrations operating geostationary fixed-satellite service, geostationary broadcasting-satellite service, or non-geostationary fixed-satellite service networks in the frequency bands to which the operational $epfd_{down}$ limits and/or additional operational $epfd_{down}$ limits in apply.

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Modifications to Resolution 538 (WRC-97)

Background information

WRC-97 adopted an allocation to non-GSO FSS in the Appendix S30 BSS bands (11.7-12.5 GHz in Region 1, 11.7-12.2 GHz in Region 3 and 12.2-12.7 GHz in Region 2) (see S5.487A). WRC-97 also specified provisions in Resolution 538, including provisional epfd limits, to govern non-GSO FSS in the Appendix S30 BSS bands and associated feeder-link bands (17.3-17.8 GHz in Regions 1 and 3, 17.8-18.1 GHz in all Regions). As a consequence of the extensive studies carried out within ITU-R under agenda item 1.13, it is expected that WRC-2000 will adopt revised epfd limits in Article S22 for non-GSO FSS in these bands. Therefore, it is necessary to revisit the provisions of Resolution 538 to update them accordingly. Annex 5 to Chapter 3 of the CPM-99 Report provides examples of modifications to Resolution 538.

The following proposal modifies Resolution 538 to suppress provisions that CPM-99 proposed to contain elsewhere in the Radio Regulations or that are no longer needed. In addition, necessary provisions of Resolution 538 are maintained, such as requesting BR to review findings made for certain non-GSO FSS systems based on the expected revision of the Article S22 epfd limits.

Proposal

MOD USA/12/163

RESOLUTION 538 (WRC-~~97~~2000)

Use of the frequency bands covered by Appendices S30/30 and S30A/30A by non-geostationary-satellite systems in the fixed-satellite service

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

MOD USA/12/164

a) that provisional limits adopted by WRC-97 have been ~~established~~revised and included in Article **S22** ~~and in the Annex to this Resolution~~ to ensure that the interference caused by non-geostationary-satellite (non-GSO) systems in the fixed-satellite service (FSS) into assignments operated in conformity with the Appendices **S30** and **S30A** Plans is maintained within ~~negligible~~agreed levels;

NOC USA/12/165

b) that the integrity of the above-mentioned Plans and their future modifications is to be ensured;

c) that non-GSO systems should not be entered into those Plans and therefore should not apply the procedures associated with the Plans and should not be protected by those procedures;

MOD USA/12/166

d) that ~~this Conference has~~WRC-97 decided to introduce in Article **S5** a new allocation to the FSS in the frequency bands 11.7-12.5 GHz in Region 1, 12.2-12.7 GHz in Region 2 and 11.7-12.2 GHz in Region 3, limited to non-GSO FSS systems,

Reasons: Editorial and changes for clarity.

resolves

1

SUP USA/12/167

1.1

MOD USA/12/168

1.~~2~~1 that ~~such a system shall, as of the end WRC-99,~~a non-GSO FSS system operating in the frequency bands covered by Appendices **30** and **30A** shall comply with the limits specified in Article **S22**, as revised~~, if appropriate~~, by WRC-~~99~~2000, irrespective of the date of receipt of the complete coordination or notification information, as appropriate, relating to the non-GSO FSS system;

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Reasons: *Resolves* 1.1 can be suppressed, as it is a provisional measure for operational non-GSO systems between WRC-97 and WRC-2000. Modification to 1.2 is required to maintain the decision of WRC-97 to ensure the protection of the BSS Plans by all non-GSO systems irrespective of filing date with BR. While the proposed provisions of Article S22 will take care of this for systems filed after WRC-97, *resolves* 1.2 addresses systems filed prior to the end of WRC-97. If it is determined that no systems were filed prior to the end of WRC-97, WRC-2000 may consider that this provision can be suppressed.

SUP USA/12/169

1.3

Reasons: This *resolves* can be suppressed, as it is included in Radio Regulation S22.5G (see Annex 1 to Chapter 3 of the CPM Report and proposal IAP/14/264).

SUP USA/12/170

1.4

Reasons: This *resolves* is now covered by the $epfd_{is}$ limits appearing in Table S22-3 and Radio Regulation S22.5G (see Annex 1 to Chapter 3 of the CPM Report and proposals IAP/14/258 and 264).

MOD USA/12/171

1.~~5~~2 that, in the case that, between 22 November 1997 and the end of WRC-~~99~~2000, ~~if~~ an administration operating or bringing into use a GSO system before the end of WRC-~~99~~2000, because it consider~~s~~ed that a non-GSO FSS system proposed by another administration might cause unacceptable interference into its GSO system~~, then~~:

– ~~the administration operating the GSO system shall send~~sent to the administration operating the non-GSO FSS system the technical details upon which its disagreement is based and, if this is not resolved by the end of WRC-2000, then;

– unless the limits adopted by WRC-2000 are met, the administration operating the non-GSO FSS system shall continue its efforts to resolve the difficulties, taking into account especially degradation of picture and sound quality or signal availability with regard to GSO systems in operation;

Reasons: Although the provisions of *resolves* 1 must have been invoked prior to the end of WRC-2000, the actions contemplated by this *resolves* could extend beyond the end of WRC-2000. Thus, it is necessary to retain this *resolves* in a suitably modified form. If this *resolves* has not been invoked by the end of WRC-2000, WRC-2000 may consider its suppression.

SUP USA/12/172

1.6

MOD USA/12/173

1.~~7~~3 that, as of 22 November 1997, such a system shall be subject, for the coordination with non-GSO systems, to the application of ~~the provisions of § 2.1 of Section II of Resolution **46 (Rev.WRC-97)**~~/No. **S9.12**;

Reasons: Although this provision is proposed to be included in a footnote in Article S5, it would then only apply after the end of WRC-2000. Therefore, it is necessary to maintain this provision to apply from 22 November 1997.

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MOD USA/12/174

1.~~8~~4 that, as of 22 November 1997, such a system shall apply, using an equivalent power flux-density threshold of –185.3 dB(W/m^2/4 kHz) for 99.7% of the time, calculated with the reference 90 cm diameter antenna pattern provided in Annex 5 of Appendix **S30** for Regions 1 and 3, the provisions of No. **S9.8**/Article 7 of Appendix **S30** with respect to assignments which appear in Article 11 of Appendix **S30** with the symbols AE or PE~~;~~.

Reasons: WRC-2000 may decide that this specific agreement from WRC-97 is no longer required and that this provision may be suppressed.

SUP USA/12/175

2

Reasons: By the end of WRC-2000, this provision will have been overtaken by events.

requests ITU-R

SUP USA/12/176

a)

SUP USA/12/177

b)

MOD USA/12/178

~~*c)*~~1 to complete the studies in the frequency bands specified in Tables **S22-1D** and **S22-2** relating to the sharing criteria to be applied for determining the need for coordination between non-GSO FSS systems where No. **S9.10** applies, with a view to promoting efficient use of spectrum/orbit resources and equitable access to these resources by all countries;

MOD USA/12/179

~~*d)*~~2 to report to ~~the 1999 Conference Preparatory Meeting (CPM-99) on the conclusion of these studies~~WRC-03 the results of the studies under *requests ITU-R* 1,

Reasons: While certain provisions are no longer required, studies relating to the sharing criteria to be applied during the coordination between non-GSO FSS systems are still needed.

instructs the Radiocommunication Bureau

MOD USA/12/180

as of the end of WRC-~~99~~2000, to review and, if appropriate, revise, any finding previously made on the compliance with the limits contained in Article **S22** of a non-GSO FSS system for which complete coordination or notification information, as appropriate, has been received between 22 November 1997 and the end of WRC-~~99~~2000. This review shall be based on the values in Article **S22**, as revised~~, if appropriate~~, by WRC-~~99~~2000.

Reasons: Modification is to update the provision. These modifications are consistent with those proposed in the CPM Report.

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SUP USA/12/181

ANNEX TO RESOLUTION 538 (WRC-97)

Provisional limits

Reasons: Limits as revised by WRC-2000 will be included in Article S22 of the Radio Regulations.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 6 to Document 12-E
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PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.6.1 - review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

Use of high altitude platform stations in IMT-2000 terrestrial systems

Background information

This proposal addresses the option to use the high altitude platform stations (HAPS) for the delivery of terrestrial IMT-2000 within the bands that WARC-92 identified for terrestrial IMT-2000 in S5.388, subject to licensing, technical, sharing, coordination and implementation regulation by administrations. It addresses regulatory issues relating to HAPS in the context of IMT-2000 and is not related to the issue of providing more spectrum for the terrestrial component of IMT-2000.

A high altitude platform station (HAPS) is defined in S1.66A as “A station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth”. Each HAPS deploys a multibeam antenna capable of projecting numerous spot beams within its coverage area. The Radio Regulations, under S4.15A, state, “Transmissions to or from high altitude platform stations shall be limited to bands specifically identified in Article S5”. The only bands currently identified for use by HAPS in Article S5 are in footnote S5.552A that states that “The allocation to the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz is designated for use by high altitude platform stations. The use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz is subject to the provisions in Resolution 122 (WRC-97)”.

ITU-R TG 8/1 completed extensive studies regarding the ability of HAPS to provide IMT-2000 services within Regions 1 and 3 using the bands 1 885-2 025 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz and within Region 2 using the bands 1 885-1 980 MHz and 2 110-2 160 MHz identified for advanced communications applications, including IMT-2000. These studies address, among other things, the ability of HAPS to coordinate and share with IMT-2000 stations operating in neighbouring administrations and with certain stations operating in other services in adjacent bands. Draft new Recommendation ITU-R M.[8/115], as approved by ITU-R Study Group 8 for adoption by correspondence, considers certain sharing and coordination requirements associated with the use of HAPS as a base station within a terrestrial IMT-2000 system. The proposed

Resolution HAPS (WRC-2000) provides minimum performance characteristics from draft new Recommendation ITU-R M.[8/115].

This proposal recognizes that in accordance with footnote MOD S5.388 and Resolution IMT (WRC-2000), administrations may use the bands identified for IMT-2000, including the bands noted herein, for stations of other primary services to which they were allocated.

As with all other types of base stations operating as a base station in an IMT-2000 system, the proposal also recognizes the need for additional future studies on the compatibility of HAPS operating as a base station in an IMT-2000 system and other stations operating in the same and adjacent frequency bands.

This proposal calls for a footnote in Article S5 of the Radio Regulations identifying HAPS as an optional method for the delivery within an IMT-2000 system in the frequency bands identified for Regions 1 and 3, the bands 1 885-2 025 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz and for Region 2, the bands 1 885-1 980 MHz and 2 110-2 160 MHz, identified for advanced communications applications, including IMT-2000, subject to Resolution HAPS (WRC-2000), Resolution IMT (WRC-2000) and national regulations.

Concerning the optional implementation of HAPS in an IMT-2000 system, the following regulatory changes are proposed:

MOD USA/12/160

1 710-2 170 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 710-1 930	FIXED MOBILE S5.380 S5.149 S5.341 S5.385 S5.386 S5.387 S5.388 ADD S5.BBB	
1 930-1 970 FIXED MOBILE S5.388 ADD S5.BBB	**1 930-1 970** FIXED MOBILE Mobile-satellite (Earth-to-space) S5.388 ADD S5.BBB	**1 930-1 970** FIXED MOBILE S5.388 ADD S5.BBB
1 970-1 980	FIXED MOBILE S5.388 ADD S5.BBB	
1 980-2 010	FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.388 S5.389A S5.389B S5.389F	
2 010-2 025 FIXED MOBILE S5.388 ADD S5.BBB	**2 010-2 025** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.388 S5.389C S5.389D S5.389E S5.390	**2 010-2 025** FIXED MOBILE S5.388 ADD S5.BBB

2 025-2 110	SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE S5.391 SPACE RESEARCH (Earth-to-space) (space-to-space) S5.392	
2 110-2 120	FIXED MOBILE SPACE RESEARCH (deep space) (Earth-to-space) S5.388 ADD S5.BBB	
2 120-2 160 FIXED MOBILE S5.388 ADD S5.BBB	**2 120-2 160** FIXED MOBILE Mobile-satellite (space-to-Earth) S5.388	**2 120-2 160** FIXED MOBILE S5.388 ADD S5.BBB
2 160-2 170 FIXED MOBILE S5.388 S5.392A ADD S5.BBB	**2 160-2 170** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) S5.388 S5.389C S5.389D S5.389E S5.390	**2 160-2 170** FIXED MOBILE S5.388 ADD S5.BBB

ADD USA/12/161

S5.BBB In Regions 1 and 3, the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, and in Region 2, the bands 1 885-1 980 MHz and 2 110-2 160 MHz, may be used by high altitude platform stations as base stations within an IMT-2000 system in accordance with Recommendation ITU-R IMT.RSPC, Resolution **HAPS (WRC-2000)** and Resolution **IMT (WRC-2000)**. These bands are allocated to the fixed, mobile and the mobile-satellite services, and the use by IMT-2000 applications using high altitude platform stations as an IMT-2000 base station in these bands is based on the equality of rights between all allocated radio services and does not establish priority of assignments in these bands among stations of the primary services to which they are allocated.

ADD USA/12/162

DRAFT RESOLUTION HAPS (WRC-2000)

Use of high altitude platform stations providing IMT-2000 in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WARC-92 identified the bands 1 885-2 025 MHz and 2 110-2 200 MHz, intended for use on a worldwide basis for IMT-2000, including the bands 1 980-2 010 MHz and 2 170-2 200 MHz for the satellite component of IMT-2000, in No. **S5.388**;

b) that a high altitude platform station (HAPS) is defined in S1.66A as "A station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth";

c) that HAPS may offer a new means of providing IMT-2000 services with minimal network build out as it is capable to provide service to a large footprint together with a dense coverage;

d) that, in accordance with MOD **S5.388** and Resolution **IMT (WRC-2000)**, administrations may use the bands identified for IMT-2000, including the bands noted herein, for stations of other primary services to which they were allocated;

e) that these bands are allocated to the fixed, mobile and mobile-satellite services;

f) that ITU-R did not address sharing and coordination between HAPS and some existing systems, such as PCS and MMDS, currently operating in some administrations in the bands 1 885-2 025 MHz and 2 110-2 200 MHz;

g) that in accordance with **S5.BBB**, HAPS is allowed to be used as a base station of terrestrial IMT-2000 in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2, which are allocated to the fixed, mobile and the mobile-satellite services. The use by high altitude platform stations as an IMT-2000 base station in these bands is based on the equality of rights between all allocated radio services and does not establish priority of assignments in these bands among stations of the primary services to which they are allocated,

resolves

1 that administrations wishing to implement HAPS within a terrestrial IMT-2000 system shall give due consideration to the minimum performance characteristics and operational conditions given in Recommendation ITU-R M.[8/115], in particular:

1.1 that for the purpose of protecting certain stations operating in neighbouring administrations from co-channel interference, administrations using HAPS as base stations to IMT-2000 shall use antennae that comply with the following antenna pattern:

$G(\psi) = G_m - 3(\psi/\psi_b)^2$	dBi	for	$0 \le \psi \le \psi_1$
$G(\psi) = G_m + L_N$	dBi	for	$\psi_1 < \psi \le \psi_2$
$G(\psi) = X - 60\log(\psi)$	dBi	for	$\psi_2 < \psi \le \psi_3$
$G(\psi) = L_F$	dBi	for	$\psi_3 < \psi \le 90°$

where:

$G(\psi)$: gain at the angle ψ from the main beam direction (dBi)

G_m: maximum gain in the main lobe (dBi)

ψ_b: one-half of the 3 dB beamwidth in the plane of interest (3 dB below G_m) (degrees)

L_N: near-in-side-lobe level in dB relative to the peak gain required by the system design, and has a maximum value of –25 dB

L_F: G_m - 73 dBi far side lobe level (dBi)

$\psi_1 = \psi_b \sqrt{-L_N/3}$	degrees
$\psi_2 = 3.745\ \psi_b$	degrees
$X = G_m + L_N + 60\log(\psi_2)$	dB
$\psi_3 = 10^{(X-L_F)/60}$	degrees

The 3 dB beamwidth ($2\psi_b$) is again estimated by:

$$(\psi_b)^2 = 7442/(10^{0.1Gm}) \text{ (in degrees}^2\text{)}$$

where G_m is the peak aperture gain (dBi);

1.2 that a HAPS operating as a base station to provide IMT-2000 shall not exceed a co-channel spectral power flux-density (spfd) level of –121.5 dB (W/(m^2/MHz)) on the Earth’s surface outside an administration’s borders unless agreed otherwise with the affected neighbouring administration, noting that this does not necessarily protect all stations operating in co-channel services;

1.3 that a HAPS operating as a base station to provide IMT-2000, in order to protect mobile earth stations of the satellite component of IMT-2000 from interference, shall not exceed an out-of-band spfd level of –165 dB (W/(m^2/4 kHz)) on the Earth’s surface in the bands 2 160-2 200 MHz in Region 2 and 2 170-2 200 MHz in Regions 1 and 3;

1.4 that a HAPS operating as a base station to provide IMT-2000, in order to protect fixed stations from interference, shall not exceed an out-of-band spfd level on the Earth’s surface in the bands 2 025-2 110 MHz of:

–165 dB(W/(m^2/MHz)) for angles of arrival (θ) less than 5° above the horizontal plane;

–165 + 1.75 (θ - 5) dB (W/(m^2 /MHz)) for angles of arrival between 5° and 25° above the horizontal plane; and

–130 dB(W/(m^2/MHz)) for angles of arrival between 25° and 90° above the horizontal plane,

invites ITU-R

to complete additional studies of HAPS sharing and coordination criteria with, between and into other systems in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 in Region 2, and in adjacent bands,

further resolves

that ITU-R should expeditiously complete its studies, and at the next WRC, update ITU regarding HAPS sharing and coordination criteria with, between and into other systems in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2, and in adjacent bands.

Reasons: Footnote S4.15A limits transmissions to and from HAPS to bands specifically identified in the Table of Frequency Allocations. The addition of S5.BBB to the Table of Frequency Allocations will provide administrations with the option to utilize HAPS for IMT-2000 services within the identified bands subject to the provisions of Resolution HAPS, Resolution IMT and national and international regulatory procedures and provisions.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

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PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

PROPOSALS RELATING TO PP-98 RESOLUTIONS

Resolution 86, the Plenipotentiary Conference (Minneapolis, 1998)
- Improving the satellite coordination and notification process

Proposal to modify Appendix S5 to the Radio Regulations to implement, with respect to geostationary-satellite networks operating in the fixed-satellite service in certain frequency bands, a coordination threshold based on a predetermined coordination arc

Background information

The 1998 Plenipotentiary Conference agreed through Resolution 86 on the need for improved coordination and notification of satellite networks. While proposals are being made to this Conference for temporary measures to deal with the current backlog of coordination requests, there is a need to improve the process to make it more efficient and effective on a long-term basis.

Working Party 4A, at its February 2000 meeting, developed a draft new Recommendation that provides the technical basis for using a coordination arc in certain frequency bands as the primary means of identifying potentially affected GSO FSS networks for coordination with other GSO FSS networks. Working Party 4A also recognized that not all systems within the coordination arc would be affected. It was also recognized that some GSO FSS systems outside of the coordination arc might want to be included in coordination based upon a calculated increase in noise temperature greater than 6%.

The following modifications to Appendix S5 to the Radio Regulations would implement such a procedure:

MOD USA/12/159

TABLE S5-1

Technical conditions for coordination
(see Article **S9**)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.7** GSO/GSO	A station in a satellite network using the geostationary-satellite orbit (GSO), in any space radiocommunication service, in a frequency band and in a Region where this service is not subject to a Plan, in respect of any other satellite network using that orbit, in any space radiocommunication service in a frequency band and in a Region where this service is not subject to a Plan, with the exception of the coordination between earth stations operating in the opposite direction of transmission	1)3 400-4 200 MHz and 5 850-6 725 MHz 2)10.95-11.2, 11.45-11.7, 11.7-12.2 (Region 2) 12.5-12.75 (Regions 1 and 3) 12.7-12.75 (Region 2) and 13.75-14.5 GHz	1)Any network in the fixed-satellite service with a space station within an orbital arc of ±10 degrees of the orbital position of a proposed network in the fixed-satellite service 2)Any network in the fixed-satellite service with a space station within an orbital arc of ±9 degrees of the orbital position of a proposed network in the fixed-satellite service		With respect to the bands in items 1, 2, and 3; coordination will be required with a network having an orbital position outside the arcs where the administration responsible for that network requests to be included in the coordination process and demonstrates that the threshold value for coordination calculated in accordance with Appendix **S8** exceeds 6% With respect to the bands in items 1, 2, and 3; coordination will not be required with a network having an orbital position inside the arcs where the administration requesting coordination or the

		3)17.7-20.2 GHz and 27.5-30 GHz	3)Any network in the fixed-satellite service with a space station within an orbital arc of ±8 degrees of the orbital position of a proposed network in the fixed-satellite service		administration responsible for an affected network demonstrates that the threshold value for coordination calculated in accordance with Appendix **S8** does not exceed 6%. A geostationary-satellite network that is the subject of such a demonstration would be considered a network for which coordination would need to be effected, until such time as the demonstration is agreed or confirmed between the concerned administrations
		4)All~~Any~~ frequency bands, other than those in items 1, 2 and 3, allocated to a space service, where this service is not subject to a Plan; and the bands in items 1), 2) and 3) where the radio service of the proposed network or affected networks is other than the fixed-satellite service	4)Value of $\Delta T/T$ exceeds 6%	4)Appendix **S8**	

Reasons: The 1998 Plenipotentiary Conference agreed through Resolution 86 on the need for improved coordination and notification of satellite networks. While proposals are being made to this Conference for temporary measures to deal with the current backlog of coordination requests, there is a need to improve the process to make it more efficient and effective on a long-term basis. This proposal provides a simplified method of identifying affected administrations by using a coordination arc in certain frequency bands as the primary means of identifying potentially affected GSO FSS networks for coordination with respect to other GSO FSS networks. It is recognized that not all systems within the coordination arc would be affected. It is also recognized that some GSO FSS systems outside of the coordination arc might want to be included in coordination based upon a calculated increase in noise temperature greater than 6%.

INTERNATIONAL TELECOMMUNICATION UNION

ITU **WRC-2000** WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 4 to*[*]
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PLENARY MEETING

United States of America

PROPOSAL FOR THE WORK OF THE CONFERENCE

PROPOSAL RELATING TO RESOLUTION 86, PLENIPOTENTIARY CONFERENCE (MINNEAPOLIS, 1998), S5.393 AND RESOLUTION 528

Background information

At WARC-92, allocations in the range 1-3 GHz were made for sound (audio) broadcasting from satellites. Different allocations were adopted for different regions of the world. The band 2 310-2 360 MHz is allocated to the United States, Mexico and India for this purpose through footnote S5.393. Resolution 86 calls for improving the methods to facilitate the coordination of satellite networks.

As implementation of the 2 310-2 360 MHz band has proceeded, Resolution 528, as applied through footnote S5.393, has proved to be a hindrance to effective coordination of systems that would utilize frequencies in different parts of the entire allocation. Specifically, as a consequence of *resolves* 3, the two countries in Region 2 have encountered unnecessary difficulties in implementing their respective systems due to the 25 MHz restriction.

Given that there are only three countries in the footnote and only two countries named in Region 2, the planning aspect of Resolution 528 is not realistic for this band. Furthermore, the coordination of sound BSS and the complementary terrestrial component is covered by footnote S5.396. Consequently, the proposal is to suppress reference to Resolution 528 in footnote S5.393.

MOD USA/12/158

S5.393 *Additional allocation:* in the United States, India and Mexico, the band 2 310-2 360 MHz is also allocated to the broadcasting-satellite service (sound) and complementary terrestrial sound broadcasting service on a primary basis. Such use is limited to digital audio broadcasting~~ and is subject to the provisions of Resolution **528 (WARC-92)**~~.

[*] Pursuant to Resolution 26 (Rev.WRC-97) the Secretariat notes that this contribution was received on 17 April 2000.

Reasons: Resolution 528 unnecessarily limits the use of the entire resource of the full allocation available to the three countries indicated in this provision. Given the number of countries involved in S5.393, the reference to the Resolution is not necessary. Further, the requirement to coordinate under Resolution 33 remains applicable through S5.396. Therefore, reference to Resolution 528 can be suppressed.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

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PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

PROPOSAL FOR TERRESTRIAL AND SATELLITE COMPONENTS OF IMT-2000

Agenda item 1.6.1 - review of spectrum and regulatory issues for advanced mobile application in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

Executive summary

The following proposal identifies bands to be considered by administrations for use for IMT-2000 and other advanced communication applications. “Advanced communication applications” include wireless systems and devices that provide high quality voice, data and/or video uses. This concept recognizes that there will be uses of the identified spectrum that are developed in response to market demands and technological advances. The proposal includes a modification to RR S5.388 and associated modifications to the Table of Frequency Allocations. Furthermore, it includes two supporting resolutions.

This proposal contains the following key characteristics:

1) identifies the bands 698-960 MHz, 1 525-1 559 MHz, 1 610-1 660.5 MHz, 1 710-2 025 MHz, 2 110-2 200 MHz and 2 483.5-2 690 MHz that encompass the terrestrial and satellite components of IMT-2000 and other advanced communication applications;

2) emphasizes that administrations have the flexibility to make their decisions regarding implementation of these bands, or portions thereof, based on their requirements and current uses;

3) identifies bands that are inclusive of the major bands being considered around the world, thereby increasing the possibility of global harmonization and international consensus;

4) amends original footnote S5.388 to clearly identify and provide equal treatment of all bands for IMT-2000 and other advanced communication applications in a single reference;

5) encourages the evolution of current technology and the freedom of service providers to select technology given market demands;

6) modifies S5.388 to emphasize that this footnote does not affect the regulatory priority of allocated services;

7) recognizes the need of many administrations to continue to study these bands for possible use for IMT-2000 and other advanced communication applications, to expeditiously complete these national studies, and to report the results of those studies and national decisions to ITU-R;

8) invites ITU-R to perform key studies and maintain a database of national studies and decisions on selection of spectrum for IMT-2000 and other advanced communication systems.

Background

The United States supports the development and implementation of IMT-2000 and other advanced communication applications and technologies. These applications will serve as critical components of the communications and information infrastructure of the future.

Over the past decade, the use of cellular-type personal mobile communications services has grown tremendously worldwide. Studies in ITU and elsewhere indicate that this growth in personal communications will likely continue and additional spectrum will be needed to accommodate this growth. Moreover, many administrations that initially introduced analogue-based services in certain bands are transitioning those services to digital technology. To facilitate the continued growth of IMT-2000 and other advanced communication applications, it is essential to provide a domestic regulatory framework that allows operators to transition easily from existing analogue and digital systems to IMT-2000 and other advanced communication applications.

The significant market demand for wireless and mobile access to new multimedia services and to the Internet further increases the need for additional spectrum for IMT-2000 and other advanced communication applications. By providing spectrum that can be used for a variety of wireless Internet applications, administrations have the opportunity to address many societal needs. This new spectrum can be used for providing Internet access to rural, sparsely populated or hard to reach areas, providing high data rate services to support tele-medicine and tele-education applications, in addition to providing a variety of new services and wireless devices for businesses and consumers.

Discussion

The United States proposes the identification of spectrum in several bands for consideration by administrations for the implementation of IMT-2000 and other advanced communication applications. Specifically, the proposed modified S5.388 and Resolution IMT (WRC-2000) identify the 698-960 MHz, 1 525-1 559 MHz, 1 610-1 660.5 MHz, 1 710-2 025 MHz, 2 110-2 200 MHz, 2 483.5-2 690 MHz bands for potential IMT-2000 use.[1]

Furthermore, the United States believes that it is essential not to tie specific technologies to specific frequency bands. In keeping with its technology-neutral belief that existing mobile operators should be free to evolve to IMT-2000 and beyond as the market demands, the United States has proposed several bands for the terrestrial and satellite components of IMT-2000 that are already allocated for mobile and mobile-satellite services. IMT-2000 and other advanced communication applications

[1] Regarding the frequency bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz, identified for the satellite component of IMT-2000, there are associated WRC-2000 issues in agenda item 1.10 and Resolution 218 that need to be resolved regarding AMS(R)S. If the satellite component of IMT-2000 uses these bands, account must be taken of the priority of AMS(R)S communications over all other communications as described in RR S5.357A and S5.362A.

will naturally evolve from existing technologies in response to market demand, allowing current operators and new licensees in existing mobile and mobile-satellite bands to bring advanced services to consumers as rapidly as new technology allows. This approach has the advantage of not artificially tying the rollout of new technology and service to new spectrum as administrations assess their ability to use that spectrum for IMT-2000 and other advanced communication applications. Although ITU plays an invaluable role in facilitating IMT-2000 and other advanced communication applications, it will be administrations, technology developers, equipment manufacturers and service providers that will ultimately decide when to introduce IMT-2000 and other advanced communication applications based on market factors. The United States believes that support for this evolutionary approach in existing mobile bands will likely lead to a more expeditious implementation of IMT-2000 and other advanced communication applications in bands that overlap globally.

The United States realizes that it may not be possible for many administrations to make available the large amount of contiguous, globally-harmonized spectrum for use by IMT-2000 and other advanced communication applications. The difficulty arises from the need of many administrations to consider the investment of existing licensees, the impact on consumers and other users of existing services and the flexibility to authorize other systems based on national needs. Many administrations are currently studying the identified bands to determine their availability for IMT-2000 and other advanced communication applications, the availability of comparable replacement spectrum to which current and emerging uses might migrate, and the costs of relocation as compared to the benefits of global harmonization of spectrum for IMT-2000 and other advanced communication applications. The proposal acknowledges the importance of these national studies, and calls for the adoption of Resolution YYY (WRC-2000) - resolving that administrations expeditiously complete their studies and update ITU-R regarding their findings. The results of these national studies and information on national decisions on selection of spectrum for IMT-2000 and other advanced communication applications will be useful for administrations wishing to implement such systems. Resolution YYY (WRC-2000) also invites ITU-R to conduct studies that address issues related to the use of the identified bands for IMT-2000 and other advanced communication applications, including band sharing, global roaming, and interference issues.

Spectrum

In accordance with the above principles, the United States believes the following bands should be identified for potential use by IMT-2000 and other advanced communication applications. The bands are broken out by terrestrial and satellite components.

Terrestrial

The United States proposes the following bands for the terrestrial component of IMT-2000 and other advanced communication applications: 698-960 MHz, 1 710-1 885 MHz, 2 500-2 690 MHz.[2] In addition, the bands 1 885-2 025 MHz and 2 110-2 200 MHz, which are already included in RR S5.388, should continue to be listed for use by IMT-2000 and other advanced communication applications. However, to eliminate any ambiguity in RR S5.388, the United States is proposing a

[2] Existing United States licensees operating in the 824-849 MHz, 869-894 MHz, 1 850-1 910 MHz and 1 930-1 990 MHz bands have expressed an interest in providing terrestrial IMT-2000 and other advanced communications applications. In addition, the Federal Communications Commission has received specific proposals to permit advanced communications applications to operate terrestrially in the 746-764 MHz, 776-794 MHz and 2 110-2 150 MHz bands.

modification that clarifies that administrations may continue to use spectrum identified for IMT-2000 and other advanced communication applications for other uses.

Section 1.1.1.1 of the CPM Report notes that it is desirable to meet the projected IMT-2000 spectrum requirements by identifying a limited number of contiguous global bands in order to reduce the cost, size and complexity of IMT-2000 terminal and network equipment and deployment, and provide the economies of scale for the mass market.

Satellite

The United States recognizes that their inherent global coverage of satellites makes them a key element of worldwide IMT-2000 and other advanced communication applications. As WRC-2000 considers the use of allocations for IMT-2000 and other advanced communication applications, it should identify sufficient global and regional spectrum for the satellite component. The CPM Report notes that “[a]vailability of global spectrum is particularly important for the satellite component.” (Section 1.1.2.1.) Further, the CPM Report advises that “[c]onsideration should be given to identifying existing MSS allocations between 1 and 3 GHz for satellite IMT-2000 applications. It is foreseen that most of the MSS bands between 1 and 3 GHz could be used for IMT-2000 in the longer term.” (Section 1.1.2.1.)

The United States supports the CPM Report statements and proposes to identify the following existing MSS allocations in bands between 1 and 3 GHz for the satellite component of IMT-2000 and other advanced communication applications: 1 525-1 559/1 626.5-1 660.5 MHz, 1 610-1 626.5/2 483.5-2 500 MHz, 1 980-2 010/2 170-2 200 MHz, 2 500-2 520/2 670-2 690 MHz, and 2010-2 025/2 160-2 170 MHz (Region 2 only). This proposal identifies existing allocations that should satisfy the projected MSS requirements through 2010, and avoids the extremely difficult task of allocating new worldwide spectrum for new technologies.

ARTICLE S5

Frequency allocations

MOD USA/12/186

470-890 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr>
<td>470-790
BROADCASTING

S5.149 S5.291A S5.294 S5.296 S5.300 S5.302 S5.304 S5.306 S5.311 S5.312</td>
<td>470-512
BROADCASTING
Fixed
Mobile
S5.292 S5.293<hr>512-608
BROADCASTING
S5.297<hr>608-614
RADIO ASTRONOMY
Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)<hr>614-806
BROADCASTING
Fixed
Mobile

S5.293 S5.309 S5.311
MOD S5.388</td>
<td>470-585
FIXED
MOBILE
BROADCASTING

S5.291 S5.298<hr>585-610
FIXED
MOBILE
BROADCASTING
RADIONAVIGATION
S5.149 S5.305 S5.306 S5.307<hr>610-890
FIXED
MOBILE
BROADCASTING

S5.149 S5.305 S5.306 S5.307 S5.311 S5.320 MOD S5.388</td>
</tr>
<tr>
<td>790-862
FIXED
BROADCASTING
S5.312 S5.314 S5.315 S5.316 S5.319 S5.321 MOD S5.388<hr>862-890
FIXED
MOBILE except aeronautical mobile
BROADCASTING S5.322

S5.319 S5.323 MOD S5.388</td>
<td>806-890
FIXED
MOBILE
BROADCASTING

S5.317 S5.318 MOD S5.388</td>
<td></td>
</tr>
</table>

Reasons: To identify spectrum for IMT-2000 and other advanced communication applications to facilitate consistent deployment. To provide clear guidance on the use of the frequency bands identified for IMT-2000 and other advanced communication applications.

MOD USA/12/187

890-1 350 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="3">890-942
FIXED
MOBILE except aeronautical mobile
BROADCASTING S5.322
Radiolocation

S5.323 MOD S5.388</td><td>890-902
FIXED
MOBILE except aeronautical mobile
Radiolocation
S5.318 S5.325 MOD S5.388</td><td rowspan="3">890-942
FIXED
MOBILE
BROADCASTING
Radiolocation

S5.327 MOD S5.388</td></tr>
<tr><td>902-928
FIXED
Amateur
Mobile except aeronautical mobile
Radiolocation
S5.150 MOD S5.325 S5.326 MOD S5.388</td></tr>
<tr><td>928-942
FIXED
MOBILE except aeronautical mobile
Radiolocation
S5.325 MOD S5.388</td></tr>
<tr><td>942-960
FIXED
MOBILE except aeronautical mobile
BROADCASTING S5.322
S5.323 MOD S5.388</td><td>942-960
FIXED
MOBILE

MOD S5.388</td><td>942-960
FIXED
MOBILE
BROADCASTING
S5.320 MOD S5.388</td></tr>
</table>

Reasons: To identify spectrum for IMT-2000 and other advanced communication applications to facilitate consistent deployment. To provide clear guidance on the use of the frequency bands identified for IMT-2000 and other advanced communication applications.

MOD USA/12/188

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 525-1 530 SPACE OPERATION (space-to-Earth) FIXED MOBILE-SATELLITE (space-to-Earth) Earth exploration-satellite Mobile except aeronautical mobile S5.349 S5.341 S5.342 S5.350 S5.351 S5.352A S5.354 MOD S5.388	**1 525-1 530** SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) Earth exploration-satellite Fixed Mobile S5.343 S5.341 S5.351 S5.354 MOD S5.388	**1 525-1 530** SPACE OPERATION (space-to-Earth) FIXED MOBILE-SATELLITE (space-to-Earth) Earth exploration-satellite Mobile S5.349 S5.341 S5.351 S5.352A S5.354 MOD S5.388
1 530-1 535 SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) S5.353A Earth exploration-satellite Fixed Mobile except aeronautical mobile S5.341 S5.342 S5.351 S5.354 MOD S5.388	**1 530-1 535** SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) S5.353A Earth exploration-satellite Fixed Mobile S5.343 S5.341 S5.351 S5.354 MOD S5.388	
1 535-1 559	MOBILE-SATELLITE (space-to-Earth) S5.341 S5.351 S5.353A S5.354 S5.355 S5.356 S5.357 S5.357A S5.359 S5.362A MOD S5.388	

Reasons: To identify spectrum for IMT-2000 and other advanced communication applications to facilitate consistent deployment. To provide clear guidance on the use of the frequency bands identified for IMT-2000 and other advanced communication applications.

MOD USA/12/189

1 610-1 660 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 610-1 610.6 MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION S5.341 S5.355 S5.359 S5.363 S5.364 S5.366 S5.367 S5.368 S5.369 S5.371 S5.372 MOD S5.388	**1 610-1 610.6** MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) S5.341 S5.364 S5.366 S5.367 S5.368 S5.370 S5.372 MOD S5.388	**1 610-1 610.6** MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) S5.341 S5.355 S5.359 S5.364 S5.366 S5.367 S5.368 S5.369 S5.372 MOD S5.388
1 610.6-1 613.8 MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION S5.149 S5.341 S5.355 S5.359 S5.363 S5.364 S5.366 S5.367 S5.368 S5.369 S5.371 S5.372 MOD S5.388	**1 610.6-1 613.8** MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) S5.149 S5.341 S5.364 S5.366 S5.367 S5.368 S5.370 S5.372 MOD S5.388	**1 610.6-1 613.8** MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) S5.149 S5.341 S5.355 S5.359 S5.364 S5.366 S5.367 S5.368 S5.369 S5.372 MOD S5.388
1 613.8-1 626.5 MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) S5.341 S5.355 S5.359 S5.363 S5.364 S5.365 S5.366 S5.367 S5.368 S5.369 S5.371 S5.372 MOD S5.388	**1 613.8-1 626.5** MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) S5.341 S5.364 S5.365 S5.366 S5.367 S5.368 S5.370 S5.372 MOD S5.388	**1 613.8-1 626.5** MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) Radiodetermination-satellite (Earth-to-space) S5.341 S5.355 S5.359 S5.364 S5.365 S5.366 S5.367 S5.368 S5.369 S5.372 MOD S5.388
1 626.5-1 660	MOBILE-SATELLITE (Earth-to-space) S5.341 S5.351 S5.353A S5.354 S5.355 S5.357A S5.359 S5.362A S5.374 S5.375 S5.376 MOD S5.388	

Reasons: To identify spectrum for IMT-2000 and other advanced communication applications to facilitate consistent deployment. To provide clear guidance on the use of the frequency bands identified for IMT-2000 and other advanced communication applications.

MOD USA/12/190

1 710-2 170 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 710-1 930	FIXED MOBILE S5.380 S5.149 S5.341 S5.385 S5.386 S5.387 S5.388 MOD S5.388	
1 930-1 970 FIXED MOBILE MOD S5.388	**1 930-1 970** FIXED MOBILE Mobile-satellite (Earth-to-space) MOD S5.388	**1 930-1 970** FIXED MOBILE MOD S5.388
1 970-1 980	FIXED MOBILE MOD S5.388	
1 980-2 010	FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) MOD S5.388 S5.389A S5.389B S5.389F	
2 010-2 025 FIXED MOBILE MOD S5.388	**2 010-2 025** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) MOD S5.388 S5.389C S5.389D S5.389E S5.390	**2 010-2 025** FIXED MOBILE MOD S5.388
2 025-2 110	SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE S5.391 SPACE RESEARCH (Earth-to-space) (space-to-space) S5.392	
2 110-2 120	FIXED MOBILE SPACE RESEARCH (deep space) (Earth-to-space) MOD S5.388	
2 120-2 160 FIXED MOBILE MOD S5.388	**2 120-2 160** FIXED MOBILE Mobile-satellite (space-to-Earth) MOD S5.388	**2 120-2 160** FIXED MOBILE MOD S5.388
2 160-2 170 FIXED MOBILE MOD S5.388 S5.392A	**2 160-2 170** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) MOD S5.388 S5.389C S5.389D S5.389E S5.390	**2 160-2 170** FIXED MOBILE MOD S5.388

Reasons: To identify spectrum for IMT-2000 and other advanced communication applications to facilitate consistent deployment. To provide clear guidance on the use of the frequency bands identified for IMT-2000 and other advanced communication applications.

MOD USA/12/191

S5.388 The bands 698-960 MHz, 1 525-1 559 MHz, 1 610-1 660.5 MHz, 1 710~~1 885~~-2 025 MHz, ~~and~~ 2 110-2 200 MHz and 2 483.5-2 690 MHz, or portions thereof that are allocated to the mobile and mobile-satellite services, are ~~intended~~ identified for use, ~~on a worldwide basis,~~ by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000) and other advanced communication applications, (see Resolution **IMT (WRC-2000)**). Such use is based on the equality of rights between all allocated radio services and does not ~~preclude the use~~ establish priority of assignments in these bands ~~by~~ among stations of the primary other services to which they are allocated. In accordance with Resolution **YYY (WRC-2000)**, studies regarding the possible use of the 698-960 MHz, 1 710-1 885 MHz and 2 500-2 690 MHz bands for IMT-2000 and other advanced communication applications are being conducted in many countries and in ITU-R, the results of which may impact the availability of those bands in those countries. ~~The bands should be made available for IMT-2000 in accordance with Resolution **212 (Rev.WRC-97)**~~.

Reasons: To identify spectrum for IMT-2000 and other advanced communication applications to facilitate consistent deployment.

MOD USA/12/192

2 170-2 520 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 170-2 200	FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) MOD S5.388 S5.389A S5.389F S5.392A	
2 200-2 290	SPACE OPERATION (space-to-Earth) (space-to-space) EARTH EXPLORATION-SATELLITE (space-to-Earth) (space-to-space) FIXED MOBILE S5.391 SPACE RESEARCH (space-to-Earth) (space-to-space) S5.392	
2 290-2 300	FIXED MOBILE except aeronautical mobile SPACE RESEARCH (deep space) (space-to-Earth)	
2 300-2 450 FIXED MOBILE Amateur Radiolocation S5.150 S5.282 S5.395	**2 300-2 450** FIXED MOBILE RADIOLOCATION Amateur S5.150 S5.282 S5.393 S5.394 S5.396	

2 450-2 483.5 FIXED MOBILE Radiolocation S5.150 S5.397	**2 450-2 483.5** FIXED MOBILE RADIOLOCATION S5.150 S5.394	
2 483.5-2 500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) Radiolocation S5.150 S5.371 S5.397 S5.398 S5.399 S5.400 S5.402 MOD S5.388	**2 483.5-2 500** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) RADIOLOCATION RADIODETERMINATION-SATELLITE (space-to-Earth) S5.398 S5.150 S5.402 MOD S5.388	**2 483.5-2 500** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) RADIOLOCATION Radiodetermination-satellite (space-to-Earth) S5.398 S5.150 S5.400 S5.402 MOD S5.388
2 500-2 520 FIXED S5.409 S5.410 S5.411 MOBILE except aeronautical mobile MOBILE-SATELLITE (space-to-Earth) S5.403 S5.405 S5.407 S5.408 S5.412 S5.414 MOD S5.388	**2 500-2 520** FIXED S5.409 S5.411 FIXED-SATELLITE (space-to-Earth) S5.415 MOBILE except aeronautical mobile MOBILE-SATELLITE (space-to-Earth) S5.403 S5.404 S5.407 S5.414 S5.415A MOD S5.388	

Reasons: To identify spectrum for IMT-2000 and other advanced communication applications to facilitate consistent deployment. To provide clear guidance on the use of the frequency bands identified for IMT-2000 and other advanced communication applications.

MOD USA/12/193

2 520-2 700 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 520-2 655 FIXED S5.409 S5.410 S5.411 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 S5.339 S5.403 S5.405 S5.408 S5.412 S5.417 S5.418 MOD S5.388	**2 520-2 655** FIXED S5.409 S5.411 FIXED-SATELLITE (space-to-Earth) S5.415 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 S5.339 S5.403 MOD S5.388	**2 520-2 535** FIXED S5.409 S5.411 FIXED-SATELLITE (space-to-Earth) S5.415 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 S5.403 S5.415A **2 535-2 655** FIXED S5.409 S5.411 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 S5.339 S5.418 MOD S5.388
2 655-2 670 FIXED S5.409 S5.410 S5.411 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.412 S5.417 S5.420 MOD S5.388	**2 655-2 670** FIXED S5.409 S5.411 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) S5.415 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.420 MOD S5.388	**2 655-2 670** FIXED S5.409 S5.411 FIXED-SATELLITE (Earth-to-space) S5.415 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.420 MOD S5.388
2 670-2 690 FIXED S5.409 S5.410 S5.411 MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.419 S5.420 MOD S5.388	**2 670-2 690** FIXED S5.409 S5.411 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) S5.415 MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.419 S5.420 MOD S5.388	**2 670-2 690** FIXED S5.409 S5.411 FIXED-SATELLITE (Earth-to-space) S5.415 MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.419 S5.420 S5.420A MOD S5.388

Reasons: To identify spectrum for IMT-2000 and other advanced communication applications to facilitate consistent deployment. To provide clear guidance on the use of the frequency bands identified for IMT-2000 and other advanced communication applications.

SUP USA/12/194

RESOLUTION 212 (Rev.WRC-97)

Implementation of International Mobile Telecommunications-2000 (IMT-2000)*

Reasons: Consequential to USA/12/191.

ADD USA/12/195

RESOLUTION IMT (WRC-2000)

Global advanced communication applications including International Mobile Telecommunications-2000 (IMT-2000)

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that IMT-2000 is the ITU vision of global mobile access and is scheduled to start service around the year 2000;

b) that IMT-2000 is an advanced communication applications concept intended to provide telecommunications services on a worldwide scale regardless of location, network or terminal used;

c) that inevitable changes in technology will lead to other advanced communication applications beyond IMT-2000;

d) that through integration of terrestrial mobile and mobile-satellite systems, different types of wireless access will be provided globally, including services available through the fixed telecommunication networks and those specific to mobile users;

e) that global roaming and the economies of scale of a global market are desirable and can be best achieved through the availability of worldwide spectrum for IMT-2000 and other advanced communication applications, in particular for the satellite component, because of their global/international nature and their diverse technical characteristics;

f) that when such alignment is not possible, multi-band phones and other new technologies may assist in achieving global roaming;

g) that technological advancement and market demand encourage the use of flexible regulatory approaches that will promote innovation and accelerate the delivery of advanced communication applications to consumers;

h) that ITU Recommendations accommodate the transition from earlier technologies to future technologies;

i) that for technical reasons, such as propagation factors and equipment design, the ITU-R has determined that consideration of additional spectrum requirements for the mobile users of IMT-2000 be focused on the frequency range below 3 GHz, however, the existing applications below 3 GHz were implemented in their current bands for similar technical reasons;

j) that ITU-R Report M.[IMT.SPEC] Spectrum Requirements for IMT-2000, forecasts a need for additional spectrum on a global basis for the terrestrial and satellite components in the year 2010;

k) that the radio specifications for IMT-2000, as well as their various technical characteristics, as presented in ITU-R Recommendations, support the evolution of first- and second-generation mobile systems to IMT-2000;

l) that there have been high levels of investment in existing systems that may not evolve to or be able to share with IMT-2000 systems. These systems may continue to operate in the bands or portions of the bands identified for IMT-2000 and other advanced communication applications, thereby reducing the amount of global spectrum potentially available to support those new applications;

m) that No. **S5.388** identifies bands for use by IMT 2000 systems,

noting

a) that administrations may implement IMT-2000 in any frequency band allocated to the mobile or mobile-satellite service;

b) that the identification of spectrum for IMT-2000 does not convey any status under the Radio Regulations of ITU but does provide uniform guidance to administrations, operators and manufacturers in terms of deploying IMT-2000 and other advanced communication applications;

c) that the implementation of the terrestrial component of IMT-2000 and other advanced communication applications, within the bands identified, is expected to commence in some bands as early as the year 2000, subject to market and technical considerations;

d) that the implementation of the satellite component of IMT-2000 and other advanced communication applications, in the bands identified and allocated to the MSS, could commence in some bands as early as the year 2000, subject to market and technical considerations;

e) that administrations who use all or parts of the frequency bands identified for IMT-2000 for first- and second-generation mobile systems may ultimately want to deploy IMT-2000 and other advanced communication applications in these bands;

f) that administrations who use the frequency bands identified for IMT-2000 for applications other than mobile systems as specified in *noting e)* may want to give the operators of these systems the flexibility to either continue to provide the current services or to evolve their systems to the provision of other terrestrial services such as IMT-2000;

g) that some administrations will be conducting studies prior to making decisions on their implementation of certain bands;

h) that, in accordance with Resolution **YYY (WRC-2000)**, studies will be conducted in many countries and in ITU-R regarding the possible implementation of IMT-2000 and other advanced communication applications in portions of the identified bands,

invites administrations

1 to adopt regulatory and spectrum decisions that protect the existing investment in mobile telecommunication systems and facilitate the ability for existing operators to evolve their systems towards IMT-2000 and beyond based on marketplace needs;

2 to adopt regulatory and spectrum decisions that ensure operators have the flexibility to provide the services and use the diverse technologies that best meet marketplace needs;

3 to give due consideration to protecting the investment in other existing radio services and to lessening the impact on existing users;

4 to adopt appropriate and reasonable mechanisms to address the cost of relocation and to ensure provision of comparable replacement spectrum in those cases where relocation is deemed necessary,

urges

that, administrations deploying IMT-2000 systems should use the relevant international technical characteristics, as identified by ITU-R and ITU-T Recommendations,

resolves

1 that administrations planning to implement terrestrial IMT-2000 and other advanced communication applications, consider the use of the bands or portions thereof: 698-960 MHz, 1 710-2 025 MHz, 2 110-2 200 MHz and 2 500-2 690 MHz (noting that the bands 2 500-2 520 MHz and 2 670-2 690 MHz are also identified for the satellite component);

2 that administrations planning to implement satellite IMT-2000 and other advanced communication applications, consider the use of the bands or portions thereof: 1 525-1 559/1 626.5-1 660.5 MHz, 1 610-1 626.5/2 483.5-2 500 MHz, 1 980-2 010/2 170-2 200 MHz, 2 500-2 520/2 670-2 690 MHz, and where appropriate within regional mobile satellite allocations consider the use of the bands or portion thereof: 2 520-2 535/2 655-2 670 MHz and 2 010-2 025/2 160-2 170 MHz (noting that the bands 2 500-2 690 MHz are also identified for the terrestrial component)[1].

Reasons: To support a flexible international allocation approach that preserves the prerogatives of administrations to implement IMT-2000 systems as appropriate. This proposal supports the evolution of existing cellular and PCS systems to IMT-2000, while at the same time identifying new spectrum for advanced communication applications.

[1] The 2 500-2 520 MHz and 2 670-2 690 MHz bands are also identified for use by the IMT-2000 terrestrial component. When considering such use prior to 1 January 2005 (see Nos. **S5.414** and **S5.419**), administrations should recognize that this may limit the use of these MSS allocations by the satellite component of IMT-2000.

ADD USA/12/196

RESOLUTION YYY (WRC-2000)

Issues for further study regarding the implementation of advanced communication applications such as International Mobile Telecommunications-2000 (IMT-2000) in the frequency bands identified in No. S5.388

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-2000 has updated the identification of frequency bands available for IMT-2000 and other advanced communication applications, as stated in the modification to No. **S5.388** and the new Resolution **IMT (WRC-2000)**;

b) that all or portions of the bands identified for IMT-2000 are currently used by second-generation mobile communication systems, systems of other radio services, or mobile-satellite systems;

c) that Recommendation ITU-R M.1036 is concerned with implementation considerations with respect to spectrum for IMT-2000 in the bands 1 885-2 025 MHz and 2 110-2 200 MHz;

d) that Recommendation ITU-R M.1308 is concerned with the evolution of existing mobile communication systems to IMT-2000;

e) that administrations may have differing additional IMT-2000 spectrum requirements and may wish to implement IMT-2000 in certain frequency bands and not others, or may wish to implement IMT-2000 at different times,

considering further

f) that IMT-2000 is an advanced communications concept intended to provide telecommunications services on a worldwide scale regardless of location, network or terminal used;

g) that various technical approaches may be available in the future to provide for global roaming across mobile radio systems that operate in different frequency bands;

h) that inevitable changes in technology will lead to other advanced communication applications beyond IMT-2000,

noting

a) that all or parts of the 1 850-1 910/1 930-1 990 MHz band are used by several Region 2 administrations for second-generation mobile communication systems and that the operators of these systems may wish to have these systems evolve to IMT-2000;

b) that all or parts of the 1 710-1 785/1 805-1 885 MHz are used by many Region 1 and 3 administrations for second-generation mobile communication systems and that the operators of such systems may want to use these bands for IMT-2000;

c) that administrations who use the 2 500-2 690 MHz band for fixed systems may want to give the operators of these systems the flexibility to either continue to provide fixed services or to evolve to the provision of IMT-2000 and other advanced communication applications;

d) that, due to the level of investment in current uses and difficulties in identifying spectrum alternatives, administrations will continue to study the 698-960 MHz, 1 710-1 885 MHz and 2 500-2 690 MHz bands or portions of those bands for IMT-2000 and other advanced communication applications in their countries,

resolves

that administrations expeditiously complete their national studies and update ITU-R regarding the results of their studies and their selection of spectrum for IMT-2000 and other advanced communication systems,

invites ITU-R

1 to study how first- and second-generation mobile communication system band plans can be used to accommodate evolution of first- and second-generation mobile communication systems to IMT-2000 and other advanced communication systems;

2 to study means to facilitate global roaming across different regional band plans within the bands identified for IMT-2000 and other advanced communication systems;

3 to study the sharing issues related to the deployment of IMT-2000 systems in portions of the bands identified for IMT-2000 and other advanced communication systems;

4 to maintain a database of national studies and decisions on selection of spectrum for IMT-2000 and other advanced communication systems.

Reasons: To recognize the need of many administrations to continue to study these bands for possible use for IMT-2000 and other advanced communication applications and provides a mechanism to report the results of those studies and national decisions to ITU-R.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 2 to Document 12-E
10 April 2000
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PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

PROPOSALS RELATING TO PP-98 RESOLUTIONS

Plenipotentiary Resolution 86

Improving the satellite coordination and notification process

There is a growing backlog problem in processing coordination requests and notifications by the Radiocommunication Bureau (BR). The backlog in coordination requests is increasing, and even if it were not increasing, it would take BR three years to address the number of submissions now in backlog. Fundamental reform of the coordination process appears to be needed. Short-term, interim and long-term solutions need to be developed. It cannot be emphasized enough that, achieving such reforms for the short term, must be accomplished at WRC-2000, and that fundamental reforms, mid-term and long term, would also need to be developed for WRC-03 and perhaps later.

Significant reforms to the process requiring changes to the Radio Regulations (RR) are long-term solutions and would not address the current backlog in a sufficiently rapid manner. Extraordinary measures are needed to eliminate the backlog in processing and publishing satellite coordination requests. The large and growing backlog cannot be addressed by chiseling away at it.

A solution to the backlog needs to be agreed at WRC-2000 and implemented through a Resolution adopted by the Conference. The Resolution would be needed for immediate application. Such a Resolution is proposed by the United States to address the backlog with some extraordinary measures as summarized below. To the extent these measures are appropriate for the long term, this Conference and WRC-03 should modify the body of the Radio Regulations accordingly.

The Resolution retains the current coordination procedure between administrations but suspends certain actions of the Radiocommunication Bureau in regard to its role in the coordination procedures. Since coordination requests for geostationary networks constitute 95 per cent of the backlog, the Resolution addresses only filings for geostationary systems.

The proposed Resolution:

- **Mandates electronic filing for any new submissions** - Mandatory electronic filing should be linked to improved capture and validation software. This software should make checks against the prepared data the same as in BR examinations so as to eliminate common errors and linkage problems from one part of the submission to other parts. Operators and administrations would likely submit coordination requests in electronic form if the software and interfaces were more fully developed and more user friendly. One of the significant time-consuming parts of the process for BR is the data capture and the associated validation with the exchange of correspondence with administrations to clarify the data. Electronic submissions in this part of the process should be of great help in addressing the backlog.

- **Suspends the requirement for BR to identify administrations to whom each coordination request should be addressed** - BR would continue to perform a technical examination of the filed parameters, checking that the filing is in line with the Radio Regulations and that pfd, tolerance, e.i.r.p. levels, etc. are not exceeded, and then simply publish the request for coordination without identifying administrations to whom the coordination request should be addressed. The administrations would carry out a self-identification by means of Appendix S8 calculations or orbital separation trigger and advise the administration concerned, with a copy to BR, where coordination was required. BR would then publish, after the four-month comment period, the list of administrations that are included in the coordination of a specific network. This list would form the basis of the Bureau's examination for compliance with the coordination procedure when the network is notified. Suspending the identification of administrations by BR would considerably speed up the processing of a notification submission as well as the coordination request.
- **Permits the application of an orbital separation trigger for coordination** between GSO FSS networks that operate in the congested bands: 3 400-4 200/5 850-6 725 MHz, certain portions of the range 10.95-14.5 GHz, plus 17.7-20.2/27.5-30.0 GHz.
- **Provides for BR to make available pending coordination requests "as received" prior to validation and capture by BR** so that administrations could begin the coordination at an early stage. All coordination requests (new and pending, electronic or paper) should be made available "as filed" prior to processing and publication by BR. Electronic submissions and captured data would be available via the website. Since paper filings converted to graphical files could entail rather large-sized files making downloading from the ITU website cumbersome, BR would make available such graphical files by CD distributions. Distributing coordination requests on CD may be helpful as well to those entities that do not have access to an infrastructure capable of high-speed access to the Bureau's website.

The Resolution makes clear the time period involved and at what stage the provisions are to be applied; it defines the minimum examinations by BR; makes clear in all cases that pfd examinations for protection of terrestrial systems would be retained.

Measures applied to the backlog would be applied to new submissions as well.

Need to assist developing countries

Developing countries often rely on the "safety-net" in the current procedures which is provided by the Bureau under the provisions of No. S9.36, in which the Bureau identifies affected administrations that may need to be included in the coordination process. While simplifying the administrative workload of the Bureau by suspending this aspect of the Bureau's examinations, the proposed suspension of BR examinations would not obviate the "safety-net" provided to developing countries. Assistance provided by BR under No. S7.6 would be maintained.

Proposals

MOD USA/12/153

ARTICLE S9

Procedure for effecting coordination with or obtaining agreement of other administrations[1, 1*bis*, 2, 3, 4, 5]

ADD USA/12/154

1*bis* **A.S9.1*bis*** Certain provisions of this Article concerning examination by the Radiocommunication Bureau of coordination requests concerning geostationary-satellite networks are temporarily suspended in accordance with Resolution **RP (WRC-2000)**.

Reasons: To provide a reference to the proposed Resolution in this Article.

MOD USA/12/155

ARTICLE S11

Notification and recording of frequency assignments[1, 1*bis*, 2, 3]

ADD USA/12/156

1*bis* **A.S11.1*bis*** Certain provisions of this Article concerning examination by the Radiocommunication Bureau of notifications concerning geostationary-satellite networks for compliance with coordination procedures are temporarily suspended in accordance with Resolution **RP (WRC-2000)**.

Reasons: To provide a reference to the proposed Resolution in this Article.

ADD USA/12/157

DRAFT RESOLUTION RP (WRC-2000)

Temporary procedures for processing coordination requests for geostationary-satellite networks

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) Resolution 86 of the Plenipotentiary Conference (Minneapolis, 1998);

b) that there now exists a large backlog of satellite network coordination requests pending with the Radiocommunication Bureau such that elimination of this backlog at current processing rates and with no new filings could take the Bureau more than three years to accomplish;

c) that 95 per cent of this backlog consists of coordination requests for geostationary-satellite networks;

d) that WRC-97 established the period between receipt of the Advance Publication information and the placing of satellite networks into use as five years (Nos. **S9.1**, **S11.44**) and the extension period as two years (Nos. **S11.44B** to **S11.44I**),

recognizing

a) the obligation of administrations to respond to coordination requests occurs at the end of the comment period following publication (Nos. **S9.51** and **S9.52**);

b) in view of the processing delay, a satellite operator may have to wait three years to coordinate its network and, because of the five-year limit to place a network into operation, be faced with a reduced time window in which to accomplish coordination;

c) extraordinary measures are needed to enable the Bureau to eliminate the backlog in processing satellite network coordination requests;

d) that this Conference needs to take extraordinary measures to ensure the continued viability and credibility of the ITU satellite coordination process,

resolves

1 that the interim procedures set forth in the Annex to this Resolution shall be applied from the close of this Conference until a subsequent competent WRC abrogates or modifies the procedures herein;

2 that the procedures set forth in the Annex shall be applicable to all geostationary-satellite network coordination requests awaiting publication at the Bureau at the close of this Conference and to all coordination requests for geostationary networks received on or after 3 June 2000;

3 that only relevant provisions of the Radio Regulations cited in the Annex for suspension shall be temporarily suspended in favour of the procedures of the Annex,

instructs

the Bureau to keep the Council and Members periodically informed of the results of these measures on the backlog and report them to the next competent Conference.

DRAFT ANNEX 1 TO RESOLUTION RP (WRC-2000)

Temporary procedures for geostationary-satellite networks

1 Form of filing

Starting from 3 June 2000, all data for geostationary-satellite network coordination requests shall be filed in electronic format as described in Attachment 1 to Circular Letter CR/58. The preferable form for submitting graphical information is the graphics data format described in Attachment 2 to Circular Letter CR/58. Where the graphics data format is not feasible, administrations are encouraged to submit graphics in the Portable Document Format (PDF). Submission of graphics in paper form will, however, continue to be accepted.

2 Processing by the Bureau of coordination requests for geostationary networks

The Bureau:

a) shall examine the coordination request only for completeness and for conformity with the Table of Frequency Allocations and other provisions of the Radio Regulations (Nos. **S9.35** and **S11.31**) including examinations in respect to the hard limits of the Regulations for pfd and e.i.r.p.;

b) shall not identify administrations with which coordination may need to be effected between satellite networks using the geostationary-satellite orbit in any space radiocommunication service and between a satellite network using the geostationary-satellite orbit and satellite networks using non-geostationary orbits in any space radiocommunication service (the Bureau's calculation of coordination thresholds and identification of administrations under Nos. **S9.36**, **S9.37** and **S9.40** are suspended for the period described in *resolves* 1. The identification of non-geostationary satellite networks under No. **S9.13** and other geostationary-satellite networks under No. **S9.7** with which coordination is necessary shall continue to be the responsibility of the satellite administrations/operators. See paragraph 4 below. Those administrations with limited resources for this purpose may utilize the Bureau's assistance in accordance with No. **S7.6**);

c) shall continue to identify administrations having terrestrial service assignments with overlapping frequency bands for coordination of the frequency assignments of geostationary-satellite networks with those terrestrial services under Nos**. S9.11A** and **S9.21**.

3 Publication

a) The complete set of data for coordination requests shall be published for comment by the Bureau in its International Frequency Information Circulars in accordance with No. **S9.38**.

b) Coordination request data for geostationary-satellite networks received prior to 3 June 2000; and

i) captured in the Bureau's computer system but not yet published shall be made available online at the earliest possible time via the Bureau's website; while

ii) paper filings received and not yet captured by the Bureau shall be made available in image format via CD distribution within 60 days from the close of this Conference;

c) Coordination request data for satellite networks submitted in accordance with above paragraph 1, but not yet published, shall be made available online via the Bureau's website within 30 days of submission.

4 Role of administrations/operators

The role of the administrations and operators in the geostationary-satellite coordination process is basically unchanged during the period described in *resolves* 1. Administrations/operators will continue to identify the networks with which coordination is necessary in accordance with the relevant provisions of the Radio Regulations. It is these networks which are used as the basis for agreements specified in the notification of the coordinated frequency assignments for a satellite network.

In assessing the need for coordination for the fixed-satellite service in the frequency bands 3 400-4 200/5 850-6 725 MHz, certain portions of the range 10.95-14.5 GHz, plus 17.7-20.2/27.5-30.0 GHz, the need for coordination shall be based on a coordination arc trigger in accordance with the attachment to this Annex. The coordination arc trigger method is to be applied as of 3 June 2000 to all coordination requests for geostationary networks that are awaiting regulatory examination by the Bureau and to new filings utilizing these bands.

For other bands, Appendix **S8** thresholds would continue to be used in all other relevant instances of coordinating geostationary networks. Those administrations with limited resources for this purpose may utilize the Bureau's assistance in accordance with No. **S7.6**.

5 Bureau examinations under Article S11

When the Bureau conducts its examination of notifications of satellite networks, subject to the above temporary procedures, for compliance with the coordination provisions under No. **S11.32**, it shall base its findings only on the basis of the list of networks or administrations provided by the notifying administration and those administrations commenting on the publication of the coordination request. The comments and findings shall be in accordance with above paragraphs 2*b)* and 4.

ATTACHMENT

Coordination under the orbital arc trigger

The procedure in this attachment is applicable only for coordination between geostationary fixed-satellite service networks having frequency assignments utilizing the same direction of transmission in the bands 3 400-4 200/5 850-6 725 MHz, certain portions of the range 10.95-14.5 GHz, plus 17.7-20.2/27.5-30.0 GHz. The specific bands are set forth in the table below. In assessing the need for coordination, administrations and satellite operators shall make that determination based on the orbital separations in the table below.

Frequency range(s)	Orbital separation outside of which coordination is not required (degrees)
3 400-4 200 MHz 5 850-6 725 MHz	±10
10.95-11.2 GHz 11.45-11.7 GHz 11.7-12.2 GHz (Region 2) 12.5-12.75 GHz (Regions 1 and 3) 12.7-12.75 GHz (Region 2) 13.75-14.5 GHz	±9
17.7-20.2 GHz 27.5-30.0 GHz	±8

A geostationary-satellite network with overlapping frequency assignments and located outside the coordination arc of the table may be included in the coordination process where the administration responsible for that network can demonstrate that the increase in noise temperature due to the network being coordinated exceeds six per cent. The relevant Appendix **S4** data is necessary for this calculation.

A geostationary-satellite network with overlapping frequency assignments and located within the coordination arc of the table need not be included in the coordination process if either the coordinating administration or administration responsible for that network can demonstrate that the increase in noise temperature due to the network being coordinated is equal to or less than six per cent. A geostationary-satellite network that is the subject of such a demonstration would be considered a network for which coordination would need to be effected, until such time as the demonstration is agreed or confirmed between the concerned administrations. The relevant Appendix **S4** data is necessary for this calculation.

Reasons: This Resolution retains the current coordination procedure between administrations but suspends certain actions of the Radiocommunication Bureau in regard to its role in the coordination procedures. Since coordination requests for geostationary networks constitute 95 per cent of the backlog, the Resolution addresses only filings for geostationary systems.

The Annex outlines the temporary application procedures for geostationary-satellite networks.

The Attachment addresses specialized coordination procedures for geostationary fixed-satellite service networks under the "Orbital arc trigger".

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

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PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

PROPOSALS RELATING TO PP-98 RESOLUTIONS

Resolution 88, Plenipotentiary Conference, (Minneapolis, 1998)

Proposal to add a new Section III to Article S9

Background information

In Resolution 88, the Plenipotentiary Conference, (Minneapolis, 1998), instructs WRC-2000 to consider whether any relevant amendments to the Radio Regulations with respect to satellite cost recovery procedures may be necessary. This matter has been discussed in several forums since consideration by the Plenipotentiary Conference. The ITU Council at its 1999 session was of the view, in Decision 482, that Resolution 88 (PP-98) implied that WRC-2000 may also consider any consequence of non-payment taking into account unforeseen circumstances and the principles contained in the Constitution and Convention relating to the sovereign right of Member States in gaining access to spectrum and orbit resources. The report to the Council of the Satellite Network Cost-Recovery Working Group mentioned that some considered that the consequences of non-payment should be that the delinquent network should not be taken into account.

As WRC-2000 will address this matter, regulatory changes are proposed to Article S9 to elaborate on a procedure addressing consequences of the non-payment of processing charges incurred under the satellite cost-recovery schedules.

In view of the importance to all administrations of processing a request for coordination, it is suggested that the procedure for addressing instances of non-payment of filing fees should be laid out clearly, in the same article of the Radio Regulations that establishes other requirements for filing for coordination and notification.

ARTICLE S9

Procedure for effecting coordination with or obtaining agreement of other administrations[1, 2, 3, 4, 5]

ADD USA/12/146

Section III – Procedure for collection of charges for processing publications and requests for coordination of space systems

ADD USA/12/147

S9.66 When the Radiocommunication Bureau assesses charges for the processing of publications and coordination requests for space systems in accordance with Resolution **88 (PP-98)**, ITU Council Decision 482 and subsequent relevant decisions of the Council, the provisions of this section shall apply.

ADD USA/12/148

S9.67 Within 30 days after publication of the relevant space system Special Section in its International Frequency Information Circular, the Radiocommunication Bureau shall transmit an invoiced billing to the entity responsible for paying charges under No. **S9.66**, either the notifying administration or operating entity as may be elected by the administration. The notifying administration shall be kept informed, in the latter case, at all stages of billing and payment. Upon transmitting the invoiced billing, the Radiocommunication Bureau will publish on an unrestricted basis on its website the satellite network name, entity invoiced, ITU Special Section number, billed amount, and the date the amount is due.

ADD USA/12/149

S9.68 The notifying administration or operating entity shall remit its payment to the Radiocommunication Bureau no later than six months from the date of the transmitted invoice of No. **S9.67**. This six-month payment period shall not be extended for any reason. Upon receipt of payment, the Radiocommunication Bureau will immediately transmit a receipt to the payer and update its website indicating that the cost-recovery amount for the satellite network has been paid. If payment is not received within four months from the date of the transmitted invoice, the Bureau shall send a reminder to the notifying administration or operating entity. The reminder shall include notice that non-receipt of payment within six months from the date of the original invoice will result in the relevant publication no longer being taken into account and the Special Sections being suppressed.

ADD USA/12/150

S9.69 If the Bureau has no record of receipt of payment within the six-month time period specified in No. **S9.68**, the Bureau shall consult with the notifying administration or operating entity to determine whether payment has been made. The notifying administration or operating entity, as appropriate, shall have 30 days to prove to the Bureau that payment has been made so as to be received by the Bureau within the six-month time period specified in No. **S9.68**.

ADD USA/12/151

S9.70 If the complete payment has not been received by the Bureau by the expiry date specified in No. **S9.68** and the provisions of No. **S9.69** have been satisfied, the published Special Sections for the advance publication, request for coordination, request for a modification to the Plans of Appendices **S30** and **S30A**, or request for the application of Section III of Article 6 of

Appendix **S30B**, as appropriate, shall be suppressed and no longer taken into account. The Bureau shall publish this information in the International Frequency Information Circular.

Reasons: To establish a regulatory basis for satellite cost recovery and to codify procedures for the collection of payments. With one free publication per administration per year provided in the schedule of Decision 482, there should be no cost-recovery financial barrier to any administration having access to spectrum and orbit resources.

ADD USA/12/152

DRAFT RESOLUTION CR-1 (WRC-2000)

Early implementation of cost-recovery provisions

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) Resolution **39** of the Plenipotentiary Conference (Kyoto, 1994) on strengthening the financial base of ITU;

b) Resolution **88** of the Plenipotentiary Conference (Minneapolis, 1998) on implementation of cost recovery for satellite network filings;

c) Council Decision 482 on implementation of cost recovery for satellite network filings;

d) that this Conference adopted procedures for collection of charges pursuant to the above Resolutions and Decision,

recognizing

the need for immediate application of these new provisions,

resolves

that the Radiocommunication Bureau shall begin applying the cost-recovery procedures of new Section III of Article **S9** from 3 June 2000.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

CONTENTS

Introduction

In this document the United States makes proposals under a number of WRC-2000 agenda topics. It is anticipated that the United States will submit at a later date some additional proposals including proposals for future conferences. The United States also supports many of the common proposals of the Inter-American Telecommunications Commission ("CITEL"). The United States will consider adoption of additional CITEL proposals as they are completed.

Summary of the United States proposals

Agenda item 1.2

The United States supports the CITEL proposal that modifies Appendix **S3**.

The United States submits a proposal for the modification of Recommendation **66 (Rev.WRC-97)**.

Agenda item 1.3

The United States submits two proposals for this agenda item:

– a proposal to modify Appendix **S7** and consequential modifications to Appendix **S5**;

– a proposal for the suppression of Resolution **60**.

Agenda item 1.4

The United States supports the CITEL proposal for confirmation of the fixed service allocation in the 31.8-33.4 GHz (Resolutions **126** and **726**).

The United States submits a proposal concerning high-density applications in the fixed service at 55.78-56.26 GHz.

Agenda item 1.6.2

The United States supports the CITEL proposal not to identify a global control channel for IMT-2000.

Agenda item 1.7

The United States supports the CITEL proposal for protecting operational, distress and safety communications in HF bands used by the aeronautical mobile (R) and maritime mobile services.

Agenda item 1.8

The United States submits a proposal for communications by earth stations on board vessels using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service.

Agenda item 1.9

The United States supports the CITEL proposal for no allocation for the mobile-satellite service (space-to-Earth) in any portion of the 1 559-1 567 MHz under agenda item 1.9. We also support the suppression of Resolution **220**.

Agenda item 1.11

The United States submits a proposal for the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz.

Agenda item 1.12

The United States supports the CITEL proposal for the modification of footnote **S5.541A** and the suppression of Resolution **121**.

Agenda item 1.14

The United States supports the CITEL proposal for Resolution **123** (Implementing feeder links of non-geostationary satellite networks in the mobile-satellite service in the band 15.43-15.63 GHz (space-to-Earth)).

Agenda item 1.15.1

The United States submits two proposals for this agenda item:

– a proposal for additional radionavigation-satellite service (RNSS) signals near 1 GHz;

– a NOC proposal regarding additional radionavigation-satellite service (RNSS) signals near 5 GHz.

Agenda item 1.15.2

The United States submits a proposal for an allocation for space-to-space use for RNSS.

Agenda item 1.16

The United States submits a proposal to modify the allocations above 71 GHz.

Agenda item 1.17

The United States support the CITEL proposal for Earth exploration-satellite (passive) and the space research (passive) services in the band 18.6-18.8 GHz on a primary basis in Regions 1 and 3.

Agenda item 1.18

The United States supports the CITEL proposal for the modification of Appendix **S18** and Resolution **342**.

Agenda item 1.19*bis*

The United States submits a proposal, which reflects the view that there is no need to repeat the work and discussion of WRC-95 and WRC-97.

Agenda item 1.20

The United States submits a modification of Appendix **S30** for the relaxation in the pfd limits for Alaska.

Agenda item 2

The United States submits a proposal for the modification of Resolution **27** and Resolution **28**.

Agenda item 4

The United States submits a proposal for the suppression of Resolution **63**.

Plenipotentiary resolutions

The United States submits a NOC proposal for Resolution **87** (Minneapolis, 1998).

Proposals for agenda item 1.2

A proposal for the modification of Recommendation 66 (Rev.WRC-97)

Background information

Recommendation **66** is being modified to reflect the current status of this document. Work has been completed on space service spurious emissions, so we are proposing the suppression of *considering f), recommends* 1 and 2. We are proposing the suppression of *recommends* 9 because TG 1/5 has concluded that OOB emission limits are not appropriate at this time.

MOD USA/12/1

RECOMMENDATION 66 (Rev.WRC-~~97~~2000)

Reasons: Editorial.

Studies of the maximum permitted levels of unwanted emissions

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that Appendix **S3** specifies the maximum permitted levels of spurious emissions, in terms of the mean power level of any spurious component supplied by a transmitter to the antenna transmission line;

b) that the principal objective of Appendix **S3** is to specify the maximum permitted levels of spurious emissions that, while being achievable, provide protection against harmful interference;

c) that excessive levels of unwanted emissions may give rise to harmful interference;

d) that while out-of-band emissions can also give rise to harmful interference, the Radio Regulations do not provide general limits for these emissions;

e) that while Appendix **S3** applies generally to the mean power of a transmitter and its spurious emissions, it also takes account of a variety of emissions where interpretation of the term "mean power", and thus its measurement, would be difficult, particularly in the cases of digital modulation broadband systems, pulsed modulation and narrow-band high-power transmitters;

SUP USA/12/2

f)

Reasons: Work has been completed on space service spurious emissions.

MOD USA/12/3

~~g~~f) that unwanted emissions from transmitters operating in space stations may cause harmful interference, particularly emissions from wideband amplifiers which cannot be adjusted after launch;

~~h~~g) that unwanted emissions may cause harmful interference to safety services and radio astronomy and space services using passive sensors;

Reasons: Consequential numbering changes.

MOD USA/12/4

~~i~~h) that, for technical or operational reasons, more stringent spurious emission limits than the general limits in Appendix **S3** may be required to protect specific services, such as safety services and passive services in specific bands or situations;

Reasons: Edited to conform to the concept in the recommends that limits may be needed for specific situations.

MOD USA/12/5

~~j~~i) that broadband digital modulation may cause unwanted emissions at frequencies far from the carrier frequency,

Reasons: Consequential number change.

noting

a) that safety services and passive services have in many cases been allocated frequencies adjacent or close to those of services employing high-power transmitters;

b) that some administrations have adopted more stringent limits for spurious emissions than those specified in Appendix **S3**,

SUP USA/12/6

recommends that ITU-R

1

Reasons: Work has been completed on space service spurious emissions.

SUP USA/12/7

2

Reasons: Work has been completed on space service spurious emissions.

MOD USA/12/8

~~3~~1 continue the study of spurious emission levels in all frequency bands, emphasizing the study of those frequency bands, services and modulation techniques not presently covered by Appendix **S3**;

~~4~~2 study the question of unwanted emissions resulting from transmitters of all services and all modulation methods, and, on the basis of those studies, develop a Recommendation or Recommendations for maximum permitted levels of spurious emissions and out-of-band emissions;

~~5~~3 establish appropriate measurement techniques for unwanted emissions, where those techniques do not currently exist, including the determination of reference levels for wideband transmissions as well as the applicability of reference measurement bandwidths;

~~6~~4 study the reasonable boundary of spurious emissions and out-of-band emissions with a view to defining such a boundary in Article **S1**;

~~7~~5 study those frequency bands and instances where, for technical or operational reasons, more stringent spurious emission limits than the general limits in Appendix **S3** may be required to protect safety services and passive services such as radio astronomy, and the impact on all concerned services of implementing or not implementing such limits;

~~8~~6 study those frequency bands and instances where, for technical or operational reasons, out-of-band limits may be required to protect safety services and passive services such as radio astronomy, and the impact on all concerned services of implementing or not implementing such limits;

Reasons: Consequential numbering changes.

SUP USA/12/9

9

Reasons: Suppressed because TG 1/5 has concluded that OOB emission limits are not appropriate at this time.

MOD USA/12/10

~~10~~7 report the results of studies under *recommends that ITU-R* ~~6, 7 and 8~~4, 5 and 6 above to a competent world radiocommunication conference(s).

Reasons: Consequential numbering change.

Proposals for agenda item 1.3

"to consider the results of ITU-R studies in respect of Appendix **S7/28** on the method for the determination of the coordination area around an earth station in frequency bands shared among space services and terrestrial radiocommunication services, and to take the appropriate decision to revise this Appendix"

A proposal to modify Appendix S7 and consequential modifications to Appendix S5

Background information

Appendix **S7** provides the methods for determining the coordination area around earth stations. These methods have not been updated in the Radio Regulations since 1979. Since that time system characteristics have changed, new bands have been allocated to satellite services, and propagation tools have been improved.

Recommendation ITU-R **SM.XX** consolidates the text of Recommendations ITU-R **847** through **849**, uses updated system characteristics, extends the frequency range, and separates the propagation aspects from other probability aspects. Therefore, it serves as a useful basis for updating Appendix **S7**.

Recognizing that the frequency bands covered by the methods for determining coordination areas, the system technical characteristics, and the potential operating scenarios will change with the decisions at each WRC, the United States proposes incorporating Recommendation ITU-R **SM.XX** into the Radio Regulations by reference. Even if Appendix **S7** is updated based on Recommendation ITU-R **SM.XX**, it will probably be out-of-date at the close of WRC-2000 based on decisions made at the Conference. It will remain so for years to come unless the recommendation is referenced to facilitate future updates. If the incorporation-by-reference method is not used, future updates will require a specific agenda item to be agreed. Given that it has required twenty years to update the current appendix and noting the rapid evolution of satellite and terrestrial radio communications, another long delay in updating the text would not be acceptable.

This proposed modification to Appendix **S7** involves the suppression of the entire text of the Appendix and its replacement with the "incorporation-by-reference" text as shown below. Furthermore, it includes updated references in Appendix **S5**, Table **S5-1**, and Appendix **S5**, Annex 1, Tables 2, 3 and 4.

Proposal[1]

SUP USA/12/11

APPENDIX S7

Method for the determination of the coordination area around an earth station in frequency bands between 1 GHz and 40 GHz shared between space and terrestrial radiocommunication services

Reasons: All text in the current Appendix S7 should be suppressed.

[1] Only the portion of the tables being modified is shown in this proposal.

ADD USA/12/12

APPENDIX S7

Method for the determination of the coordination area around an earth station in frequency bands between 0.1 GHz and 105 GHz shared between space and terrestrial radiocommunication services

The method for determining the coordination area around an earth station between the frequency bands between 0.1 GHz and 105 GHz shared between space and terrestrial radiocommunications services is given in Annexes 1 and 2 of Recommendation ITU-R SM.XX.

Reasons: To update the method for determining coordination areas and to provide a responsive mechanism for future updates.

MOD USA/12/13

APPENDIX S5

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article S9

TABLE S5-1

Technical conditions for coordination

(see Article S9)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.17** GSO, non-GSO/ terrestrial	A specific earth station or a typical mobile earth station in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**	Any frequency band allocated to a space service, except those mentioned in the Plans in Appendix **S30A**	The coordination area of the earth station covers the territory of another administration	~~Appendix S7~~ Recommendation ITU-R SM.XX (for earth stations in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz, 2 483.5-2 500 MHz and 2 500-2 516.5 MHz, see Remarks column) 1) The coordination area of aircraft earth stations is determined by increasing the service area by 1 000 km with respect to the aeronautical mobile service (terrestrial) or 500 km with respect to terrestrial services other than the aeronautical mobile service	NOTE – For RDSS earth stations, a uniform coordination distance of 400 km corresponding to an airborne earth station shall be used. In cases where the earth stations are all ground-based, a coordination distance of 100 km shall be used

No. **S9.17A** GSO, non-GSO/ GSO, non-GSO	A specific earth station in respect of other earth stations operating in the opposite direction of transmission in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission, where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of a coordinated earth station, with the exception of the frequency bands subject to the Plans in Appendix **S30A**	Any frequency band allocated to a space service	The coordination area of the earth station covers the territory of another administration or the earth station is located within the coordination area of an earth station	i) For bands in Table S5-2, see § 2 of Annex 1 of this Appendix ii) See Recommendations ~~ITU-R IS.847, ITU-R IS.848 and ITU-R IS.849~~ITU-R SM.XX	

Reasons: Update references to recommendations dealing with determination of coordination areas.

ANNEX 1

MOD USA/12/14

TABLE 2

Earth stations operating at frequencies in the 1-3 GHz range

Frequency sharing situation		**Coordination distance** (in sharing situations involving services allocated with equal rights) (km)
Frequency band and earth station for which coordination area is determined	**Other service or station (station in terrestrial service or earth station)**	
Ground-based mobile (NOTE 1) (GSO network)	Ground-based stations in terrestrial services	Determined using Recommendation ITU-R ~~IS.847~~ SM.XX with the parameters specified therein for terrestrial stations and all applicable equations and figures
Ground-based mobile (NOTE 1) (non-GSO network)	Ground-based stations in terrestrial services	~~The methodology of~~Determined using Recommendation ITU-R ~~IS.849~~SM.XX ~~is applied in conjunction with Recommendation ITU-R IS.847 (see above)~~

NOTE 1 – Recommendation ITU-R ~~IS.847~~SM.XX supplies the necessary terrestrial station parameters for the bands 1 492-1 530 MHz, 1 555-1 559 MHz, 1 610-1 645.5 MHz, 1 646.5-1 660 MHz, 1 675-1 710 MHz, 1 980-2 025 MHz, 2 160-2 200 MHz, 2 483.5-2 520 MHz, and 2 655-2 690 MHz.

Reasons: Update references to recommendations dealing with determination of coordination areas.

MOD USA/12/15

TABLE 3

Non-GSO MSS feeder-link earth stations

Frequency sharing situation		**Coordination distance** (in sharing situations involving services allocated with equal rights)
Frequency band and earth station for which coordination area is determined	**Other service or station (station in terrestrial service or earth station)**	
19.3-19.7 GHz and 29.1-29.5 GHz; earth station operating co-directionally with other earth stations	Ground-based stations in terrestrial services	Determined using Recommendation~~s ITU-R IS.847 and~~ ITU-R ~~IS.849~~SM.XX with the parameters specified therein for terrestrial stations and all applicable equations and figures.

Reasons: Update references to recommendations dealing with determination of coordination areas.

MOD USA/12/16

TABLE 4

Non-GSO FSS earth stations

Frequency sharing situation		**Coordination distance (in sharing situations involving services allocated with equal rights)**
Frequency band and earth station for which coordination area is determined	**Other service or station (station in terrestrial service or earth station)**	
18.9-19.3 GHz and 28.7-29.1 GHz; earth station operating co-directionally with other earth stations	Ground-based stations in terrestrial services	Determined using Recommendation~~s ITU-R IS.847 and~~ ITU-R ~~IS.849~~SM.XX with the parameters specified therein for terrestrial stations and all applicable equations and figures.

Reasons: Update references to recommendations dealing with determination of coordination areas.

A proposal for the suppression of Resolution 60

Background information

A proposal for the suppression of Resolution **60** is being submitted because this Resolution is no longer needed.

SUP USA/12/17

RESOLUTION 60

Relating to information on the propagation of radio waves used in the determination of the coordination area

Reasons: WP 3M provided updated propagation material to TG 1/6. Resolution no longer required.

Proposals for agenda item 1.4

"to consider issues concerning allocations and regulatory aspects related to Resolutions **126 (WRC-97), 128 (WRC-97)**, **129 (WRC-97)**, **133 (WRC-97)**, **134 (WRC-97)** and **726 (WRC-97)**"

A proposal concerning high-density applications in the fixed service

Background information

WRC-97, in its realignment of the 50.2-71 GHz spectral region, placed a primary allocation to the fixed service in the frequency band 55.78-59 GHz. Footnote **S5.547** and Resolution **726 (WRC-97)** indicate that this band (among others) is available for high-density applications in the fixed service.

With respect to 55.78-59 GHz, Resolution **726 (WRC-97)** resolves that administrations should take into account that this band is available for high-density application in the fixed service, when considering allocations or other regulatory provisions in relation to this band and requests ITU-R:

– to undertake studies leading to the identification of system characteristics of high-density systems in the fixed service in 55.78-59 GHz; and

– to undertake, as a matter of urgency, studies of technical and operational criteria and of methods to facilitate sharing between high-density systems in the fixed service and other services in 55.78-59 GHz.

Based upon study results contained within Recommendation ITU-R SA.1279, sharing is feasible between the EESS passive and the HDFS provided that the parameters assumed in the Recommendation are not exceeded. Additionally, the current state of the art out put power of a HDFS system is limited to a maximum of approximately –31.5 dBW/MHz.

Section IV – Table of Frequency Allocations

MOD USA/12/18

55.78-66 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
55.78-~~56.9~~56.26	EARTH EXPLORATION-SATELLITE (passive) FIXED ADD S5.EESS INTER-SATELLITE S5.556A MOBILE S5.558 SPACE RESEARCH (passive) S5.547 S5.557	

MOD USA/12/19

56.26-56.9	EARTH EXPLORATION-SATELLITE (passive) FIXED ADD S5.547 INTER-SATELLITE S5.556A MOBILE S5.558 SPACE RESEARCH (passive) S5.547 S5.557	

ADD USA/12/20

S5.EESS Within the band 55.78-56.26 GHz, the maximum e.i.r.p. of the FS is limited to –28.5 dBW/MHz in order to protect stations in the EESS passive service.

Reasons: ITU-R studies have shown that, without limitations on the power of high-density applications in the fixed service in the band 55.78-56.26 GHz, unacceptable interference may occur to passive sensors on board earth exploration satellites.

MOD USA/12/21

RESOLUTION 726 (WRC-~~97~~2000)

Frequency bands above 30 GHz available for high-density applications in the fixed service

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that there is a dramatically increasing demand for high-density applications in the fixed service resulting from the deployment of new mobile networks and from the rapid worldwide deregulation in the provision of local broadband services, including multimedia;

b) that the frequency range from 30 GHz to about 50 GHz is the range preferred to satisfy initial requirements, as indicated in *considering a)*, while the bands above about 50 GHz are preferred for similar applications but which take technical advantage of high atmospheric absorption;

c) that the lower part of the spectrum above 30 GHz has advantages for the fixed service in areas where longer path lengths are necessary;

d) that the 38 GHz band is already heavily used by many administrations for high-density applications in the fixed service;

e) that the needs of other services to which the relevant frequency bands are already allocated must be taken into account;

f) that the band 37-37.5 GHz is being planned for use by the space research service (space-to-Earth) to provide moon-to-Earth and planetary communication links;

g) that the band 37-38 GHz is being planned for use by the space research service to provide space based very long baseline interferometry;

h) that the deployment of high-density applications in the fixed service in some bands potentially presents sharing difficulties with other primary services allocated to the same band, e.g. the fixed-satellite service;

i) that operations in the space services, such as in the fixed-satellite service, in those bands used by high-density applications in the fixed service may lead to sharing difficulties;

j) that there is a need for global harmonization of new and existing allocations of radio frequency bands to facilitate coordination between administrations and encourage development of competitive products, through economies of scale, and the worldwide introduction of new telecommunication services, including the provision of reliable global information infrastructure access at an affordable cost,

resolves

that administrations should take into account that the bands 31.8-33.4 GHz[*], 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are available for high-density applications in the fixed service, when considering allocations or other regulatory provisions in relation to these bands~~,~~.

SUP USA/12/22

requests ITU-R

1

2

urges administrations

Reasons: Consequential to the completion of the studies.

[*] The date of provisional application of this allocation shall be in conformity with Resolution **126 (WRC-97)**.

Proposals for agenda item 1.8

"to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands"

A proposal for communications by earth stations on board vessels using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service

Background information

This item concerns provision of communications by earth stations on board vessels (ESVs) using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service. These stations operate in three distinct modes: at sea; while stationary in or near port; and in motion approaching or departing from port.

Operations at sea (beyond a certain distance for near-shore coordination) by ESVs in the fixed-satellite service do not present a potential for interference to stations in the fixed service operating in accordance with the 6 GHz FS allocation, and therefore need not be coordinated. Operations while these earth stations are stationary at predetermined points can be coordinated bilaterally with fixed service systems. Technical and regulatory issues concern the potential for interference between in-motion operations by these ESVs operating close to shore and stations in the fixed service both on and offshore.

The studies that have been conducted in ITU-R have illustrated that the values for the minimum distance are principally affected by the interference criteria required to protect the fixed service and the number of passages per unit time by vessels equipped with earth stations. Based on different values for these assumptions, the results of these preliminary studies yielded a range of values for the minimum distance from 100 km to 540 km. It should be noted that studies submitted to the CPM by some administrations suggested values for the minimum distance of 150 km to 370 km. However, there should be a single minimum distance value.

MOD USA/12/23

2 700-4 800 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td></td><td colspan="2" rowspan="2">3 500-3 700
FIXED
FIXED-SATELLITE (space-to-Earth)
MOBILE except aeronautical mobile
Radiolocation S5.433
S5.435</td></tr>
<tr><td>3 600-~~4 200~~3 700
FIXED
FIXED-SATELLITE (space-to-Earth)
Mobile</td></tr>
<tr><td>3 700-4 200
FIXED
FIXED-SATELLITE ~~(space-to-Earth)~~ ADD S5.ESV
Mobile</td><td colspan="2">3 700-4 200
FIXED
FIXED-SATELLITE (space-to-Earth) ADD S5.ESV
MOBILE except aeronautical mobile</td></tr>
</table>

Reasons: To establish regulatory and technical provisions for operations of earth stations on board vessels in the fixed-satellite service.

MOD USA/12/24

5 830-7 550 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 925-~~6 700~~6 425	FIXED FIXED-SATELLITE (Earth-to-space) ADD S5.ESV MOBILE S5.149 S5.440 S5.458	
6 425-6 700	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.149 S5.440 S5.458	

Reasons: To establish regulatory and technical provisions for operations of earth stations on board vessels in the fixed-satellite service.

ADD USA/12/25

S5.ESV In the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz, transponders on space stations in the fixed-satellite service may be used, additionally, by earth stations on vessels. Such use is subject to the provisions specified in the procedures of Resolution **ZZZ (WRC-2000)**.

Reasons: To establish regulatory and technical provisions for operations of earth stations on board vessels in the fixed-satellite service.

ADD USA/12/26

RESOLUTION ZZZ (WRC-2000)

Provisions to enable earth stations located on board vessels to operate in fixed-satellite service networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that there is a demand for global wideband satellite communication services on vessels;

b) that the technology exists that would permit the use of fixed-satellite services (FSS) networks by earth stations on board vessels (ESVs) operating in the 3 700-4 200 and 5 925-6 425 MHz bands;

c) that ESVs have the potential to cause unacceptable interference to the fixed service (FS) systems in the band 5 925-6 425 MHz;

d) that FS systems have the potential to cause interference to ESVs in the 3 700-4 200 MHz band;

e) that ESVs operating in these bands require considerably less than the full bandwidth in this FSS allocation and only a portion of the visible geostationary arc;

f) that there are a limited number of geostationary FSS systems that have global coverage;

g) that in order to ensure the protection and future growth of the FS, the ESV must operate with certain technical and operational constraints;

h) that administrations may authorize radiocommunication stations on off-shore structures and platforms for which they are responsible;

i) that based on appropriate assumptions a minimum distance can be calculated beyond which the ESV will not have the potential to cause unacceptable interference to the fixed service in this band,

noting

a) that operation within the territorial sea is at the discretion of the administration with territorial authority, in which case the relevant procedures of that administration will apply;

b) that operation of earth stations on vessels from specified fixed points at locations outside the territorial sea but for which an administration has territorial jurisdiction is fully within the FSS,

resolves

1 that the administration that issues the radio licence for the use of ESVs in these bands (licensing administration) shall ensure that such stations do not cause unacceptable interference to stations in the fixed service;

2 that licensing administrations shall ensure that ESVs are capable of operating in compliance with the requirements of this Resolution;

3 that operators of ESVs shall comply with the conditions established by the licensing administration(s);

4 that ESVs shall not claim protection from fixed service station transmissions;

5 that any transmissions from ESVs within a distance 200 km off any given coast shall be based upon the prior agreement of that coastal administration;

6 that the ESV system shall include means of identification and automatic mechanisms to terminate transmissions whenever the station operates outside its pre-authorized geographic (see *resolves* 5) or operational limits;

7 that ESVs shall be equipped so as to enable the licensing administration under the provisions of Article **S18** to verify earth station performance and to accomplish the switch off of the ESV transmission immediately upon request by an administration whose services may be affected;

8 that when ESVs operating beyond the territorial sea but within 200 km of the coast of an administration fail to comply with the terms required by that administration pursuant to *resolves* 3 and 5, then that administration may:

– request the ESV to comply with such terms or cease operation immediately; or

– request the licensing administration to require such compliance or immediate cessation of the operation;

9 that any licensing authority that licenses ESVs shall agree to maintain at all times a point of contact, which shall be published in an ITU circular, that may be contacted by an affected administration seeking assistance pursuant to *resolves* 3 and 5 above.

Proposals for agenda item 1.11

"to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking account the results of ITU studies conducted in response to Resolutions **214 (Rev.WRC-97)** and **219 (WRC-97)**"

A proposal for the Tables of Criteria Applicable to MSS allocations for the non-GSO systems below 1 GHz

Background information

A number of studies have been carried out since MSS allocations for non-GSO satellite systems were first agreed at WARC-92. These have led to ITU-R recommendations which indicate the sharing techniques which are being used by those systems to share with each other and other co-primary services.

The table below (Non-GSO MSS sharing summary) from Recommendation ITU-R M.[YA] "Methods for achieving coordinated use of multiple non-GSO MSS systems below 1 GHz and sharing with other services in existing MSS allocations" summarizes the techniques and recommendations applied to existing MSS allocations. Many of these techniques are being employed in practice successfully.

Non-GSO MSS sharing summary

	Narrow-band	**Wideband**
Fixed and mobile (148-149.9 MHz) (455-456 MHz) and (459-460 MHz in Region 2) (454-455 MHz by footnotes)	Combination: – Dynamic channel avoidance (Rec. ITU-R M.1039) – Low duty cycle – Brief message duration – (Rec. ITU-R M.1185)	Combination: – Low output power density – Brief message duration – Low data rate – Filtering at satellite – Geographical separation
Fixed and mobile (137-138 MHz) (400.15-401 MHz)	Ground level pfd per RR S5.208	Ground level pfd per RR S5.208
Meteorological satellites (137-138 MHz)* (400.15-401 MHz)	Assignment separation	Combination: – Low pfd at ground level – Cross polarization discrimination – Adaptive filter at satellite
Space operations Space research (137-138 MHz)	Channel avoidance	Combination: – Low pfd – Cross polarization discrimination
Space research (400.15-401 MHz)	Channel avoidance	Combination: – Low pfd – Cross polarization discrimination
Meteorological aids (400.15-401 MHz)	Channel avoidance	Combination: – Low pfd – Cross polarization discrimination

The constraints on existing allocations are reflected in the footnotes to the allocations, and in the Annex 1 to Appendix **S5**. These have evolved to their present form since WARC-92, and now reflect a balance with regard to sharing criteria among the primary services concerned.

These constraints have served to provide a basis for implementing non-GSO MSS systems in these bands and at the same time provide protection to other space and terrestrial services. Therefore in respect to the constraints of the MSS in existing allocations below 1 GHz, no further modifications are needed.

ARTICLE S9

Procedure for effecting coordination with or obtaining agreement of other administrations[1, 2, 3, 4, 5]

Section II – Procedure for effecting coordination[8, 9]

Sub-Section IIA – Requirement and request for coordination

NOC USA/12/27

S9.11A *e)* for a station for which the requirement to coordinate is included in a footnote of the Table of Frequency Allocations referring to this provision:

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

APPENDIX S5

ANNEX 1

1 Coordination thresholds for sharing between MSS (space-to-Earth) and terrestrial services in the same frequency bands and between non-GSO MSS feeder links (space-to-Earth) and terrestrial services in the same frequency bands

1.1 Below 1 GHz*

NOC USA/12/28

1.1.1 In the bands 137-138 MHz and 400.15-401 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to terrestrial services (except aeronautical mobile (OR) service networks operated by the administrations listed in Nos. **S5.204** and **S5.206** as of 1 November 1996) is required only if the pfd produced by this space station exceeds –125 dB (W/m^2/4 kHz) at the Earth's surface.

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

NOC USA/12/29

1.1.2 In the band 137-138 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to the aeronautical mobile (OR) service is required only if the pfd produced by this space station at the Earth's surface exceeds:

– –125 dB (W/m^2/4 kHz) for networks for which complete Appendix **3** coordination information has been received by the Bureau prior to 1 November 1996;

– –140 dB (W/m^2/4 kHz) for networks for which complete Appendix **S4**/**3** coordination information has been received by the Bureau after 1 November 1996 for the administrations referred to in § 1.1.1 above.

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

NOC USA/12/30

1.1.3 In the band 137-138 MHz, coordination is also required for a space station on a replacement satellite of a MSS network for which complete Appendix **3** coordination information has been received by the Bureau prior to 1 November 1996 and the pfd exceeds −125 dB(W/m^2/4 kHz) at the Earth's surface for the administrations referred to in § 1.1.1 above.

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

3.2 General considerations

NOC USA/12/31

TABLE 1

Earth stations operating at frequencies below 1 GHz

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for use by non-GSO systems below 1 GHz, as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

Proposals for agenda item 1.15.1

"to consider new allocations to the radionavigation-satellite service in the range from 1 to 6 GHz required to support developments"

A proposal for additional radionavigation-satellite service (RNSS) signals near 1 GHz

Background information

Additional radionavigation-satellite service (RNSS) signals will greatly enhance the accuracy, reliability and robustness of the civil global positioning system (GPS) by enabling more effective corrections to be made for the time delay effects of the ionosphere on the signals from space. The International Civil Aviation Organization (ICAO) has stated the requirement for an additional civil signal on GPS to support global navigation satellite system (GNSS) requirements and for space-based augmentation systems. A requirement for aeronautical users is having the protected signal operate within radio spectrum allocated to the aeronautical radionavigation service (ARNS), which would also include the possibility of terrestrial augmentation systems.

The United States has identified a third signal at 1 176.45 MHz to support GNSS developments. The third signal is proposed to be an international civil aviation safety-of-life service signal with a required bandwidth 24 MHz. Technical studies show compatibility between existing operational ARNS systems and the proposed new signal at 1 176.45 MHz. The power levels and signal structure will allow the operation of a relatively large number of co-frequency satellite and terrestrial stations to be in view of an RNSS receiver.

Section IV – Table of Frequency Allocations

MOD USA/12/32

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
960-1 215	AERONAUTICAL RADIONAVIGATION MOD S5.328	

S5.328 The band 960-1 215 MHz is reserved on a worldwide basis for the use and development of airborne electronic aids to air navigation and any directly associated ground-based and satellite-borne facilities. In the 1 164-1 188 MHz portion of this band, the radionavigation-satellite service (space-to-Earth) is also allocated worldwide on a primary basis. In this band stations of the radionavigation-satellite services, but not in the aeronautical radionavigation-satellite service, shall not cause harmful interference to, or claim protection from, stations of the aeronautical radionavigation and aeronautical radionavigation-satellite services.

Reasons: Additional radionavigation-satellite service (RNSS) signals will greatly enhance the accuracy, reliability and robustness of the civil global navigation satellite system (GNSS) by enabling more effective corrections to be made for the time delay effects of the ionosphere on the signals from space.

NOC proposal regarding additional radionavigation-satellite service (RNSS) signals

Background information

The 5 GHz band presents no unique advantages for new RNSS systems and all RNSS requirements can be satisfied by existing and new allocation to be implemented in the 1 200 and 1 600 MHz bands. The increased power required at 5 GHz compared to the lower frequencies makes an allocation for RNSS at 5 GHz questionable because it may not be feasible to implement satellite networks from an economic standpoint.

ITU-R studies to date do not support the need for an allocation for RNSS at 5 GHz. There are a number of unresolved sharing situations at 5 GHz including protection the international microwave landing system (MLS) and mobile-satellite (MS) feeder links now operating at 5 000-5 150 MHz.

There are recognized difficulties in fully protecting existing radio astronomy operations. See the CPM Report, section 2.4.1.3.1: "The separation distance between RNSS (space-to-earth) and the radio astronomy service would be a minimum of 10 MHz to protect radio astronomy inside its allocation. This may cause difficulties due to the radio astronomy receiver sensitivity outside the band allocated to the radio astronomy service."

Studies under Resolution **114 (WRC-95)** are continuing and could result in changes in the future use of the 5 000-5 150 MHz band.

NOC USA/12/33

4 800-5 830 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 000-5 150	AERONAUTICAL RADIONAVIGATION S5.367 S5.444 S5.444A	

Reasons: ITU-R studies to date do not support the need for an allocation for RNSS at 5 GHz.

Proposals for agenda item 1.15.2

"to consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the bands 1 215-1 260 and 1 559-1610 MHz"

A proposal for an allocation for space-to-space use for RNSS to ensure the protection of space-based RNSS receivers

Background information

Radionavigation-Satellite Service (RNSS) systems such as the Global Positioning System and Global Navigation Satellite System are primarily being used in the space-to-Earth direction to provide service to terrestrial users. These systems are, however, also increasingly being used in the space-to-space direction by spaceborne users for such applications as spacecraft three-dimensional positioning and velocity determination; three-axis attitude control; precise time synchronization; precision orbit determination, and atmospheric science. The use of RNSS signals is presently protected only through a space-to-Earth allocation in the 1 215-1 260 and 1 559-1 610 MHz bands. Recognizing current and future operational usage of spaceborne RNSS receivers for scientific and commercial applications, it is important to add the space-to-space direction to the existing RNSS allocations so that these uses can be taken into consideration when changes to the use of these bands are contemplated.

Interference studies have been conducted to assess the sensitivity of spaceborne RNSS receivers to interference from radiolocation, Earth exploration-satellite (active), space research (active), fixed, mobile and aeronautical radionavigation services in the 1 215-1 260 MHz band; from the aeronautical radionavigation and fixed services in the 1 559-1 610 MHz band; and also their sensitivity to intra-service interference between radionavigation-satellite service systems in these two bands.

The ITU-R has concluded that the addition of a space-to-space direction to the 1 215-1 260 MHz and 1 559-1 610 MHz RNSS bands will not cause any additional interference to other services since it involves no change to the space-to-Earth transmissions.

Studies demonstrate that RNSS spaceborne receivers can operate satisfactorily in the presence of interference caused by systems in other services as well as other RNSS systems. Potential interference from services in adjacent bands was also examined.

Existing coordination procedures are adequate for space-to-space operations.

MOD USA/12/34

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 215-1 240	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) S5.329 SPACE RESEARCH (active) S5.330 S5.331 S5.332	

MOD USA/12/35

1 240-1 260	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) S5.329 SPACE RESEARCH (active) Amateur S5.330 S5.331 S5.332 S5.334 S5.335

Reasons: Provide an allocation for space-to-space use for RNSS, which will ensure the protection of space-based RNSS receivers.

MOD USA/12/36

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 559-1 610	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) S5.341 S5.355 S5.359 S5.363	

Reasons: Provide an allocation for space-to-space use for RNSS, which will ensure the protection of space-based RNSS receivers.

Proposals for agenda item 1.16

"to consider allocations of frequency bands above 71 GHz to the Earth-exploration satellite (passive) and radio astronomy services, taking into account Resolution **723 (WRC-97)**"

A proposal to modify the allocations above 71 GHz

Background information

The following proposals modify many of the Table of Frequency Allocations above 71 GHz to accommodate the requirements of the radio astronomy and Earth-exploration satellite (passive) services, while giving consideration to the needs of other services. The modifications to the Table of Frequency Allocations maintain the aggregate amount of spectrum allocated to the displaced services (including the fixed-satellite service), provide frequency blocks 5-9 GHz wide to accommodate future wideband multimedia systems while taking into account differences in atmospheric attenuation, and provide appropriate separation between services.

Resolutions XXX and YYY address the need for future study between co-allocated active services and between active and passive services at such a time when the technical characteristics of the active services become known. Also, the United States may submit at a later date a corrigendum to this proposal addressing allocations to active services within the bands 71-86 GHz.

MOD USA/12/37

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
71-74	FIXED FIXED-SATELLITE ~~(Earth-to-space)~~(space-to-Earth) MOBILE MOBILE-SATELLITE ~~(Earth-to-space)~~(space-to-Earth) ~~S5.149 S5.556~~	

Reasons: MSS and FSS uplinks and downlinks in 71-74 GHz and 81-84 GHz bands have been interchanged to avoid satellite downlinks in bands needed by RAS. Atmospheric absorption is only slightly higher in 71-74 GHz band than in 81-84 GHz band. The RAS footnotes S5.149 and S5.556 have been deleted in favour of allocations above 76 GHz. The reference to the 72.77-72.91 GHz band in footnotes S5.149 and S5.556 has been deleted.

MOD USA/12/38

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
74-75.5	BROADCASTING-SATELLITE FIXED FIXED-SATELLITE ~~(Earth-to-space)~~(space-to-Earth) MOBILE Space research (space-to-Earth) MOD S5.561	

MOD USA/12/39

75.5-76	~~AMATEUR~~ ~~AMATEUR-SATELLITE~~ BROADCASTING-SATELLITE FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Space research (space-to-Earth) MOD S5.561 ADD S5.EEE

Reasons: BSS, which is currently allocated to the 84-86 GHz band, has been relocated to this band to protect RAS above 76 GHz. Atmospheric absorption is only slightly higher in 74-76 GHz band than in 84-86 GHz band. Amateur and amateur-satellite allocations have been shifted to 80.5-81 GHz. The new footnote S5.EEE protects existing amateur and amateur-satellite operations in the 75.5-76 GHz band until the year 200[X]. The FSS (Earth-to-space) allocation has been moved to 84-86 GHz band. The proposed allocations in the 74-84 GHz range preserve a contiguous 10 GHz space research downlink (secondary), which is required for space VLBI purposes. The footnote S5.561 has been modified to recognize the change in BSS allocation.

MOD USA/12/40

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
76-~~81~~77.5	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth) ~~S5.560~~MOD S5.149	

MOD USA/12/41

77.5-78	AMATEUR AMATEUR-SATELLITE ~~RADIOLOCATION~~ ~~Amateur~~ ~~Amateur-satellite~~ Radio astronomy Space research (space-to-Earth) ~~S5.560~~MOD S5.149

MOD USA/12/42

78-81	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth) ~~S5.560~~MOD S5.149

Reasons: The existing 76-81 GHz band has been divided into three sub-bands. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide in both the 76-77.5 GHz and 78-81 GHz bands. Radio astronomy is added as a secondary allocation in the 77.5-78 GHz band. Amateur and amateur-satellite services are shifted by 0.5 GHz, to accommodate BS, FSS and MSS downlinks at the lower portion of atmospheric window, and to avoid sharing with vehicular radars, which some administrations have authorized to operate in the 76-77 GHz band. There is no change in sharing between services, except for introduction of RAS allocation in the upper and lower sub-bands. These bands have been added to those listed under S5.149. The footnote S5.560 is deleted from the 76-77.5 and 77-78 GHz sub-bands, where it does not apply.

MOD USA/12/43

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
81-84	FIXED FIXED-SATELLITE ~~(space-to-Earth)~~(Earth-to-space) MOBILE ~~MOBILE-SATELLITE (space-to-Earth)~~ MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY Space research (space-to-Earth) MOD S5.149 ADD S5.DDD	

Reasons: The directions of MSS and FSS downlinks have been reversed to allow radio astronomy observations. The uplinks are paired with the 71-74 GHz downlinks. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. Footnote S5.DDD has been added to maintain the current amount of secondary amateur and amateur-satellite spectrum. This band has been added to footnote S5.149.

MOD USA/12/44

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
84-86	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE BROADCASTING ~~BROADCASTING-SATELLITE~~ RADIO ASTRONOMY MOD S5.149~~S5.561~~	

Reasons: The broadcasting-satellite allocation has been relocated to the 74-76 GHz band. The direction of satellite downlinks has been reversed to allow radio astronomy observations. The uplink has been paired with 74-76 GHz downlink. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. This band has been added to footnote S5.149. The S5.561 footnote is no longer relevant to this band; appropriately modified it now applies to the 74-75.5 GHz and 75.5-76 GHz bands.

MOD USA/12/45

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
86-92	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340	

Reasons: This band is of crucial importance to the RAS, SR (passive) and EES (passive) services; it is the window for the band around 118.75 GHz. No active services are acceptable in this band and no change in current allocations is feasible.

MOD USA/12/46

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
92-94	FIXED ~~FIXED-SATELLITE (Earth-to-space)~~ MOBILE RADIO ASTRONOMY RADIOLOCATION MOD S5.149~~ S5.556~~	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. Previously, radio astronomy interest was recognised via footnote S5.556. The FSS (Earth-to-space) allocation, no longer needed to balance 102-105 GHz allocation, has been relocated to 71-76 GHz band. This band has been added to those listed under S5.149. Footnote S5.556 has been deleted from this band, as it is no longer necessary.

MOD USA/12/47

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
94-94.1	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) Radio astronomy S5.562	

Reasons: The radio astronomy service is secondary to the active services. No change in sharing between services is proposed, except for introduction of the RAS allocation in this band.

MOD USA/12/48

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
94.1-95	FIXED ~~FIXED-SATELLITE (Earth-to-space)~~ MOBILE RADIO ASTRONOMY RADIOLOCATION MOD S5.149	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. No change in sharing between existing services, except for introduction of RAS allocation in band. The FSS (Earth-to-space) allocation, no longer needed to balance 102-105 GHz, has been relocated to 71-76 GHz band. Footnote S5.556 is deleted, as it is not relevant to this band (should have been suppressed consequential to WRC-97 actions). This band has been added to those listed under S5.149.

MOD USA/12/49

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
95-100	FIXED MOBILE ~~MOBILE-SATELLITE~~ RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE ~~Radiolocation~~ MOD S5.149 MOD S5.553 MOD S5.554 ~~S5.555~~	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. Radiolocation has been upgraded to primary, consequential to the addition of radio astronomy as a primary service. The mobile-satellite service is deleted, as it can not share with the radiolocation service. This band has been added to those listed under S5.149. Footnote S5.555, which allocates the 97.88-98.08 GHz sub-band to the RAS on a primary basis has been deleted, and the band has been deleted from footnote S5.555. Footnote S5.553 has been modified to include stations in the fixed service.

MOD USA/12/50

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
100-102	EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.149 S5.341	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. There is no change in sharing between services, except for introduction of RAS allocation in band. This band is used by EES (passive) for limb sounding of atmospheric constituents (NO line at 100.49 GHz). This band added to those listed under S5.149.

MOD USA/12/51

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
102-105	FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY MOD S5.149 S5.341	

Reasons: The FSS allocation has been moved to 74-76 GHz band, to eliminate downlinks in the middle of the atmospheric window needed for radio astronomy observations. Atmospheric absorption in these two windows is similar. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. This band has been added to those listed under S5.149.

MOD USA/12/52

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
105-~~116~~109.5	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149~~S5.340~~ S5.341	

Reasons: The 105-116 GHz range has been divided into four sub-bands to make additional spectrum available for other services and to adjust other passive allocations to areas of the spectrum that are more appropriate to meet scientific needs. Passive sensors have no known use for, and do not need the band 105-109.5 GHz, so they have been deleted. Fixed and mobile services have been added, relocated from 116-122.5 GHz band, where deletion of these services is needed to protect essential passive sensor operations. Since this band is no longer passive in nature, footnote S5.340 should be deleted. This band is added to those included under S5.149, to reflect the need to protect radio astronomy in a band that is no longer passive. Footnote S5.CCC is added to limit space research (passive) allocation to space-based radio astronomy in this band.

MOD USA/12/53

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
109.5-111.8	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341	

Reasons: It is essential to maintain this passive band. The MOD refers to the band limits only; no change (NOC) is proposed to the allocations within this sub-band. This band contains an ozone line at 110.8 GHz, which is used for microwave limb sounding. The entire band is of vital importance to radio astronomy for observations of the CO lines at 109.8 and 110.2 GHz, and continuum observations.

MOD USA/12/54

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
111.8-114.25	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149~~S5.340~~ S5.341	

Reasons: Passive sensors do not need the band 111.8-114.25 GHz and have been deleted. Fixed and mobile services are added to this band, they were relocated from the 116-122.5 GHz band where deletion of these services is needed to protect essential passive sensor operations. This band is added to those included under S5.149 to reflect the need to protect radio astronomy in a band that is no longer passive. The addition of the new footnote S5.CCC limits the space research (passive) allocation to space-based radio astronomy in this band.

MOD USA/12/55

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
114.25-116	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341	

Reasons: It is essential to maintain this passive band. The MOD refers to the band limits only; no change (NOC) is proposed to the allocations within this sub-band. The band 114.25-116 GHz is of vital importance to radio astronomy for observations of the 115.3 GHz CO line and is the first portion of the 114.25-122.25 GHz oxygen absorption band which is required for remote sensing, with a peak at 118.75 GHz.

MOD USA/12/56

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
116-119.98	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.XXX ~~MOBILE S5.558~~ SPACE RESEARCH (passive) S5.341	

MOD USA/12/57

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
119.98-120.02	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.XXX ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~Amateur~~ S5.341	

MOD USA/12/58

120.02-~~126~~122.25	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.XXX ~~MOBILE S5.558~~ SPACE RESEARCH (passive) S5.138

Reasons: This band is of crucial importance for passive sensing, as it is comprised the majority of the necessary 114.25-122.25 GHz band, the oxygen absorption band, with its peak at 118.75 GHz. The fixed and mobile services have been moved down to 105-109.5 GHz and 111.8-114.25 GHz, as sharing with passive sensors would severely restrict these services in this portion of the spectrum. The inter-satellite service needs to be limited by footnote S5.XXX to links between GSO satellites only, with pfd limits as specified in sharing studies in order to share the band 116-122.25 GHz with passive sensors. The secondary allocation to amateur services in the band 119.98-120.02 GHz is also moved to 122.5-123 GHz band to avoid interference to passive sensors.

MOD USA/12/59

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
122.25-123	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED INTER-SATELLITE MOBILE MOD S5.558 ~~SPACE RESEARCH (passive)~~ AMATEUR S5.138	

Reasons: The passive sensor allocations have been deleted from this band, as they are not needed for remote sensing applications. A secondary amateur service allocation has been added to compensate for the deletion of their allocation in the 119.98-120.02 GHz band.

MOD USA/12/60

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
123-126	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE ~~SPACE RESEARCH (passive)~~ Radio astronomy ~~S5.138~~	

Reasons: This band is not required for passive sensor operations and those allocations have been deleted. Satellite downlinks from the 141-153 GHz band have been moved to the 123-130 GHz band to avoid interference to the radio astronomy service. The radio astronomy service is added on a secondary basis, for possible use in wideband continuum observations. Sharing conditions between the ISS and the FSS, MSS, RNS and RNSS services need to be developed, but no imminent use of the band by these services is contemplated. The MSS directional indicator has been left undefined. Footnotes S5.138 and S5.341 do not apply to this band due to changed band limit, and are consequentially deleted.

MOD USA/12/61

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
126-~~134~~130	~~FIXED~~ FIXED-SATELLITE (space-to-Earth) ~~INTER-SATELLITE~~ ~~MOBILE S5.558~~ MOBILE-SATELLITE ~~RADIOLOCATION S5.559~~ RADIONAVIGATION RADIONAVIGATION-SATELLITE Radio astronomy MOD S5.554	

Reasons: Satellite downlinks from the 141-153 GHz band have been moved to the 123-130 GHz band to avoid interference to the radio astronomy service. The radio astronomy service is added on a secondary basis for spectral line and wideband continuum observations. The fixed, mobile, inter-satellite and radiolocation allocations have been relocated to improve sharing situations. Sharing conditions between the FSS, MSS, RNS and RNSS services need to be developed, but no imminent use of the band by these services is contemplated. The MSS directional indicator has been left undefined. Footnote S5.554 has been modified to include this band.

MOD USA/12/62

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
130-134	FIXED INTER-SATELLITE MOBILE MOD S5.558 RADIO ASTRONOMY ~~RADIOLOCATION S5.559~~ MOD S5.149	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. Sharing conditions between the RAS and the ISS need to be developed. Footnote S5.558 is modified to reflect new mobile service band limit. Radiolocation service has been relocated, to improve sharing conditions.

MOD USA/12/63

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
134-~~142~~136	AMATEUR AMATEUR-SATELLITE ~~MOBILE S5.553~~ ~~MOBILE-SATELLITE~~ ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ Radio astronomy ~~Radiolocation~~ ~~S5.149 S5.340 S5.554 S5.555~~	

Reasons: The amateur and amateur-satellite services are moved here from the 142-144 GHz band to avoid interference to radio astronomy at higher frequencies. Radio astronomy is added as secondary service. All footnotes are deleted, as they no longer apply to this band.

MOD USA/12/64

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
136-141	~~MOBILE S5.553~~ ~~MOBILE-SATELLITE~~ RADIO ASTRONOMY RADIOLOCATION ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ Amateur Amateur-satellite ~~Radiolocation~~ MOD S5.149 ~~S5.340 S5.554 S5.555~~	

Reasons: Services currently allocated to the 144-149 GHz band are moved to this band to facilitate realignment. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. This band added to those listed under S5.149. Since this band is no longer passive, it is removed from S5.340. Footnote S5.554 no longer applies to this band and is deleted. Footnote S5.555 is no longer needed, as the radio astronomy service is allocated on a primary basis in the entire 136-141 GHz band.

MOD USA/12/65

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
141-142	FIXED MOBILE ~~S5.553~~ ~~MOBILE-SATELLITE~~ RADIO ASTRONOMY RADIOLOCATION ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ ~~Radiolocation~~ MOD S5.149 ~~S5.340 S5.554 S5.555~~	

MOD USA/12/66

142-144	~~AMATEUR~~ ~~AMATEUR-SATELLITE~~ FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION MOD S5.149	

MOD USA/12/67

144-~~149~~148.5	FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION ~~Amateur~~ ~~Amateur-satellite~~ MOD S5.149 ~~S5.555~~	

Reasons: Allocations are transferred to the 141-148.5 GHz band from the 126-134 GHz band to allow for radio astronomy allocations in this band. The bandwidth has been reduced to 7.5 GHz to accommodate EES (passive) and SR (passive) requirements in the 148.5-151.5 GHz band. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. Since the 141-142 GHz sub-band is no longer passive, S5.340 is deleted from that band and modified accordingly. All sub-bands are added to those listed under S5.149. Footnotes S5.554 and S5.555 no longer apply to any portion of this band and are deleted and modified accordingly.

MOD USA/12/68

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
148.5-149	~~RADIOLOCATION~~ EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) ~~Amateur~~ ~~Amateur-satellite~~ ~~S5.149 S5.555~~MOD S5.340	

MOD USA/12/69

149-150	~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340

MOD USA/12/70

150-151	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) ~~S5.149 S5.385~~MOD S5.340

MOD USA/12/71

151-~~156~~151.5	~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340

Reasons: The current passive allocation of 150-151 GHz has insufficient bandwidth for remote sensing observations and is not adequately protected from potential interference. The scientific requirement is for a 3 GHz band centred at 150 GHz for use in conjunction with water vapour observations around 183 GHz. Also, the 150.74 GHz nitrous oxide line at required for microwave limb sounding applications. All active services are relocated from this band to meet these requirements. Since the 148.5-151.5 GHz band is now purely passive, it is added to those listed under S5.340. For the same reason, there is no need to include the band 150-151 GHz in S5.149, and it is deleted from this footnote. Footnotes S5.385 (150-151 GHz band) and S5.555 (148.5-149 GHz band) are no longer needed and are deleted from these bands.

MOD USA/12/72

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
151.5-155.5	FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY RADIOLOCATION MOD S5.149	

Reasons: The FSS downlink allocation is incompatible with radio astronomy requirements in this band and is relocated elsewhere. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. This band is added to those listed under footnote S5.149. The additional radiolocation allocation compensates for removal from the 126-134 GHz band.

MOD USA/12/73

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
155.5-156	EARTH EXPLORATION-SATELLITE (passive) ADD S5.AAA FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ADD S5.BBB	

MOD USA/12/74

156-158	EARTH EXPLORATION-SATELLITE (passive) ADD S5.AAA FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ADD S5.BBB	

MOD USA/12/75

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
158-~~164~~158.5	EARTH EXPLORATION-SATELLITE (passive) ADD S5.AAA FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ADD S5.BBB	

Reasons: The scientific requirement is for a 3 GHz band centred at 157 GHz for use in conjunction with water vapour observations around 183 GHz. This allocation is only required until 2018 since current planned and operational instruments are already in this band. By 2018, all of these applications will have transitioned to the 148.5-151.5 GHz band. The FSS downlink allocation is incompatible with radio astronomy requirements and is relocated. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. These sub-bands are added to those listed under S5.149. EES operations in the band 155.5-158.5 GHz need to be protected until 01/01/2018. After this date the fixed and mobile services need to coordinate with radio astronomy sites only. The space research (passive) allocation is limited to space-based radio astronomy in this band.

MOD USA/12/76

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
158.5-164	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth)	

Reasons: Mobile-satellite allocation has been added to partially compensate for loss of 134-142 GHz band.

MOD USA/12/77

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
164-~~168~~167	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340	

Reasons: Passive sensors require only this 3 GHz band from the current 164-168 GHz passive allocation. It is essential to maintain the 164-167 GHz portion of the band passive. The MOD refers to the band limits and addition of the band to footnote S5.340 only, no change (NOC) is proposed to the allocations within this sub-band. This band, along with the band 148.5-151.5 GHz will become the harmonized reference window for passive sensor observations of the 183.31 GHz water vapour line. The band is also used for microwave limb sounding of the 164.38 GHz ClO line. This passive band has been added to those listed under S5.340; the 164-168 GHz band had been omitted from S5.340.

MOD USA/12/78

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
167-168	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558 ~~RADIO ASTRONOMY~~ ~~SPACE RESEARCH (passive)~~	

MOD USA/12/79

168-170	FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558	

MOD USA/12/80

170-174.5	FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558 ~~S5.149 S5.385~~	

MOD USA/12/81

174.5-~~176.5~~174.8	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED INTER-SATELLITE MOBILE MOD S5.558 ~~SPACE RESEARCH (passive)~~ ~~S5.149 S5.385~~	

Reasons: Passive services do not need the 167-168 GHz band and this band is yielded to displaced active services. Fixed, mobile and inter-satellite services are added to the 167-174.8 GHz band as well as fixed-satellite downlinks to the 167-174.5 GHz band to compensate for deletions in other bands. Passive sensor allocations are deleted from the 174.5-174.8 GHz band to properly adjust the band edge for the 183.3 GHz remote sensing requirement. Footnotes S5.149 and S5.385 are deleted from these bands and are appropriately modified. Footnote S5.558 is added next to mobile allocations in this band and the footnote is modified to include the 167-174.8 GHz band due to sharing with the inter-satellite service.

MOD USA/12/82

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
174.8-176.5	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.YYY ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~S5.149 S5.385~~	

MOD USA/12/83

176.5-182	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.YYY ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~S5.149 S5.385~~	

MOD USA/12/84

182-185	EARTH EXPLORATION-SATELLITE (passive) ~~RADIO ASTRONOMY~~ SPACE RESEARCH (passive) MOD S5.340 S5.563	

MOD USA/12/85

185-190	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.YYY ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~S5.149 S5.385~~	

MOD USA/12/86

190-~~200~~191.8	EARTH EXPLORATION-SATELLITE (passive) ~~MOBILE S5.553~~ ~~MOBILE-SATELLITE~~ ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ SPACE RESEARCH (passive) ~~S5.341 S5.554~~MOD S5.340	

Reasons: The band 174.8-191.8 GHz is of crucial importance for passive sensing of the water vapour absorption line whose peak is at 183.31 GHz. Sharing with fixed and mobile services is not practical, so these services are relocated. The inter-satellite service needs to be limited to links between GSO satellites and to a pfd limit as specified in sharing studies. Footnote S5.YYY is added to reflect this requirement. The entire band is deleted from those listed under S5.149, S5.385 (secondary radio astronomy allocation). All applicable footnotes are appropriately modified. Since no terrestrial radio astronomy use of the band 182-185 GHz is possible due to high atmospheric absorption, the radio astronomy allocation is deleted. Active services are moved from the

190-191.8 GHz band to make room for the addition of passive sensor allocations. Footnote S5.554 is deleted from this band to reflect removal of active services, and modified to reflect this change. S5.341 does not apply to this band and is deleted. Footnote S5.340 has been modified to include this band.

MOD USA/12/87

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
191.8-200	FIXED INTER-SATELLITE MOBILE MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE S5.34 MOD S5.553 MOD S5.554	

Reasons: Inter-satellite and fixed service allocations added to compensate for deletions from other bands. The footnotes S5.553 and S5.554 modified to reflect deletion of terrestrial services from 190.0-191.8 GHz band, and to include stations in the fixed service, allocated to the 191.8-200 GHz band.

MOD USA/12/88

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
200-202	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341	

MOD USA/12/89

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
202-209	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (Earth-to-space)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341	

Reasons: This band is the optimum band for microwave limb sounding of water vapour and other atmospheric constituents in the low troposphere. Fixed and mobile services as well as the fixed-satellite uplink in the 202-209 GHz band are all relocated to meet this requirement. Footnote S5.340

is consequentially modified, to include this band. A radio astronomy allocation has been added to satisfy the requirement for radio astronomy spectral line and wideband continuum observations.

MOD USA/12/90

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
209-217	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY MOD S5.149 S5.341	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. This band has been added to those listed under S5.149.

MOD USA/12/91

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
217-~~231~~226	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC ~~S5.340~~MOD S5.149 S5.341	

Reasons: Passive sensors do not need this band and the EESS allocation is deleted. Fixed and mobile services and fixed-satellite uplinks are moved to this band from other locations. This band is no longer passive; consequentially it now needs to be listed under footnote S5.149. This band has been removed from footnote S5.340 and footnote S5.340 has been deleted from this band.

MOD USA/12/92

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
226-231	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 ~~S5.341~~	

MOD USA/12/93

202-~~400~~1 000 GHz

231-~~235~~231.5	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) ~~Radiolocation~~ MOD S5.340

Reasons: It is essential to maintain the 226-231.5 GHz band passive. The MOD refers to the band limits only; no change (NOC) is proposed to the allocations within this sub-band. Passive sensors require exclusive use of only the 226-231.5 GHz portion of the 217-231 GHz band for microwave limb sounding of atmospheric constituents. In addition, this band contains a 4 GHz reference window for higher frequency water vapour measurements. This band is of vital importance to the radio astronomy service for observations of the 230.5 GHz CO line. Footnote S5.340 is modified to take into account that 217-226 GHz band is no longer passive, while adding the 231-231.5 GHz band. The fixed and mobile services, as well as the fixed-satellite downlinks, have been deleted from the 231-231.5 GHz portion to allow passive observations in this band.

MOD USA/12/94

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
231.5-235	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Radiolocation	

Reasons: The only required change in this band is the 500 MHz upward adjustment of the lower band edge (see the previous modification).

MOD USA/12/95

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
235-238	EARTH EXPLORATION-SATELLITE (passive) FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive)	

Reasons: Passive sensors are limited to microwave limb sounding in the band 235-238 GHz and can share with terrestrial services due to the absorption characteristics of this band. The fixed-satellite downlink is not compatible with the radio astronomy requirement for this band and is reallocated elsewhere. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide.

MOD USA/12/96

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
238-241	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE ~~Radiolocation~~	

Reasons: Additional allocations to the radiolocation, radionavigation and radionavigation-satellite services, to compensate for allocation changes in the 150-160 GHz frequency range.

MOD USA/12/97

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
241-248	RADIOLOCATION RADIO ASTRONOMY Amateur Amateur-satellite S5.138 MOD S5.149	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. This band is added to those listed under footnote S5.149. There is no change in sharing between existing services, except for the introduction of the radio astronomy service allocation in band.

MOD USA/12/98

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
248-250	AMATEUR AMATEUR-SATELLITE Radio astronomy	

Reasons: The radio astronomy service allocation is added on a secondary basis.

MOD USA/12/99

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
250-252	EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) RADIO ASTRONOMY ~~S5.149 S5.555~~MOD S5.340	

Reasons: Microwave limb sounding of nitrous oxide near 251 GHz defines the passive-sensing requirement for this band. Radio astronomy is added to the other passive services. The addition of another passive service does not alter sharing scenario. Footnotes S5.149 and S5.555 are consequentially deleted and band lists in these footnotes are appropriately modified. Footnote S5.340 is added to reflect the passive nature of band.

MOD USA/12/100

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
252-265	FIXED MOBILE ~~S5.553~~ MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION RADIONAVIGATION-SATELLITE RADIO ASTRONOMY MOD S5.553 MOD S5.149 ~~S5.385~~ S5.554 ~~S5.555 S5.564~~	

Reasons: The fixed service is relocated to this band due to other allocation actions in other bands. The addition of a radio astronomy allocation, along with RES RAS, satisfy requirements for radio astronomy spectral line (current secondary allocation to radio astronomy at 257.5-258 GHz deleted) and wideband continuum observations from remote locations worldwide. The directional indicator added to mobile-satellite service allocation, which is paired with allocation in the 190-200 GHz band. Atmospheric absorption in the 252-265 GHz band is relatively constant and somewhat higher than in the paired downlink band. This entire band is added to those listed under footnote S5.149, and the band is deleted from S5.385 and S5.555. Footnotes S5.385 and S5.555 have been modified to reflect changes. Footnote S5.564 is no longer needed in this band due to the worldwide nature of the radio astronomy allocation.

MOD USA/12/101

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
265-275	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY MOD S5.149	

MOD USA/12/102

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
275-~~400~~1 000	(Not allocated) MOD S5.565	

Reasons: The change of the upper limit for applicability of footnote MOD S5.565 is to account for various passive service needs above 275 GHz that have been identified by administrations. Many lines and windows required for radio astronomy observations and passive remote sensing of the Earth exist above 275 GHz.

MOD USA/12/103

S5.149 In making assignments to stations of other services to which the bands:

13 360-13 410 kHz,
25 550-25 670 kHz,
37.5-38.25 MHz,
73-74.6 MHz in Regions 1 and 3,
150.05-153 MHz in Region 1,
322-328.6 MHz*,
406.1-410 MHz,
608-614 MHz in Regions 1 and 3,
1 330-1 400 MHz*,
1 610.6-1 613.8 MHz*,
1 660-1 670 MHz,
1 718.8-1 722.2 MHz*,
2 655-2 690 MHz,
3 260-3 267 MHz*,
3 332-3 339 MHz*,
3 345.8-3 352.5 MHz*,
4 825-4 835 MHz*,
4 950-4 990 MHz,
4 990-5 000 MHz,
6 650-6 675.2 MHz*,
10.6-10.68 GHz,
14.47-14.5 GHz*,
22.01-22.21 GHz*,
22.21-22.5 GHz,
22.81-22.86 GHz*,
23.07-23.12 GHz*,
31.2-31.3 GHz,
31.5-31.8 GHz in Regions 1 and 3,
36.43-36.5 GHz*,
42.5-43.5 GHz,
42.77-42.87 GHz*,
43.07-43.17 GHz*,
43.37-43.47 GHz*,
48.94-49.04 GHz*,
~~72.77-72.91 GHz*,~~
76.5-81.5 GHz,
81.5-84.5 GHz,
84.5-86 GHz,
~~93.07-93.27 GHz*,~~
92-94 GHz,
94.1-95 GHz,
95-100 GHz,
~~97.88-98.08 GHz*,~~
100-102 GHz,
102-105 GHz,
105-109.5 GHz,
111.8-114.25 GHz,
140.69-140.98 GHz*,
141-148.5 GHz,
148.5-151.5 GHz,
~~144.68-144.98 GHz*,~~
~~145.45-145.75 GHz*,~~
~~146.82-147.12 GHz*,~~
~~150-151 GHz*,~~
174.42-175.02 GHz*,
177-177.4 GHz*,
178.2-178.6 GHz*,
181-181.46 GHz*,
~~186.2-186.6 GHz*,~~
209-226 GHz,
~~250-251 GHz*,~~
~~257.5-258 GHz*,~~
~~261-265 GHz,~~
~~262.24-262.76 GHz*,~~
252-275 GHz,
265-275 GHz~~,~~
~~265.64-266.16 GHz*,~~
~~267.34-267.86 GHz*,~~
~~271.74-272.26 GHz*~~

are allocated (* indicates radio astronomy use for spectral line observations), administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. **S4.5** and **S4.6** and Article **S29**).

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD USA/12/104

S5.340 All emissions are prohibited in the following bands:

1 400-1 427 MHz,	
2 690-2 700 MHz,	except those provided for by Nos. **S5.421** and **S5.422**,
10.68-10.7 GHz,	except those provided for by No. **S5.483**,
15.35-15.4 GHz,	except those provided for by No. **S5.511**,
23.6-24 GHz,	

31.3-31.5 GHz,	
31.5-31.8 GHz,	in Region 2,
48.94-49.04 GHz,	from airborne stations,
50.2-50.4 GHz[2],	except those provided for by No. **S5.555A**,
52.6-54.25 GHz,	
86-92 GHz,	
~~105-116 GHz,~~	
109.5-111.8 GHz,	
114.25-116 GHz,	
~~140.69-140.98 GHz,~~	~~from airborne stations and from space stations in the space-to-Earth direction,~~
148.5-151.5 GHz,	
164-167 GHz,	
182-185 GHz,	except those provided for by No. **S5.563**,
190-191.8 GHz,	
200-202 GHz,	
202-209 GHz,	
~~217-231 GHz.~~	
226-231.5 GHz,	
250-252 GHz.	

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

NOC USA/12/105

S5.341 In the bands 1 400-1 727 MHz, 101-120 GHz and 197-220 GHz, passive research is being conducted by some countries in a programme for the search for intentional emissions of extraterrestrial origin.

Reasons: This informational footnote is still accurate.

MOD USA/12/106

S5.385 *Additional allocation:* the bands 1 718.8-1 722.2 MHz~~, 150-151 GHz, 174.42-175.02 GHz, 177-177.4 GHz, 178.2-178.6 GHz, 181-181.46 GHz, 186.2-186.6 GHz and 257.5-258 GHz are~~ is also allocated to the radio astronomy service on a secondary basis for spectral line observations.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD USA/12/107

S5.553 In the bands 43.5-47 GHz, 66-71 GHz, 95-100 GHz, ~~134-142 GHz, 190~~191.8-200 GHz and 252-265 GHz, stations in the fixed and land mobile service may be operated subject to not causing harmful interference to the space radiocommunication services to which these bands are allocated (see No. **S5.43**).

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD USA/12/108

S5.554 In the bands 43.5-47 GHz, 66-71 GHz, 95-100 GHz, ~~134-142~~126-134 GHz, 190-200 GHz and 252-265 GHz, satellite links connecting land stations at specified fixed points are also authorized when used in conjunction with the mobile-satellite service or the radionavigation-satellite service.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD USA/12/109

S5.555 *Additional allocation:* the bands 48.94-49.04 GHz~~, 97.88-98.08 GHz, 140.69-140.98 GHz, 144.68-144.98 GHz, 145.45-145.75 GHz, 146.82-147.12 GHz, 250-251 GHz and 262.24-262.76 GHz are~~ is also allocated to the radio astronomy service on a primary basis.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD USA/12/110

S5.556 In the bands 51.4-54.25 GHz, 58.2-59 GHz~~,~~ and 64-65 GHz~~, 72.77-72.91 GHz and 93.07-93.27 GHz~~, radio astronomy observations may be carried out under national arrangements.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD USA/12/111

S5.558 In the bands 55.78-58.2 GHz, 59-64 GHz, 66-71 GHz, ~~116-134~~122.5-126 GHz, ~~170-182~~167-174.8 GHz and 185-190 GHz, stations in the aeronautical mobile service may be operated subject to not causing harmful interference to the inter-satellite service (see No. **S5.43**).

Reasons: The changes to this footnote are consequential to the changes made to the related allocation.

MOD USA/12/112

S5.559 In the band~~s~~ 59-64 GHz~~ and 126-134 GHz~~, airborne radars in the radiolocation service may be operated subject to not causing harmful interference to the inter-satellite service (see No. **S5.43**).

Reasons: The changes to this footnote are consequential to the changes made to the related allocation. The radiolocation and inter-satellite services are no longer co-allocated in this spectral region.

NOC USA/12/113

S5.560 In the band 78-79 GHz radars located on space stations may be operated on a primary basis in the Earth exploration-satellite service and in the space research service.

Reasons: No change is required to this footnote.

MOD USA/12/114

S5.561 In the band ~~84-86~~74-76 GHz, stations in the fixed~~,~~ and mobile~~ and broadcasting~~ services shall not cause harmful interference to broadcasting-satellite stations operating in accordance with the decisions of the appropriate frequency assignment planning conference for the broadcasting-satellite service.

Reasons: The broadcasting-satellite allocation has been transferred to the 74-76 GHz band and the broadcasting and broadcasting-satellite services are no longer co-allocated.

NOC USA/12/115

S5.562 The use of the band 94-94.1 GHz by the Earth exploration-satellite (active) and space research (active) services is limited to spaceborne cloud radars.

Reasons: This footnote was the result of allocation decisions made at WRC-97 and no change is needed.

SUP USA/12/116

S5.564

Reasons: The radio astronomy allocation is now worldwide in the 261-265 GHz band, therefore a country footnote is no longer needed.

MOD USA/12/117

S5.565 The frequency band 275-~~400~~1 000 GHz may be used by administrations for experimentation with, and development of, various active and passive services. In this band a need has been identified for the following spectral line measurements for passive services:

– radio astronomy service:~~ 278-280 GHz and 343-348 GHz~~275-323 GHz, 327-371 GHz, 388-434 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz and 795-909 GHz;

– Earth exploration-satellite service (passive) and space research service (passive): 275-277 GHz, ~~300~~294-30~~2~~6 GHz, ~~324~~316~~-326~~324 GHz, 34~~5~~2-34~~7~~9 GHz, 363-365 GHz~~, and~~ 37~~9~~1-38~~1~~9 GHz, 416-434 GHz, 442-444 GHz, 496-506 GHz, 546-568 GHz, 624-629 GHz, 634-654 GHz, 659-661 GHz, 684-692 GHz, 730-732 GHz, 851-853 GHz and 951-956 GHz.

Future research in this largely unexplored spectral region may yield additional spectral lines and continuum bands of interest to the passive services. Administrations are urged to take all practicable steps to protect these passive services from harmful interference until the next competent world radiocommunication conference.

Reasons: These additional bands have been identified by various administrations as bands that will also be used for radio astronomy observations and spaceborne passive remote sensing.

ADD USA/12/118

S5.AAA In the band 155.5-158.5 GHz, the allocation to the Earth exploration-satellite (passive) and space research (passive) services shall terminate on 1 January 2018.

Reasons: This allocation will not be needed by passive sensors after the termination date. By the termination date, all passive sensors will have transitioned to the 148.5-151.5 GHz band.

ADD USA/12/119

S5.BBB The date of entry for the allocation to the fixed and mobile services in the band 155.5-158.5 GHz shall be 1 January 2018.

Reasons: Passive sensors require the use of this band until 1 January 2018.

ADD USA/12/120

S5.CCC Use of this allocation is limited to space-based radio astronomy only.

Reasons: This band is a likely candidate for a future space-based radio astronomy mission. No other space research use is contemplated.

ADD USA/12/121

S5.DDD The 81-81.5 GHz band is also allocated to the amateur and amateur-satellite services on a secondary basis.

Reasons: Amateur allocation

ADD USA/12/122

S5.EEE The band 75.5-76 GHz is also allocated to the amateur and amateur-satellite services on a primary basis until the year 200[6].

Reasons: Amateur allocation

ADD USA/12/123

S5.YYY Use of the bands 174.5-182 GHz by the inter-satellite service is limited to satellites in the geostationary-satellite orbit. The single-entry power flux-density, at all altitudes from 0 km to 1 000 km above the Earth's surface and in the vicinity of all geostationary orbital positions occupied by passive sensors, produced by a station in the inter-satellite service, for all conditions and for all methods of modulation, shall not exceed –144 dBW/m^2/MHz for all angles of arrival.

Reasons: This footnote is required to protect passive sensors operating in this band.

ADD USA/12/124

S5.XXX Use of the bands 116-123 GHz by the inter-satellite service is limited to satellites in the geostationary-satellite orbit. The single-entry power flux-density, at all altitudes from 0 km to 1 000 km above the Earth's surface and in the vicinity of all geostationary orbital positions occupied by passive sensors, produced by a station in the inter-satellite service, for all conditions and for all methods of modulation, shall not exceed –148 dBW/m^2/MHz for all angles of arrival.

Reasons: This footnote is required to protect passive sensors operating in this band.

ADD USA/12/125

RESOLUTION RAS

Use of the bands [ ] by the radio astronomy service

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that a large number of spectral lines of astrophysical interest above 71 GHz provide unique information about cosmic processes, such as the chemistry of the interstellar medium and the formation of stars and planets, and that this information cannot be obtained from any other source;

b) that Doppler shifted lines, which are also of great interest for astronomical studies, are found far removed from the rest frequency of some spectral lines and that highly Doppler shifted lines may offer the only means to obtain information about the very early universe and the formation of galaxies;

c) that mm-wave radio astronomy receivers are designed to cover substantial portions of the atmospheric windows above 70 GHz to take advantage of the information contained in spectral lines, as well as in continuum radiation;

d) that several administrations operate mm-wave radio astronomy observatories and that some are building or are planning to build a limited number of large new facilities to exploit the most advanced technologies; and that these facilities are intended to serve the needs of the worldwide scientific community;

e) that mm-wave observatories must be located on high mountain tops or plateaux to take advantage of the driest possible atmospheric conditions necessary to obtain high quality observations; and require substantial investments on behalf of the scientific communities concerned, and that therefore their number will remain low,

noting

that sharing between the radio astronomy service and other terrestrial services operating in bands above 71 GHz is facilitated by the natural attenuation provided by atmospheric gases, and that it can be further facilitated by adequate geographic separation,

urges

administrations to establish coordination zones around mm-wave radio astronomy sites operating in bands above 71 GHz. Coordination zone radii should be determined following the procedure outlined in Recommendation ITU-R RA.1031-1, separately for ground-based transmitters, airborne transmitters and transmitters that may be located on high altitude platforms (HAPS),

resolves

1 that in the frequency bands referred to in this Resolution, co-primary status of the radio astronomy service shall be recognized within coordination zones established by administrations. No coordination requirements should be imposed upon terrestrial services outside established coordination zones;

2 that in the bands referred to in this Resolution, co-primary services operating stations within a coordination zone should coordinate their operations with affected radio astronomy stations within five years of the date of notification of the radio astronomy site to the Radiocommunication Bureau.

Annex 1 lists the radio astronomy sites that operate, or plan to operate in the bands referred to in this Resolution as of [8 June 2000]. Observatories that operate only up to 92 GHz are identified with *** under the SITE column.

ADD USA/12/126

[ANNEX 1]*

List of radio astronomical observatories operating in bands above 71 GHz

REGION 1

Country	Site	Long. o	’	"	Lat. o	’	"	Alt. (m)	Diam. (m)	Remarks
Finland	Metsahovi	24	23	17	60	13	04	61	13.7	
France	Bordeaux	–00	31	37	44	50	10	73	2.5	
	Plateau de Bure[1]	05	54	26	44	38	01	2 552	15	
Germany	Effelsberg	06	53	00	50	31	32	369	100	
Italy	Medicina***	11	38	43	44	31	14	44	32	EVLBI
	Noto***	15	03	00	36	31	48			EVLBI
Russia	Zelenchukskaya	41	26	30	43	39	12	2 100		
Spain	Pico Veleta	–03	23	34	37	03	58	2 870	30	
	Robledo	–04	14	57	40	25	38	761		
	Yepes	–03	06	00	40	31	30	931		
Turkey	Gebse-Kocaeli	29	26	52	40	47	06	200		

REGION 2

Country	Site	Long. o	’	"	Lat. o	’	"	Alt. (m)	Diam. (m)	Remarks
Argentina	El Leoncito (SJ)	69	18	07	31	47	57	2 552	1.5	Solar telescope Sub mm
Chile	San Pedro de Atacama	67	44	00	-23	02		5 000		MMA (planned)[2]
	La Silla	70	44	04	–29	15	34	2 300	15	
	Las Campanas	70	41	10	–29	01	43	2 440	4	SEST
	Pampa La Bola	67	42	00	–22	58	00	4 800		LMSA (planned)[3]
Mexico	Sierra Negra	97	18	00	18	59	00	4 500	50	Large Millimeter Telescope (LMT-under construction)

* All of Annex 1 should be considered in [ ].

1 The Observatoire de Plateau de Bure interferometer consists of three antennas of 15 m diameter.

2 The USA MMA (MilliMeter Array) will consist of 40 antennas of 8 m diameter, on a ring configuration. The diameter of the ring will be capable of variation, ranging from 80 m to 10 km across.

3 The Japanese LMSA (Large Southern Millimeter Array) will consist of 50 antennas of 10 m diameter.

Country	Site	Long. o	’	"	Lat. o	’	"	Alt. (m)	Diam. (m)	Remarks
USA	Green Bank, WVA***	79	50	24	38	25	59	946	100	NRAO-GBT
	Socorro, NM***	107	37	06	34	04	44	2 155	25	NRAO-VLA[4]
	St. Croix, VI***	64	35	01	17	45	24	46	25	NRAO
	Hancock, NH***	71	59	12	42	56	01	340	25	NRAO VLBA[5]
	North Liberty, IO***	91	34	27	41	46	17	272	25	NRAO VLBA
	Ft. Davis, TX***	103	56	41	30	38	06	1 646	25	NRAO VLBA
	Los Alamos, NM***	106	14	44	35	46	31	1 997	25	NRAO VLBA
	Pie Town, NM***	108	07	09	34	18	04	2 402	25	NRAO VLBA
	Kitt Peak, AZ***	111	36	45	31	57	23	1 946	25	NRAO VLBA
	Owens Valley, CA***	118	16	37	37	13	54	1 237	25	NRAO VLBA
	Brewster, WA***	119	41	00	48	07	52	286	25	NRAO VLBA
	Mauna Kea, HI***	155	27	19	19	48	05	3 751	25	NRAO VLBA
	Kitt Peak, AZ	111	36	50	31	57	10	1 930	12	NRAO VLBA
	Amherst, MA	72	20	40	42	23	33	314	13.7	NRAO 12 m
	Owens Valley, CA	118	17	36	37	13	54	1 236	10.4	FCRAO (Five Colleges Obs.)
	Hat Creek, CA	121	28	24	40	49	04	1 042	6.1	Caltech[6]
	Westford, MA	71	29	19	42	37	23	122	36	BIMA[7]
	Mauna Kea, HI	155	28	20	19	49	33	4 000	10.4	Haystack Obs. J.C. Maxwell Tel. CSO

[4] The VLA consists of 27 antennas of 25 m diameter, arranged in a Y pattern up to 36 km across.

[5] The VLBA consists of ten antennas of 25 m diameter, distributed across the continental US, Hawaii and the US Virgin Islands

[6] The Caltech interferometer consists of three antennas of 10.4 m diameter.

[7] The BIMA (Berkeley-Illinois-Maryland Array) currently consists of nine antennas of 6.1 m diameter. The final configuration will consist of 11 antennas.

REGION 3

Country	Site	Long. o	'	"	Lat. o	'	"	Alt. (m)	Diam. (m)	Remarks
Australia	Parkes	148	15	44	–33	00	00	60	64	
	Mopra	149	05	58	–31	16	04			
	Narrabri, NSW	149	32	56	–30	59	52			Austr. Tel. Compact Array
China	Delingha	97	43	75	37	22	43	3 200	13.7	
Japan	Nobeyama[8]	138	28	32	35	56	29	1 350	45	
	Kashima	140	39	46	35	57	15	50	34	Comm. Res. Lab.
	Mizusawa	141	08	09	39	08	00	87	10	
	Nagoya	136	58	24	35	08	55	70	4	
	Mt. Fuji	138	45	06	35	21	30	3 776	1.2	Only >300 GHz
	Kagoshima	130	26	32	31	44	52	520	20	VERA (planned)
Korea	Taejon	127	22	18	36	23	54	120	13.7	

Other

Country	Site	Long. o	'	"	Lat. o	'	"	Alt. (m)	Diam. (m)	Remarks
	Antarctica				–90	00	00			

Reasons: RES RAS sets out the details of the limitation on the radio astronomy service. Annex 1 lists the observatories that operate in the radio astronomy service in bands shared with terrestrial services above 71 GHz at the time of WRC-2000.

[8] The Nobeyama site includes a 45 m diameter telescope, an interferometer that consists of six antennas of 10 m diameter, and a 60 cm diameter submillimeter telescope.

ADD USA/12/127

DRAFT RESOLUTION XXX (WRC-2000)

Consideration by a future world radiocommunication conference of issues dealing with sharing between passive and active services 71 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the changes made to the Table of Frequency Allocations by WRC-2000 in bands above 71 GHz were based on the requirements known at the time of the Conference;

b) that the passive service spectrum requirements above 71 GHz are based on physical phenomenon and therefore are well known. These requirements are reflected in the changes made to the Table of Frequency Allocations by WRC-2000;

c) that several bands above 71 GHz are already used by EESS (passive) and SR (passive) because they are unique bands to measure specific atmospheric parameters;

d) that currently there is only limited knowledge of requirements and implementation plans for the active services to operate in bands above 71 GHz;

e) that in the past, technological developments have led to viable communication systems operating at increasingly higher frequencies and this can be expected to continue so as to make communication technology available in the future for the frequency bands above 71 GHz;

f) that in the future, there should be accommodation of alternative spectrum needs of the active and passive services when the new technologies become available;

g) that, following the revisions to the Table of Frequency Allocations by WRC-2000, sharing studies may be required for services in some bands above 71 GHz;

h) that interference criteria for passive sensors have been developed and are given in ITU-R SA.1029-1;

i) that sharing criteria for active and passive services in bands above 71 GHz have not yet fully developed within the ITU-R;

j) that, in order to ensure the protection of passive services above 71 GHz, WRC-2000 avoided co-allocations of active and passive services to prevent potential sharing problems,

recognizing

that to the extent practicable, the burden of sharing among active and passive services should be equitably distributed amongst the allocated services,

invites ITU-R

1 to continue its studies to determine if sharing is possible between active and passive services in the bands above 71 GHz;

2 to take into account the principles of burden sharing to the extent practicable in their studies;

3 complete the necessary studies, as soon as the technical characteristics of the active services in these bands are known;

4 develop recommendations specifying sharing criteria for those bands where sharing is feasible,

resolves

that a future competent conference should consider the results of ITU-R studies with a view to revising as appropriate the Radio Regulations in order to accommodate the emerging requirements of the active services taking into account the requirements of the passive services, in bands above 71 GHz,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

ADD USA/12/128

RESOLUTION YYY (WRC-2000)

Consideration by a future competent world radiocommunication conference of issues dealing with sharing between active services above 71 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-2000 made changes to the Table of Frequency Allocations above 71 GHz, following consideration of science service issues;

b) that there are several co-primary active services in some bands above 71 GHz in the Table of Frequency Allocations as revised by WRC-2000;

c) that there is limited knowledge of characteristics of active services that may be developed to operate in bands above 71 GHz;

d) that sharing criteria for sharing between active services in bands above 71 GHz have not yet been fully developed within ITU-R;

e) that sharing between multiple co-primary active services may hinder the development of each active service in bands above 71 GHz;

f) that the technology for some active services may be commercially available earlier than for some other active services;

g) that adequate spectrum should be available for the active services for which the technology is available at a later time,

noting

that sharing criteria need to be developed, to be used by a future conference, for determining to what extent sharing between multiple co-primary active services is possible in each of the bands,

resolves

1 that appropriate measures should be taken to fulfill the spectrum requirements for active services for which the technology is commercially available at a later time;

2 that sharing criteria be developed for co-primary active services in bands above 71 GHz;

3 that the sharing criteria developed should form a basis for a review of active service allocations above 71 GHz at a future conference, if necessary,

requests ITU-R

to complete the necessary studies with a view to presenting, at the appropriate time, the technical information likely to be required as a basis for the work of a future competent conference,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

Reasons: There is no consensus whether sharing between the passive services and the active services is feasible in many of the bands above 71 GHz. This is because there is a lack of information available on these active services in this frequency range. New Resolution XXX has been added which calls for ITU-R studies on sharing between active and passive services in bands above 71 GHz. Similarly, sharing conditions between many of the relocated active services above 71 GHz are not known and need to be developed and Resolution YYY calls for studies that can develop sharing criteria and should form a basis for a review of active service allocations above 71 GHz at a future conference, if necessary.

Proposals for agenda item 1.17

"to consider possible worldwide allocation for the Earth exploration-satellite (passive) and space research (passive) service in the band 18.6-18.8 GHz, taking into account the results of the ITU-R studies"

A proposal for worldwide allocation to the Earth exploration-satellite (passive) service in the band 18.6-18.8 GHz on a primary basis

Background information

At present, the allocations for the Earth exploration-satellite (passive) and the space research (passive) services in the band 18.6-18.8 GHz are on a primary basis in Region 2, but on a secondary basis in Regions 1 and 3.

The allocation to the Earth exploration-satellite (passive) service must be upgraded to primary status if the long-term ability to obtain environmental data with passive spaceborne sensors is to be preserved. Compatibility between the passive sensors and the fixed and fixed-satellite services requires adoption of constraints on the parameters of the fixed and fixed-satellite systems that use the band.

A pfd limit of –95 dBW/m^2 in a reference bandwidth of 200 MHz on geostationary systems in the fixed-satellite service will enable passive sensors to perform their mission if measurements are restricted to portions of the sensor orbit where the sensor is moving away from the Equator while taking sensor data over land masses. Additionally, allowing for an exceedance of this value by 3 dB for up to 5% of the time will allow the fixed-satellite service to implement power control in overcoming rain fades when needed.

Similarly, limiting the power delivered to any antenna of a station in the fixed service measured across the band 18.6-18.8 GHz to not exceed 0 dBW in 200 MHz along with an antenna pattern complying with Recommendation ITU-R F.699-4 will enable sharing with the fixed service.

MOD USA/12/129

18.6-22.21 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) MOD S5.523 MOBILE except aeronautical mobile ~~Earth exploration-satellite (passive)~~ Space research (passive) MOD S5.522	**18.6-18.8** EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) MOD S5.523 MOBILE except aeronautical mobile SPACE RESEARCH (passive) MOD S5.522	**18.6-18.8** EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) MOD S5.523 MOBILE except aeronautical mobile ~~Earth exploration-satellite (passive)~~ Space research (passive) MOD S5.522

Reasons: To establish a common worldwide primary allocation to the Earth exploration-satellite (passive) services to be used for environmental measurements.

MOD USA/12/130

S5.522 ~~In making assignments to stations in the fixed and mobile services, administrations are invited to take account of passive sensors in the Earth-exploration satellite and space research services operating in the band 18.6-18.8 GHz. In this band, administrations should endeavour to limit as far as possible both the power delivered by the transmitter to the antenna and the e.i.r.p. in order to reduce the risk of interference to passive sensors to the minimum.~~In the band 18.6-18.8 GHz, fixed and mobile service stations shall be limited to a total power delivered to each antenna of 0 dBW.

Reasons: To enable passive sensors and the fixed service to operate in the band without excessive interference to the sensors.

MOD USA/12/131

S5.523 ~~In assigning frequencies to stations in the fixed-satellite service in the direction space-to-Earth, administrations are requested to limit as far as practicable the power flux-density at the Earth's surface in the band 18.6-18.8 GHz, in order to reduce the risk of interference to passive sensors in the earth exploration-satellite and space research services.~~ The fixed-satellite service shall be limited to a power flux-density at the Earth's surface of –95 (dBW/m^2) across the 18.6-18.8 GHz band for all angles of arrival. This power flux-density limit may be exceeded by 3 dB for up to 5% of the time everywhere in the FSS service area. The use of this band by non-geostationary-satellite orbit fixed satellite service systems with apogees lower than 20 000 km shall be in accordance with the provisions of Resolution ZZZ (WRC-2000).

Reasons: To enable passive sensors and the fixed-satellite service to operate in the band without excessive interference to the sensors. Further, studies have not been completed to determine an allowable power flux-density limit on non-geostationary fixed-satellite service systems needed to protect Earth exploration-satellite service (passive).

ADD USA/12/132

DRAFT RESOLUTION ZZZ (WRC-2000)

Power flux-density limits applicable to non-GSO systems for protection of Earth exploration-satellite service (passive) in the band 18.6-18.8 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-2000 made changes to the Table of Frequency Allocations in the band 18.6-18.8 GHz;

b) that the power flux-density (pfd) limit in footnote **MOD S5.523** of the Radio Regulations was derived solely upon consideration of geostationary-satellite orbit fixed-satellite service systems and non-geostationary-satellite orbit fixed-satellite service systems with apogees higher than 20 000 km;

c) that initial sharing studies have indicated that low-Earth orbiting fixed-satellite service systems cause significantly greater interference into Earth exploration-satellite (passive) service sensors than do geostationary-satellite orbit fixed-satellite service systems;

d) that further sharing studies are required of the power flux-density limit applicable to non-geostationary-satellite orbit fixed satellite service systems operating with apogees below 20 000 km for the protection of Earth exploration-satellite (passive) service systems,

resolves

that non-geostationary-satellite orbit fixed-satellite service systems operating with apogees below 20 000 km shall do so only on a non-interference basis until an appropriate power flux-density limit is determined for protection of EESS (passive) systems,

invites ITU-R

to study, as a matter of urgency, the appropriate power flux-density values to be applied to non-geostationary-satellite systems in the 18.6-18.8 GHz band to ensure protection of the Earth exploration-satellite (passive) service without unduly constraining the development of either type of system, and submit the results to a future competent conference,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

Proposals for agenda item 1.19*bis*

"in accordance with Article **S14**, to consider objections expressed by administrations with respect to the Radio Regulations Board's Rules of Procedure relating to the application of RR **2674/S23.13** in order for the Bureau to modify its findings in accordance with the conclusions of the Conference"

Background Information

No**. S23.13 (RR2674)** states that, "in devising the characteristics of a space station in the broadcasting-satellite service, all technical means available shall be used to reduce, to the maximum, the radiation over the territory of other countries unless an agreement has been previously reached with such countries." No. **S23.13 (RR2674)** was adopted at WARC-71. It was intended as a statement of good engineering practice to reduce BSS interference with the terrestrial services outside of the intended service area.

At WRC-95, however, some countries sought to have the interpretation of No. **S23.13** (RR **2674**) revised to require, as a condition for registration, the approval of other countries within the service area of a BSS system proposed as a plan modification. After thorough debate, WRC-95 instructed the RRB to revise its Rules of Procedures to reflect the results of its debate. The decision reached by WRC-95 reflected a difficult compromise on the parts of all parties involved. The RRB made the revisions, but further concerns were raised at WRC-97. These concerns led WRC-97 to adopt Resolution **536** which resolves that: "in addition to observing No. **S23.13/2674**, and before providing satellite-broadcasting services to other administrations, administrations originating the services should obtain the agreement of those other administrations."

Still dissatisfied after a review of the RRB Rules for RR **S23.13** under the "review of finding" procedures of Article **S14**, the concerned countries persuaded the 1998 meeting of the ITU Council to adopt new agenda item 1.19*bis*.

NOC USA/12/133

Therefore, the United States is of the view that there is no need to repeat the work and discussion of WRC-95 and WRC-97, and that Resolution **536** and RR **S23.13** are sufficient. The United States proposes that WRC-2000 not revise the present Rule of Procedure for RR **S23.13/2674** to apply it retroactively, i.e. to BSS filings (under Article 4 of Appendix **S30** or under Resolution **33/S9**) made prior to 18 November 1995. The United States also supports the existing separation of Article 4 of Appendix **S30** and the Rule of Procedure for RR **S23.13/2674**.

Reasons: Agenda item 1.19*bis* has the effect of re-opening an issue that was resolved after much discussion first at WRC-95, and then at WRC-97 by the adoption of Resolution 536.

Proposals for agenda item 1.20

"to consider the issues related to the application of Nos. **S9.8, S9.9** and **S9.17** and the corresponding parts of Appendix **S5** with respect to Appendices **S30** and **S30A**, with a view to possible deletion of Articles **6** and **7** of Appendices **S30** and **S30A**, also taking into consideration Recommendation **35 (WRC-95)**"

A proposal for the modification of Appendix S30, Annex 1

Background information

Annex 1 to Appendix **S30** of the Radio Regulations specifies limits for determining whether a service is affected by a proposed modification to the BSS Plan (i.e. when it is necessary to seek the agreement of any other administration). Section 5 of Annex 1 specifies limits to the change in the pfd to protect the terrestrial services of administrations in Regions 1 and 3 from modifications to the Region 2 Plan. In particular, Section 5c) specifies the pfd limits for administrations in Region 1 east of longitude 30° E. Further, through Section 8a), the pfd limits in Section 5b) of Annex 1 apply to protect terrestrial services in Regions 1 and 3 from modifications to the Regions 1 and 3 BSS Plan.

This pfd limit is very stringent at low angles of elevation. For example, in order to meet this pfd limit the BSS spacecraft power must be significantly lower in areas of western Region 2 near Region 1 (e.g. Alaska) as compared to other areas in Region 2. As a result, the provision of BSS service to these areas requires larger BSS receive dishes, in some cases as large as 2.4 m. This will be the case for Region 2 administrations that propose to modify their Plan assignments to provide service to these areas.

The FCC requires provision of BSS service to Alaska when technically feasible. A relaxation in the pfd limit in Section 5c) of Annex 1 of Appendix **S30**, as proposed below, would allow the use of 60 cm BSS receive dishes in these areas for BSS service. ITU-R studied possible modifications to the limits in Sections 5b) and 5c) of Annex 1. Section 5.2.3.5 of the CPM Report contains a proposed change to these limits. Consistent with the CPM Report, the following changes to Section 5 of Annex 1 of Appendix **S30** are proposed:

APPENDIX S30

ANNEX 1

5 Limits to the change in the power flux-density to protect the terrestrial services of administrations in Regions 1 and 3[16]

MOD USA/12/134

b) in the frequency band 12.2-12.~~5~~7 GHz for territories of administrations in Regions 1[17] and 3 ~~and those in the western part of Region 1, west of longitude 30° E~~[18]:

–~~132~~148 dB(W/m^2/~~5 M~~4 kHz) for 0° ≤ γ < ~~10~~5°;

–~~132~~148 + ~~4.2~~0.5 (γ ~~– 10~~5) dB(W/m^2/~~5 M~~4 kHz) for ~~10~~5° ≤ γ < ~~15~~25°;

–~~111~~138 dB(W/m^2/~~5 M~~4 kHz) for ~~15~~25° ≤ γ < 90°;

Reasons: A relaxation in the pfd limit in Section 5c) of Annex 1 of Appendix S30, as proposed below, would allow the use of 60 cm BSS receive dishes in these areas for BSS service. This proposal is consistent with the CPM Report.

SUP USA/12/135

c)

Reasons: Due to the changes made to item "*b)*", this note is no longer required.

NOC USA/12/136

d) in the frequency band 12.5-12.7 GHz for all the territories of administrations of Regions 1[17] and 3:

–148 dB(W/m^2/4 kHz) for $\gamma = 0°$;

–148 + 4.6975 γ^2 dB(W/m^2/4 kHz) for $0° < \gamma \leq 0.8°$;

–142.5 + 25 log γ dB(W/m^2/4 kHz) for $\gamma > 0.8°$;

where γ is the angle of arrival of the incident wave above the horizontal plane, in degrees.

Reasons: Consequential number change.

Proposals for agenda item 2

"to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution **27 (Rev.WRC-97)"**

Proposals to modify Resolution 27 (Rev.WRC-97) and Resolution 28 (WRC-95)

Background information

Certain provisions of the Radio Regulations make specific reference to ITU-R recommendations. As the ITU-R recommendations are updated, it is necessary to determine if such references should be continued, suppressed, or updated citing the revised version of the applicable ITU-R recommendation.

Although the principle of Incorporation by Reference is widely supported by ITU members, its implementation in practice leads to various difficulties. It is important that administrations are aware of which recommendations could be candidates for incorporation by reference into the Radio Regulations. Also, administrations need to know of any ITU-R recommendation currently incorporated by reference, which are being (or have been) revised during the current study period. Administrations would benefit greatly by being advised of such recommendations well in advance of a WRC. Therefore, a mechanism for the early identification should be established.

In order to allow administrations as much time as possible to consult their experts and to consider the implications of updating references in the Radio Regulations, to reflect changes to Recommendations which are currently incorporated by reference, the approach outlined in 1) below is proposed. Similarly, to facilitate the work of administrations in their preparation for the possible introduction of new instances where recommendations may be incorporated by reference into the Radio Regulations, the approach outlined in 2) below is proposed.

1) Rather than have only the Radiocommunication Assembly (RA) communicate to the WRC a list of the ITU-R recommendations currently incorporated by reference in the Radio Regulations which have been revised and approved during the elapsed study period, the Director of the Radiocommunication Bureau should provide a report to the Conference Preparatory Meeting. This report would also include a listing of those ITU-R recommendations currently incorporated by reference which are being revised in preparation for the RA. This report would be for information only and would not confer any special status on the recommendations listed.

2) If a recommendation is not currently incorporated by reference into the Radio Regulations, it could only be considered for incorporation by reference if it is in response to a WRC agenda item.

MOD USA/12/137

RESOLUTION 27 (Rev.WRC-~~97~~2000)

References to ITU-R and ITU-T Recommendations in the Radio Regulations

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that the principles of incorporation by reference were adopted by the WRC-95 and have been revised by this Conference (see Annex 1 to this Resolution);

b) that there are provisions of the Radio Regulations which employ mandatory incorporation by reference but fail to make explicit reference to the ITU-R or ITU-T Recommendations incorporated;

MOD USA/12/138

c) that the 199~~7~~9 Conference Preparatory Meeting (CPM-~~97~~99) for this Conference urged administrations to give further consideration to the status of material incorporated by reference:

– using the initial assessment provided by the Radiocommunication Bureau in the CPM Report and the set of principles given in Annex 1 to this Resolution;

– noting that mandatory references shall be explicit and use the appropriate regulatory language;

– taking into account the factors set out in Annex 2 to this Resolution;

d) that the Director of the Radiocommunication Bureau has drawn up a list (see Annex 1 to the CPM Report to this Conference) of the provisions of the Radio Regulations using incorporation by reference, which provides an initial assessment of the status of each reference and forms the basis for the work on appropriate referencing, examples of which are contained in Annex 3 to this Resolution;

e) that the Bureau has drawn up a list, contained in Annex 4 to this Resolution, of the ITU-R Recommendations to which explicit reference is made in the Radio Regulations,

MOD USA/12/139

resolves

that ITU-R and ITU-T Recommendations incorporated or proposed for incorporation by reference in the provisions of the Radio Regulations be identified and examined at WRC-~~99~~[03], with a view to establishing the correct method of reference in accordance with the principles set out in Annex 1 to this Resolution and taking into account the factors listed in Annex 2 to this Resolution, in order to complete the simplification of the Radio Regulations in respect of incorporation by reference,

ADD USA/12/140

further resolves

that, in the case of ITU-R Recommendations which are not currently referenced in the Radio Regulations, only those Recommendations which are in response to a WRC agenda item can be considered for incorporation by reference,

MOD USA/12/141

instructs the Director of the Radiocommunication Bureau

to arrange for a review of the provisions of the Radio Regulations containing references to ITU-R or ITU-T Recommendations and propose suitable recommendations to the CPM-~~99~~[02] for inclusion in its Report to WRC-~~99~~[03], using the list of provisions contained in Annex 3 to this Resolution together with the guidance contained in Annexes 1 and 2 to this Resolution, and taking into account the list of ITU-R Recommendations contained in Annex 4 to this Resolution,

urges administrations

to use the CPM Report to WRC-~~99~~[03] in order to prepare their proposals on incorporation by reference to that Conference.

ANNEX 1 TO RESOLUTION 27 (Rev.WRC-~~97~~2000)

Principles of incorporation by reference

1 Where references are non-mandatory, it is not necessary to establish specific conditions in applying the texts quoted. In such cases, reference could, for example, be made to "the latest version" of a Recommendation.

2 Mandatory references to Resolutions or Recommendations of a world radiocommunication conference (WRC) are acceptable without restriction, since such texts will have been agreed by a WRC.

3 Where mandatory references are suggested, and the relevant texts are brief, the referenced material should be incorporated in the body of the Radio Regulations.

4 If, on a case-by-case basis, it is decided to incorporate material by reference on a mandatory basis, then the following provisions shall apply:

4.1 the referenced text shall have the same treaty status as the Radio Regulations themselves;

4.2 the reference must be explicit, specifying the specific part of the text (if appropriate) and the version or issue number;

4.3 the referenced text must be adopted by the Plenary of a competent WRC, but should not be part of the Final Acts;

4.4 all texts incorporated by reference must be readily available, by being published in a separate volume;

4.5 if, between WRCs, a referenced text (e.g. an ITU-R Recommendation) is updated, the reference in the Radio Regulations shall continue to apply to the original version until such time as a competent WRC agrees to incorporate the new version of the reference. The mechanism for considering such a step is given in Resolution **28 (WRC-~~95~~2000)**.

ANNEX 2 TO RESOLUTION 27 (Rev.WRC-~~97~~2000)

Factors to be considered for the further application of incorporation by reference

In reviewing the provisions of the Radio Regulations employing references to other texts, administrations and study groups should address the following factors:

1 whether each reference is of mandatory~~, i.e. incorporated by reference,~~ or non-mandatory character;

2 whether in existing non-mandatory references, or mandatory references which are determined to be of non-mandatory character, appropriate linking language is used, e.g. the words "should" or "may";

3 whether in existing mandatory references, or other types of reference which are determined to be of mandatory character, clear mandatory linking language is used, e.g. the word "shall";

4 whether the incorporated ITU-R or ITU-T Recommendation(s) are explicitly identified;

5 where referenced ITU-R or ITU-T Recommendations are not explicitly identified, determine which ones should be identified;

6 whether text incorporated from ITU-R or ITU-T Recommendations should be placed directly in the Radio Regulations instead of using incorporation by reference;

7 if the ITU-R or ITU-T Recommendation to be incorporated is, as a whole, unsuitable as treaty status text, whether to limit the reference to those portions of the ITU-R or ITU-T Recommendation which are of a suitable nature or to place the mandatory portion directly in the Radio Regulations.

Reasons: To clarify that, in the case of ITU-R Recommendations which are not currently referenced in the Radio Regulations, only those Recommendations which are in response to a WRC agenda item can be considered for incorporation by reference. Also, minor consequential editorial changes have also been identified.

MOD USA/12/142

RESOLUTION 28 (Rev.WRC-~~95~~2000)

Revision of references to ITU-R Recommendations incorporated by reference in the Radio Regulations

The World Radiocommunication Conference (~~Geneva, 1995~~Istanbul, 2000),

considering

a) that the Voluntary Group of Experts on simplification of the Radio Regulations (VGE) proposed the transfer of certain texts of the Radio Regulations to other documents, especially to ITU-R Recommendations, using the incorporation by reference procedure;

b) that, in some cases, the provisions of the Radio Regulations imply an obligation on Member States [‡] to conform to the criteria or specifications incorporated by reference;

c) that references to incorporated texts shall be explicit and shall refer to a precisely identified provision;

d) that, taking into account the rapid evolution of technology, ITU-R may revise the Recommendations incorporated by reference at short intervals;

e) that revised and approved Recommendations will not have the same legal force as the initial Recommendations, incorporated by reference until a competent world radiocommunication conference has so decided;

f) that it would be desirable to ensure, in the cases provided for in the Radio Regulations, that the provisions reflect the most recent technical developments,

ADD USA/12/143

noting

that Member States would benefit greatly from being advised, as early as possible, of which Recommendations have been revised and approved during the study period,

NOC USA/12/143*bis*

resolves

1 that each Radiocommunication Assembly shall communicate to the following world radiocommunication conference a list of the ITU-R Recommendations incorporated by reference in the Radio Regulations which have been revised and approved during the elapsed study period;

2 that, on this basis, the WRC shall examine those revised Recommendations, and decide whether or not to update the corresponding references in the Radio Regulations;

3 that, if the WRC decides not to update the corresponding references, ITU-R shall continue publishing the ITU-R Recommendations currently referenced in the Radio Regulations;

4 that WRCs shall place the examination of Recommendations in conformity with *resolves* 1 and *resolves* 2 of this Resolution on the agenda of future WRCs,

ADD USA/12/144

further resolves

5 to instruct the Director of the Radiocommunication Bureau to report to the CPM immediately preceding the WRC those ITU-R Recommendations already incorporated by reference in the Radio Regulations which have been revised and approved since the previous WRC, or which may be revised in time for the Radiocommunication Assembly;

6 that, in the case of ITU-R Recommendations which are not currently referenced in the Radio Regulations, only those Recommendations which are in response to a WRC agenda item can be considered for incorporation by reference,

NOC USA/12/144*bis*

urges administrations

to participate actively in the work of the Radiocommunication Study Groups and the Radiocommunication Assembly in the revision of those Recommendations to which mandatory references are made in the Radio Regulations.

Reasons: To establish a procedure to advise administrations, well in advance of a WRC, of those ITU-R Recommendations already incorporated by reference in the Radio Regulations which have been revised and approved since the previous WRC, or which may be revised in time for the Radiocommunication Assembly. Also to clarify that, in the case of ITU-R Recommendations which are not currently referenced in the Radio Regulations, only those Recommendations which are in response to a WRC agenda item can be considered for incorporation by reference. Minor consequential editorial changes have also been identified.

Proposals for agenda item 4

A proposal for the suppression of Resolution 63

Background information

A proposal for the suppression of Resolution 63; this Resolution is being suppressed because the work of TG 1/2 related to this Resolution has been completed.

SUP USA/12/145

RESOLUTION 63

Relating to the protection of radiocommunication services against interference caused by radiation from industrial, scientific and medical (ISM) equipment[1]

Reasons: TG 1/2 completed its work related to Resolution 63.

Plenipotentiary resolutions

in accordance with Resolution **95 (WRC-97)**, to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

Resolution 87 (Minneapolis, 1998) - Role of the notifying administration when acting as the notifying administration on behalf of a named group of administrations

Background information

The Administration of the United States, in particular as the notifying administration for INTELSAT, has considered any possible modifications to the Radio Regulations under Resolution **87**. This Administration has not experienced any difficulties either with other administrations acting as the notifying administration for a group of named administrations or acting as the notifying administration for INTELSAT. The Administration of the United States believes that the Radio Regulations are now adequate in this area and require no changes regarding the responsibilities of the notifying administration. The notifying administration and the intergovernmental organizations should retain the flexibility of making their own arrangements for interfaces with the ITU. Members of an intergovernmental organization responsible for satellite networks can best determine how it needs to comply with the Radio Regulations.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 8 to
Document 13-E
25 March 2000
Original: French/ English/ Spanish

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

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Proposals submitted by the following administrations

Germany, Austria, Bosnia and Herzegovina, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Liechtenstein, Norway, Netherlands, Portugal, San Marino, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 8

Agenda item 7.2 - Agenda for future conferences

PART 8A

Agenda for WRC-[03] and WRC-[06]

1 Agenda for WRC-[03] - Modification of Resolution 722 (WRC-97)

Introduction

Agenda item 7.2 requests WRC-2000 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its view on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences.

Proposals

Europe proposes that WRC-2000 suppresses Resolution 722 (WRC-97) and adopts Resolution NNN [EUR/13/10] (WRC-2000) as the agenda for WRC-[03] to be proposed for adoption by the Council.

SUP EUR/13/383

RESOLUTION 722 (WRC-97)

Preliminary agenda for the 2001 World Radiocommunication Conference

ADD EUR/13/384

RESOLUTION NNN [EUR/13/10] (WRC-2000)

Agenda for the 200[3] World Radiocommunication Conference

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that, in accordance with Nos. 118 and 126 of the Convention of the International Telecommunication Union (Geneva, 1992), the general scope of the agenda for a world radiocommunication conference should be established four years in advance and a final agenda shall be established two years before the conference;

b) Article 13 of the Constitution of the International Telecommunication Union (Geneva, 1992) regarding the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention (Geneva, 1992) regarding their agendas;

c) the relevant Resolutions and Recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

recognizing

a) that this Conference has identified a number of urgent issues requiring further examination by the 200[3] World Radiocommunication Conference (WRC-[03]);

b) that in preparing this agenda, many proposals from administrations could not be included and have had to be deferred to future conference agendas,

resolves

to recommend to the Council that a world radiocommunication conference be held in late 200[3] for a period of four weeks, with the following agenda:

1 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, taking account of the results of the 2000 World Radiocommunication Conference (WRC-2000), and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following topics:

1.1 requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution **26** (**Rev.WRC-97**);

1.2 to consider the revision of Articles **S25** and **S19** and the rephrasing of Article **S1** of the ITU Radio Regulations concerning the amateur and amateur-satellite services;

Reasons: Modernization of the regulations concerning amateur radio (Article S25) is generally supported by administrations and all three Regions of the International Amateur Radio Union (IARU). To take account of this modernization some administrations already have practices that are not in accordance with the existing stipulations of the Radio Regulations, e.g. formation of amateur call signs as defined in Article S19. The proposed changes will take account of the need for improvement, simplification and adaptation in the technical and legal conditions related to the amateur service This may require related changes in Article S1 and other relevant parts of the RR.

1.3 issues related to Appendix **S3**:

1.3.1 to consider the results of studies regarding the boundary between spurious and out-of-band emissions;

Reasons: Task Group 1/5 has studied the issue of the definition of the boundary between OOB and spurious emission and will come up with solutions to define the boundary in October 2000. This will need to be reflected in Appendix S3.

1.3.2 to consider the results of studies and to propose any regulatory measure regarding the protection of passive services and safety services from unwanted emissions, in particular from space services transmissions, in response to *recommends* 7 and 8 of Recommendation **66** (**Rev.WRC-97**);

Reasons: ITU-R, in preparation of the WRC-2000 agenda item 1.2, have concluded that the “design objectives” for satellite services’ spurious emission limits in Appendix S3 should be reconfirmed as definitive limits. This conclusion was based on the technical feasibility for space services to comply with these limits. However, ITU-R has pointed out that there are clear indications that in many instances, safety and passive services do not receive adequate protection against unwanted emissions.

ITU-R is studying the means of providing additional, necessary protection against unwanted emissions for safety and passive services beyond that given in Appendix S3. These studies should enable to respond to Recommendation 66 (Rev.WRC-97) (particularly *recommends* 7 and 8).

1.3.3 to consider the inclusion of general limits for out-of-band emissions in the Radio Regulations, in particular with regard to whether it is appropriate to do so, taking into account the results of ITU-R studies;

Reasons: Task Group 1/5 is developing a new Recommendation specifying safety limits for OOB emissions. This agenda item was proposed for giving WRC-03 the opportunity to assess whether there would be any interest in including these limits in the RR.

1.4 review the frequency and channel arrangements in the MF and HF bands by the maritime-mobile service, with a view to meeting the changing needs of this service and the introduction of digital technology and taking into account Resolution **347 (WRC-97)**;

review the use of the HF bands by the aeronautical mobile (R) service with a view to meeting the changing needs of this service.

Reasons: At the time of WRC-03 the GMDSS will have been operational for a number of years. Sufficient experience will have been gained about the consequences of GMDSS and other recent developments affecting the use of frequencies on MF (415-526.5 kHz and 1 606.5-3 800 kHz) and HF bands. Many countries are in the process of reviewing the activities of their commercial coast stations. New developments in the field of satellite services will also influence the use of MF and HF bands.

1.5 to consider the status of allocations to the radiolocation and other services in the bands 2 900-3 100 MHz and around 5.5 GHz;

Reasons: To possibly upgrade the radiolocation service from secondary status to primary status in the band 2 900-3 100 MHz and around 5.5 GHz and to give WRC-03 the opportunity to consider the outcome of studies carried out by ITU-R on the possibility of introducing mobile applications in these bands and particularly around 5.5 GHz, according to proposed agenda item 1.9.

1.6 to consider Appendix **S13** and Resolution **331 (Rev.WRC-97)** with a view to their deletion and, if appropriate, consider related changes to Chapter **SVII** and other provisions of the Radio Regulations as necessary, taking into account the implementation of the Global Maritime Distress and Safety System (GMDSS) and the possibility of its application to ships not subject to SOLAS regulations;

Reasons: WRC-97 decided that the listening watch on 2 182 kHz remains mandatory until 1 February 1999, but some ship and coast stations continue maintaining watch on a voluntary basis. The IMO Maritime Safety Committee at its 69th meeting (May, 1998) agreed that the mandatory listening watch on channel 16 on board SOLAS ships ceases on 1 February 2005. The continuing implementation of GMDSS on an increasing number of non-SOLAS vessels makes it necessary to review the provisions of Appendix S13 and Chapter SVII together with the related Resolution 331 (Rev.WRC-97) in good time before 2005. The IMO in its opinion to WRC-2000 on this matter strongly recommends that this item be retained on the final agenda of WRC-03.

1.7 to consider the results of studies, and take necessary actions relating to:

1.7.1 the exhaustion of the maritime-mobile service identity numbering resource (Resolution **344 (WRC-97)**);

Reasons: It is evident that the MMSI numbers are a scarce resource. ITU-R studies performed in accordance with Resolution 344 may reveal means of extending this resource or identifying new resources.

1.7.2 shore-to-ship distress communication priorities (Resolution **348 (WRC-97)**);

Reasons: This item is in accordance with Resolution 348 (WRC-97).

1.8 consideration of the need to realign the allocations to the amateur, amateur-satellite and broadcasting services around 7 MHz on a worldwide basis, taking into account Recommendation **718 (WARC-92)**;

Reasons: Recommendation 718 has already been awaiting implementation for eight years. Therefore, the purpose of this proposal is to satisfy this Recommendation and reasons stated therein such as different allocations in ITU Regions, large disparity in power levels between amateur and broadcasting services and consequential incompatibility. In addition, others reasons are:

– to meet the ITU objective of harmonization of allocations on a worldwide basis;

– to ensure globally harmonized, satisfactory spectrum access around 7 MHz for the amateur, broadcasting, fixed and mobile services;

– to remove the long-lasting uncertainty concerning the future of this part of the spectrum to facilitate planning and efficient spectrum utilization.

Since WARC-92 significant changes have occurred that make the issue even more pressing. The main users of HF fixed and mobile links in Europe find that their usage below 10 MHz has increased; so much so that extensive sharing between the amateur service and the fixed/mobile services could no longer offer a satisfactory solution for either service. Also, there needs to be more of a balance between the fixed and mobile spectrum available above and below 7 MHz. Pressure on the available spectrum for HF broadcasting below 10 MHz has also increased over the last few years as a result of a more cooperative political environment and economic factors, both of which have combined to increase the use of medium range single hop transmissions for programme delivery.

Studies are therefore continuing on the basis that:

- there is no real distinction between fixed and mobile equipment and use so that allocations in the frequency allocation table should be made generic;
- congestion in the broadcasting bands between 4 and 7 MHz continues the recent trend towards single hop, lower frequency coverage, as a result of greater sharing of broadcasting facilities between countries.

1.9 consider the allocation of frequencies to the mobile service in the frequency ranges 5 150-5 350 MHz and 5 470-5 725 MHz;

Reasons: To gain global harmonized frequency allocations to the mobile service in support of radio local area networks (RLAN) applications, including HIPERLANs, on a worldwide basis, while ensuring the protection and on-going operations of existing services.

The band 5 150-5 350 MHz is already nationally used for RLAN in many countries and the global MS allocation would give RLANs an appropriate ITU allocation status.

Studies in ETSI and CEPT have indicated that 320-330 MHz spectrum is needed for RLANs at 5 GHz band, then the 5 150-5 350 MHz could not alone be sufficient. Also, this band is shared with other services, which limits the RLAN use indoors. The bands 5 470-5 725 MHz could fulfil the RLAN requirement. Studies in CEPT have proved that sharing with existing services in the band 5 470-5 725 MHz can be arranged.

RLANs are widely seen as complementing the picture of Mobile Information Society together with cellular networks, taking care of the broadband data traffic in offices and other hot spots. A global allocation would help this scenario, make the global circulation of equipment easier and facilitate the benefits of economy of scale.

ISM band at 5 GHz is not preferred due to the expected significant increase of the use of other applications in this band and the high quality of service requirement for RLANs.

1.10 review of spectrum and regulatory requirements to facilitate emerging terrestrial wireless interactive multimedia applications in accordance with Resolution [**EUR/13/12**] **(WRC-2000)**;

Reasons: Wireless mobile multimedia applications are not defined by ITU-R, but are regarded to be end-user radio connection(s) to core networks, where core networks include, for example, PSTN, ISDN, PLMN, PSDN, Internet, WAN/LAN, CATV, etc. Although a wireless mobile multimedia application in itself is not a service, it can clearly be provided within the radio services FS, MS, and BS, as defined by the Radio Regulations.

To respond to the rapid convergence of technologies, the Radio Regulations need to address this issue.

To allow for a progressive allocation of spectrum required for new applications and to satisfy Universal Services as to obtain:

- flexibility;
- instant implementation;
- worldwide use; and
- a reduction of the regulatory constraints.

1.11 add a primary allocation to the fixed service in the band 17.3-17.7 GHz for Region 1 in Article **S5** of the RR;

Reasons: In Region 1, the only primary service allocated in the band 17.3-17.7 GHz is the FSS (Earth-to-space). This band is considered of significant interest for point-to-point and point-to-multipoint systems in the fixed service.

1.12 to consider regulatory provisions and possibly identification of spectrum above about 19.7 GHz for high density systems in the fixed-satellite service;

Reasons: Many FSS bands have been shared with the FS, which has worked well with a limited number of terminals for both types of service.

In recent years, many of these shared bands are being identified for HDFS use, often involving Fixed Wireless Access, Multimedia Wireless services, etc.

As a consequence, many bands available for future HDFSS use are becoming more difficult to share.

There are exclusive FSS bands (without the FS) for the possible use of HDFSS in the range 10-30 GHz. Taking Region 1 as an example, these bands amount to 1.5 GHz in total, and they will be used in the first generations of interactive satellites, leaving no room for expansion of the high density use of the fixed-satellite service in the exclusive FSS bands.

There is a need to provide more spectrum for one-way or two-way services via satellites and for global harmonization of satellite spectrum, also for GSO satellites.

It should be noted that satellite systems in general have a longer preparation time than terrestrial systems, and that spectrum availability is a condition for the large investments needed for satellite systems. Furthermore, obtaining the required capital to initiate a space system in a new band requires a certainty that the band will be available across the whole of the coverage area when the network is brought into use. If there is a diversity of usage allowed in the countries within the coverage area, with HDFSS allowed in only some of the area, then this would result in sub-optimum efficiency in the use of the spectrum. It is exceedingly difficult and expensive if it is necessary to change the frequency usage for a satellite network once the design has been started.

Consideration thus must be made to ensuring that a sufficiently wide allocation (500-1 000 MHz for uplink as well as for downlink in the 20/30 GHz range and 1-2 GHz in each direction in the 40/50 GHz range) in addition to that presently available is established for HDFSS on a global basis.

This matter has been considered by the CPM in sections 4.2, 6.1.2, 6.1.4 and 6.1.5 of the Report.

1.13 review of the usage of the band 13.75-14 GHz for all services, in accordance with Resolution **[EUR/13/13] (WRC-2000)**, with a view to improve sharing conditions for FSS;

Reasons: The 13.75-14 GHz band is shared by the FSS and the radiolocation and radionavigation services and certain limitations have been placed on the FSS, radiolocation and radionavigation service in No. S5.502. The band is also shared with the Space Research Service, on a secondary basis, under the conditions set out in provision Nos. S5.503 and S5.503A.

The FSS operators have expressed interest in operating small earth station terminals in this band. In order to accommodate this request, the constraints regarding the minimum antenna diameter (and e.i.r.p. levels) of FSS earth stations stated in No. S5.502 have to be re-examined for the possible identification of alternative sharing conditions that would continue to ensure the protection of the radiolocation service.

Europe is already proposing suppression of the constraint on minimum e.i.r.p. for FSS under agenda item 1.13.1. Studies have been initiated within ITU-R to determine whether some other constraints on FSS could be alleviated.

1.14 to consider the results of studies related to Resolution **114 (WRC-95)**, dealing with the use of the band 5 091-5 150 MHz by the fixed-satellite service (Earth-to-space) (limited to feeder links of the non-geostationary mobile-satellite service), and review the allocation to the aeronautical radionavigation service and the fixed-satellite service in the frequency band 5 091-5 150 MHz;

Reasons: WRC-95, by the means of Resolution 114, resolved:

"that the allocation to the aeronautical radionavigation service and the fixed-satellite service in the frequency band 5 091-5 150 MHz should be reviewed at WRC-01".

WRC-95, by the means of Resolution 114, required ITU-R "to study the technical and operational issues relating to sharing of this band between the aeronautical radionavigation service and the fixed-satellite service providing feeder links of the non-GSO mobile-satellite service (Earth-to-space)" and "to bring the results of these studies to the attention of WRC-01".

WRC-95 invited ICAO "to further review, within the same time-frame, detailed spectrum requirements and planning for international standard aeronautical radionavigation systems in the above-mentioned band".

It is appropriate that WRC-[03] review the allocations in the band 5 091-5 150 MHz and takes on board a requirement to WRC-01 by WRC-95.

1.15 revise **APS30** and **APS30A** in accordance with the decisions of WRC-2000;

Reasons: Facilitate Council Resolution 1129.

1.16 to consider possible changes to the procedures for the advance publication, coordination and notification of satellite networks in response to Resolution 86 (Minneapolis, 1998);

2 to consider outstanding items from WRC-2000:

2.1 to consider results of ITU-R studies on the feasibility of sharing in the band 2 700-2 900 MHz between the aeronautical radionavigation service and the mobile service carried out in accordance with Resolution **[EUR/13/1] (WRC-2000)** and take appropriate action on this subject;

2.2 to consider any additional changes to Appendix **S18** to enable the use of digital communications by the maritime-mobile service, taking into account Resolution **342 (Rev.WRC-2000)**;

2.3 on the basis of the results of the technical, operational and regulatory studies conducted in accordance with Resolution **[EUR/13/5] (WRC-2000)**:

2.3.1 to review and, if appropriate, revise the provisional pfd limits concerning the operation of RNSS (space-to-Earth) systems in the frequency bands 1 151-1 300 MHz in order to ensure that the RNSS (space-to-Earth) will not cause harmful interference to the aeronautical radionavigation, the radionavigation and the radiolocation services;

2.3.2 to consider compatibility between RNSS and ARNS in the band 960-1 215 MHz;

2.4 to consider, on the basis of the results of the studies in accordance with Resolution **130 (Rev.WRC-2000)**, the inclusion of power limits or other frequency sharing mechanisms among GSO, non-GSO and terrestrial systems;

2.5 to consider regulatory provisions for high altitude platform stations in the bands 47.2-47.5 GHz and 47.9-48.2 GHz and possible additional frequency allocations for such high altitude platform stations in the fixed service in the range 18-32 GHz taking into account the results of ITU-R studies conducted in accordance with Resolution **122 (Rev.WRC-2000)**;

2.6 to consider whether earth stations located on board vessels could operate in fixed-satellite service networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz taking into account the results of the regulatory, technical and operational studies conducted in accordance with Resolution **[EUR/13/8] (WRC-2000)**;

3 to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations which have been communicated by the 2001 Radiocommunication Assembly, in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in the Annex to Resolution **27 (Rev.WRC-97)**;

4 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the Conference;

5 in accordance with Resolution **95 (WRC-97)**, to review the Resolutions and Recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

6 to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the Convention (Geneva, 1992);

7 to identify those items requiring urgent action by the radiocommunication study groups;

8 in accordance with Article 7 of the Convention (Geneva, 1992):

8.1 to consider and approve the Report of the Director of the Radiocommunication Bureau on the activities of the Radiocommunication Sector since WRC-2000;

8.2 to recommend to the Council items for inclusion in the agenda for the [2006] World Radiocommunication Conference,

invites the Council

to finalize the agenda and arrange for the convening of WRC-[03] and to initiate as soon as possible the necessary consultation with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a Report to WRC-[03],

instructs the Secretary-General

to communicate this Resolution to concerned international and regional organizations.

2 Preliminary agenda for WRC-[06]

Introduction

Agenda item 7.2 requests WRC-2000 to recommend to the Council items for inclusion in the agenda for WRC-[03], and to give its view on the preliminary agenda for the [2006] Conference and on possible agenda items for future conferences.

Proposal

Europe proposes that WRC-2000 adopt the preliminary agenda for WRC-[06] for consideration by the next Council.

ADD EUR/13/385

RESOLUTION [EUR/13/11] (WRC-2000)

Preliminary agenda for the [2006] World Radiocommunication Conference

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that, in accordance with Nos. 118 and 126 of the Convention of the International Telecommunication Union (Geneva, 1992), the general scope of the agenda for the [2006] World Radiocommunication Conference (WRC-[06]) should be established four years in advance;

b) Article 13 of the Constitution of the International Telecommunication Union (Geneva, 1992) regarding the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention (Geneva, 1992) regarding their agendas;

c) the relevant Resolutions and Recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

resolves to give the view

that the following items should be included in the preliminary agenda of WRC-[06], to be held in late [2006]:

1 to take appropriate action in respect of those urgent issues that were specifically requested by the [2003] World Radiocommunication Conference (WRC-[03]);

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-[03], to consider and take appropriate action in respect of the following topics:

2.1 requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution **26 (Rev.WRC-97)**;

2.2 to consider the development of appropriate arrangements in order to facilitate global circulation for carriage and use of radiocommunication terminals;

Reasons: It is clear that global circulation cannot be allowed for all kinds of terminals. In many cases the circulation needs to be restricted. Reasons for restriction can be e.g. that frequency or site clearance is necessary in order to avoid interference.

Taking into account the aforementioned considerations, it should be recognized that in recent years good experience has been gained from implementation of mechanisms allowing for CEPT-wide circulation of various radio terminals. With the examples of GSM, S-PCS and in the future also IMT-2000, services are now extending beyond countries and regions.

This proposed agenda item is aiming at securing the successful development of systems on a worldwide basis by providing means to facilitate global circulation of their terminals.

2.3 to review the allocations for the HF services taking account of the impact of new modulation and adaptive control techniques and any recommendations by WRC-[03] on the adequacy of the frequency allocations for HF broadcasting from about 4 MHz to 10 MHz and on the future use and requirements of the aeronautical mobile (R) and maritime-mobile services;

Reasons: WRC-03 may be expected to recommend changes to the current allocations to the HF services as a result of the examination of several items related to the HF services already included on the preliminary agenda for WRC-03. There will therefore be a need for consequential changes at WRC-05 to implement any recommended changes coming out of WRC-03.

This is in line with PP-98 Resolution 80 which, in order to improve the efficiency of WRCs, requires WRC agendas to be set in two conference cycles so that the preliminary work of one WRC is brought to a swift conclusion by the following WRC.

The preliminary agenda item 2.12 for WRC-03 included in Resolution 722 (WRC-97), may result in a substantial rearrangement of the present allocations to the HF services around 7 MHz. In particular, the solution achieved for the realignment around 7 MHz will have a direct impact on the work related to WRC-03 agenda item 2.13 on the future spectrum requirements in the range 4-10 MHz. Should WRC-03 confirm the need for additional spectrum for HFBC and identify 7 MHz as one of the bands for this possible expansion, then this together with any rearrangement resulting from agenda item 2.12 will need to be taken into account at a future WRC.

Other WRC-03 topics involving HF services include item 3.6 on the use of adaptive systems in the MF/HF bands, and studies into the needs of the aeronautical mobile (R) and maritime-mobile services undertaken in response to preliminary agenda item 2.4 and the agenda item 8.4 deferred from WRC-2000. (NOTE - A separate proposal addresses the merging of the two items regarding the mobile services.)

In addition, specific proposals directly related to the amateur and fixed services may emerge from WRC-03 for consideration by WRC-05. It is therefore appropriate to provide for a preliminary agenda item for WRC-05 referring to the need for a review of the allocations to the services involved following on from the work at WRC-03. The scope of the work will have to be kept under review in order to accommodate further development of the provisional WRC-03 agenda in respect of HF services.

2.4 consider possible changes to the procedures for the advance publication, coordination and notification of satellite networks in response to Resolution 86 (Minneapolis, 1998),

invites the Council

to consider the views given in this Resolution,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a Report to WRC-[06],

instructs the Secretary-General

to communicate this Resolution to concerned international and regional organizations.

Proposals submitted by the following administrations

Germany, Austria, Bosnia and Herzegovina, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Liechtenstein, Norway, Netherlands, Portugal, San Marino, Slovenia, Sweden, Switzerland, Turkey

PART 8B

Additional resolutions for future conferences

1 Review of service definitions in light of technology convergence

Introduction

The objective of this proposed new agenda item to the next competent WRC, illustrated by Resolution [EUR/13/12] (WRC-2000), is to provide suggested review of spectrum and regulatory requirements as guidance for administrations wishing to implement new terrestrial wireless interactive multimedia applications, taking due account of sharing and harmonization issues, and the possible widespread worldwide use. Both traditional telephony applications as well as wireless interactive multimedia applications should be considered.

Terrestrial wireless interactive multimedia applications are not defined by ITU-R, but are regarded to be end-user radio connection(s) to core networks. Although a terrestrial wireless interactive multimedia application in itself is not a service, it can clearly be provided within the radio services fixed (FS), mobile (MS), and broadcasting (BS), as defined by the Radio Regulations.

It can be foreseen that new wireless mobile multimedia applications will show an extraordinary expansion and that they will comprise multiple services, including FS and BS. The potential for terrestrial wireless interactive multimedia applications to enhance the availability of telecommunications services in both developing and developed countries is substantial.

The present procedure for establishing and approving of WRC agendas is far too slow, as compared with the progress of technology and could be to the detriment of development. The inclusion, in the agenda of each WRC, of a standing agenda item, calling for a review of the spectrum requirement for these emerging terrestrial wireless interactive multimedia applications would facilitate:

- simpler, efficient planning of the spectrum;
- simpler administration of frequency allocations and the accommodation of market/technology evolution;
- faster deployment of new services due to reduced administrative burdens;
- equitable treatment of operators worldwide;
- the encouragement of innovative technologies in a less prescriptive and more flexible regulatory regime.

Proposal

The above-mentioned administrations suggest that WRC-2000 adopt the proposed Resolution [EUR/13/12] (WRC-2000), which would enable ITU to review spectrum and regulatory requirements to facilitate implementation of emerging terrestrial wireless interactive multimedia systems and to respond to the rapid convergence of technologies in a timely manner.

ADD EUR/13/386

RESOLUTION [EUR/13/12] (WRC-2000)

Review of spectrum and regulatory requirements to facilitate emerging terrestrial wireless interactive multimedia applications

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) the rapid technical evolution in several areas of telecommunications;

b) the importance of finding global solutions for new terrestrial wireless interactive multimedia applications;

c) the need for terrestrial wireless interactive multimedia applications to individual end-users;

d) the convergence between services using digital formats (such as fixed, mobile and some broadcasting applications);

e) the need for worldwide allocations to such services also calling for higher spectrum efficiency;

f) the benefit, also for developing countries, when applying new, globally harmonized equipment and spectrum allocations for the implementation of market driven universal services,

noting

a) the historical based frequency segmentation, particularly the differences between Regions, but also the segmentation between services, of the Table of Frequency Allocations (Article **S5** of the Radio Regulations);

b) Recommendation **34 (WRC-95)**, which was derived from the recommendations of the Voluntary Group of Experts (VGE) to study alternative allocation methods, merging of services, etc., and which set the objectives to allocate frequency bands on a worldwide basis and to the most broadly defined services, wherever possible,

also noting

c) Resolution 9 of the World Telecommunication Development Conference (Valetta, 1998), calling for an active participation by the developing countries to review the global spectrum requirements for new technologies;

d) the new ITU-R Question 221/9 pertaining to spectrum vision for the fixed [and mobile] service[s];

e) ITU-R Study Group 8 [Question xxx/8] [Recommendation M.YYY] is currently addressing the relevant issues,

resolves

that competent WRCs include in their agendas an item to review spectrum and regulatory requirements to facilitate implementation of emerging terrestrial wireless interactive multimedia applications to respond to the convergence of technologies, in order to enable future conferences to make suitable allocations in a timely manner, to meet new requirements of new and emerging technological developments in the fixed, mobile and broadcasting services,

requests ITU-R

to pursue its studies in this area, in order to assist in the development of common, worldwide fixed and mobile allocations suitable for such new terrestrial wireless interactive multimedia technologies and applications, and to report its conclusions in time for the next competent WRC,

invites administrations

to participate in these studies and to bring proposals to future WRCs to meet the above.

Reasons: To allow for a progressive allocation of spectrum required for new applications and to satisfy universal services as to obtain:

- flexibility;
- instant implementation;
- worldwide use; and,
- a reduction of the regulatory constraints.

2 Sharing between FSS and radiolocation services

Introduction

The constraints under which FSS and radiolocation services are allowed to share the 13.75-14 GHz band need to be reviewed and possibly revised.

The ITU-R is invited to continue its studies to allow WRC-[03] to consider adopting alternative sharing constraints, more in line with today's technological advances and market demand for services.

Proposal

Europe proposes that WRC-2000 adopt the following Resolution which would facilitate sharing between FSS and radiolocation services.

ADD EUR/13/387

RESOLUTION [EUR/13/13] (WRC-2000)

Sharing between FSS and radiolocation in the band 13.75-14 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WARC-92 (Malaga-Torremolinos) added an allocation to the fixed-satellite service (FSS) in the band 13.75-14 GHz;

b) that this band is shared with the radiolocation and radionavigation services and certain limitations have been placed on the fixed-satellite, radiolocation and radionavigation services in provision No. **S5.502**;

c) that this band is also shared with the space research service, on a secondary basis, under the conditions set out in provisions Nos. **S5.503** and **S5.503A**;

d) that the FSS operators have expressed interest in operating small earth station terminals in the band 13.75-14 GHz;

e) that there is a need for the continued protection of the radiolocation service,

resolves

to invite ITU-R

1 to conduct studies prior to WRC-[03] to consider the sharing conditions stated in footnotes Nos. **S5.502** and **S5.503** with a view to reviewing the constraints regarding the minimum antenna diameter and e.i.r.p. levels of FSS earth stations in No. **S5.502** while continuing to ensure the protection of the radiolocation;

2 to identify alternative sharing conditions that could allow sharing between FSS, radiolocation and other services.

Reasons: The 13.75-14 GHz band is shared by the FSS and the radiolocation and radionavigation services and certain limitations have been placed on the FSS, radiolocation and radionavigation service in No. S5.502. The band is also shared with the space research service, on a secondary basis, under the conditions set out in provisions Nos. S5.503 and S5.503A.

The FSS operators have expressed interest in operating small earth stations terminals in this band. In order to accommodate this request, the constraints regarding the minimum antenna diameter (and e.i.r.p. levels) of FSS earth stations stated in No. S5.502 have to be re-examined for the possible identification of alternative sharing conditions that would continue to ensure the protection of the radiolocation service.

Europe is already proposing suppression of the constrain on minimum e.i.r.p. for FSS under agenda item 1.13.1. Studies have been initiated within ITU-R to determine whether some other constraints on FSS could be alleviated.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 2 to Addendum 7 to Document 13-E
25 March 2000
Original: French/ English/ Spanish

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

PART 7

APPENDICES S3 AND S7, RESOLUTIONS 28 (WRC-95) AND 95 (WRC-97), PP-98 RESOLUTIONS

CONTENTS

Proposals submitted by the following administrations

Germany, Austria, Bosnia and Herzegovina, Croatia, Denmark, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Norway, Netherlands, Portugal, San Marino, Slovenia, Sweden, Switzerland, Turkey

PART 7D

Agenda item 7.1 - Report of the Director, BR

PART 7D2

Rules of Procedure - Resolution 80 (WRC-97)

Add the following text at the end of Part 7D of the European common proposals.

1 Background

Europe has noted the attempts by the Radio Regulations Board to prepare some draft Rules of Procedure in response to Resolution 80. In Document CMR2000/29, the RRB have suggested to the WRC some possible additions No. S11.44*bis* and No. S11.48*bis* which would have the effect of increasing the time period to bring satellite frequencies into use.

In reviewing the suggestions made by the RRB, Europe would like to recall that one of the few improvements made by WRC-97 following the Resolution 18 (Kyoto, 1994) review was the shortening of the time frame for the bringing into use of satellite networks. The suggestions put forward by the RRB in Document CMR2000/29 go counter to the improvements that were made at WRC-97. Consequently, Europe cannot support proposals of this type for the following reasons:

- these proposals negate the improvements made by WRC-97;
- the final decisions of WRC-97 were to have a 5-year period with a 2-year extension subject to very specific conditions. At the time of WRC-97 an extension of 3 years was also considered but not accepted by the WRC;
- any extension on an exceptional basis will probably result in the extension being applied almost universally;
- the delay in processing should not be a factor in determining what the time limit for the bringing into use of satellite networks should be. If it were the case then there would be different time limits for different networks as the BR delay varies with time and administrations would not know in advance what the time period is. In addition, there are other measures being proposed to deal with the backlog problem.

2 Proposal

NOC EUR/13/376

S11.44
to
S11.44I

Reasons: In response to Resolution 80 (WRC-97), there shall be no increase in the time periods of Article S11 to bring satellite frequencies into use.

Proposals submitted by the following administrations

Germany, Austria, Bosnia and Herzegovina, Croatia, Denmark, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Norway, Portugal, San Marino, Slovenia, Sweden, Switzerland, Turkey

PART 7D3

Rules of Procedure - S5.488

Add the following at the end of Part 7D of the European common proposals:

Introduction

Section 7.6 of the CPM Report discusses the regulatory situation resulting from the modification of footnote S5.488 by WRC-97 and the associated RoP adopted by the RRB at its 13th meeting 6-14 July, Geneva, 1998 which became effective as from 1 January 1999.

Europe considers that in order to bridge the apparent regulatory gap resulting from this situation, there is a need to establish an appropriate regulatory mechanism by which the terrestrial service sharing the same frequency band with the space service, on an equal basis, are to be adequately protected.

The CPM Report identified three approaches to this effect:

Approach 1: The introduction of hard pfd limits for Region 2 GSO FSS networks, similar to those currently in Article **S21**;

Approach 2: The introduction of pfd values which are thresholds;

Approach 3: Existing provision **S5.488** might be modified to refer explicitly to **S9.21**.

Europe considers that the most appropriate method to resolve this situation is the adoption of Approach 1. The following proposals are made in this respect:

MOD EUR/13/377

S5.488 The use of the bands ~~11.7-12.2 GHz by the fixed-satellite service in Region 2 and~~ 12.2-12.7 GHz by the broadcasting-satellite service in Region 2 is limited to national and subregional systems.~~ The use of the band 11.7-12.2 GHz by the fixed-satellite service in Region 2 is subject to previous agreement between the administrations concerned and those having services, operating or planned to operate in accordance with the Table, which may be affected (see Articles **S9** and **S11**).~~ For the use of the band 12.2-12.7 GHz by the broadcasting-satellite service in Region 2, see Appendix **S30**.

Reasons:

1 For the suppression of the provisions relating to national or subregional systems, see EUR/13/138.

2 Europe has also addressed the issue raised at the CPM in relation to the possible replacement of Article S14/No. S9.21 to the FSS allocation in this band. Europe considers that there is a need, in order:

- to avoid undue constraints to the terrestrial services allocated in the bands in the three Regions;
- to avoid undue constraints on the development of the Plans in Regions 1 and 3;
- to limit the degree of inhomogeneity between different GSO FSS networks;
- to apply pfd limits to the operation of GSO FSS in Region 2 to ensure the protection of terrestrial services in the three Regions. For this purpose, the pfd limits currently in force in the adjacent band (12.2-12.5 GHz) are considered to be appropriate and are therefore proposed for this purpose. In doing so, the reference to footnote 7 in this particular part of Table S21-4 is no longer required, since this footnote refers to the applicability of limits in ITU-R Recommendations.

MOD EUR/13/378

TABLE **S21-4** *(continued)*

Frequency band	**Service***	**Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane**			**Reference bandwidth**
		0°-5°	**5°-25°**	**25°-90°**	
11.7-12.2 GHz (Region 2) 12.2-12.5 GHz~~7~~ (Region 3) 12.5-12.75 GHz~~7~~ (Region 1~~ and Region 3~~ countries listed in Nos. **S5.494** and **S5.496**)	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	–148~~ 14~~	–148 + 0.5(δ – 5)~~ 14~~	–138~~ 14~~	4 kHz

NOC

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7 **S21.16.1**

Proposals submitted by the following administrations

Germany, Austria, Bosnia and Herzegovina, Croatia, Denmark, Spain, Estonia, Finland, France, Ireland, Iceland, Italy, Liechtenstein, Norway, Netherlands, Portugal, San Marino, Slovenia, Sweden, Switzerland

PART 7E

PP-98 Resolutions

PART 7E2

PP-98 Resolution 86 - Scope of S5.43

Add the following section at the end of Part 7 E2 of the European common proposals.

3 Scope of No. S5.43

3.1 Introduction

Past WRCs have introduced in Article S5 of the Radio Regulations footnotes to the effect that stations in a particular service “shall not cause harmful interference to” or “shall not claim protection from” stations in (an)other service(s) allocated in the table. No. S5.43 and its associated Rule of Procedure may be understood as establishing a general linkage between an allocation subject to not causing harmful interference and an allocation which cannot claim protection from the other services allocated in the table of Article S5. Such a general linkage appears to be in contradiction with most of the footnotes which may be considered within the scope of No. S5.43. After detailed review of this issue, this contribution proposes the modification of this provision. This proposal is made in the framework of the WRC-2000 agenda item relating to Resolution 86 of the Plenipotentiary Conference (Minneapolis, 1998), since in most cases, the relevant footnotes relate to space services.

It is also proposed that WRC-2000 adopt a resolution requesting ITU-R to study the sharing situations in the footnotes identified in this contribution and that WRC-03 reviews these situations with a view to clarify the regulatory situations in the corresponding bands and suppressing S5.43. The RRB should also be requested to revise its RoP on the basis of the decisions of the Conference on this issue.

As a general conclusion, future conferences should avoid adding footnotes in Article S5 which may fall in the scope of S5.43, since such decisions do not provide for satisfactory protection of incumbent services, nor provide any status to new services.

3.2 Framework

S1.169 of the Radio Regulations defines *harmful interference* as follows:

> "*Interference* which endangers the functioning of a *radionavigation service* or of other *safety services* or seriously degrades, obstructs, or repeatedly interrupts a *radiocommunication service* operating in accordance with Radio Regulations (CS)."

The main purpose of the Radio Regulations is to define allocations and procedures which preclude the occurrence of harmful interference between services. This fundamental principle is one of the first provisions of the Radio Regulations and echoes No. 197 of the Constitution:

S0.4 All stations, whatever their purpose, must be established and operated in such a manner as not to cause harmful interference to the radio services or communications of other Members or of recognized operating agencies, or of other duly authorized operating agencies which carry on a radio service, and which operate in accordance with the provisions of these Regulations (No. 197 of the Constitution).

Under this general principle, Article S5 specifies two categories of radiocommunication services (primary and secondary), with the following definition of a secondary service:

S5.28 3) Stations of a secondary service:

S5.29 *a)* shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date;

S5.30 *b)* cannot claim protection from harmful interference from stations of a primary service to which frequencies are already assigned or may be assigned at a later date;

S5.31 *c)* can claim protection, however, from harmful interference from stations of the same or other secondary service(s) to which frequencies may be assigned at a later date.

No. S5.43 appears as creating a third category of services, lower than secondary, but higher than under S4.4, by using the following wording:

S5.43 1) Where it is indicated in these Regulations that a service may operate in a specific frequency band subject to not causing harmful interference, this means also that this service cannot claim protection from harmful interference caused by other services to which the band is allocated under Chapter **SII** of these Regulations.

The current RRB Rule of Procedure on this provision recognizes this lower status and extends it to the cases of allocations made without the right to claim protection. This Rule of Procedure therefore introduces a general linkage between an allocation subject to not causing harmful interference and an allocation which cannot claim protection, even when the allocation is made subject to not causing harmful interference into only one of the other services allocated in Article S5 in the same frequency band.

Such a general linkage is in contradiction with most of the footnotes which may be considered within the scope of No. S5.43. A careful analysis of these footnotes shows that in most cases, it appears that was not the intention of the Conference which decided the inclusion of these footnotes in the RR to make the corresponding allocation less than secondary, or even to make it secondary with respect to more than one service.

The footnotes of Article S5 which may be within the scope of S5.43 or its RoP may be grouped in seven categories:

- Category 1 (may operate… subject to not causing harmful interference to...) (this is the exact wording of S5.43);

- Category 2 (may be used under the condition not to cause…);
- Category 3 (shall not cause…);
- Category 4 (shall ensure/take all practicable steps not to cause harmful interference is caused…);
- Category 5 (shall not cause harmful interference or claim protection…);
- Category 6 (shall not cause harmful interference or constrain the development/use …);
- Category 7 (shall not claim protection from/constrain the development of...).

Category	Footnote in Article S5 (S5.xx)
1	243, 282, 289, 291, 553, 558, 559
2	60, 73, 97, 106, 128, 129, 136, 137, 143, 146, 147, 151, 254, 475
3	61, 76, 124, 296, 329, 372, 374, 376A, 390, 487, 490, 496, 503A, 511A, 511D, 561
4	53, 56, 77, 82, 96, 100
5	164, 221, 233, 235, 246, 286B, 316, 319, 332, 352A, 392A, 399, 447C, 476A, 513, 517, 551A
6	377, 389B, 389E, 389F, 448B, 469A, 498A, 501B, 513A, 551A
7	268, 364, 429, 533, 535, 536A, 536B

3.3 Proposals

EUR/13/379

It is proposed that the following principles be followed in considering the applicability of S5.43:

a) When a conference specified (a) particular service(s) to which the allocation identified shall not cause harmful interference, S5.43 can only be understood as implying that an administration using this allocation cannot claim protection from this (these) particular service(s).

b) When WRCs have specified that a given service “shall not causing harmful interference to and not claim protection from (or constrain the development of)” a particular service (e.g. S5.164, S5.221, S5.233, S5.235), the generalized interpretation of section 2 of the RoP on S5.43 (i.e. status less than all other services) can by no means be applied.

c) When it is specified in a footnote of Article S5 (e.g. S5.376A) that a service shall not cause harmful interference into a passive service like radio astronomy, it can by no means be interpreted as implying that S5.43 applies.

d) When the obligation not to cause harmful interference is into a service only allocated in certain countries, it can by no means be interpreted as implying that S5.43 applies.

On the basis of these principles, it can be seen that none of the above footnotes would be affected by the following alternative drafting of S5.43.

MOD EUR/13/380

S5.43 1) Where it is indicated in these Regulations that a service or stations in a service may operate in a specific frequency band subject to not causing harmful interference to another specified service or to other services allocated in this frequency band, this means also that the former~~this~~ service or stations cannot claim protection from harmful interferencecaused by the latter ~~other~~ service(s) or stations.~~to which the band is allocated under Chapter **SII** of these Regulations.~~

3.4 Conclusion

The discrepancies identified in this contribution between S5.43 and many of the footnotes in Article S5 need to be corrected by WRC-2000. Initial proposals are made to this effect. However, it is also proposed that WRC-2000 adopt a resolution requesting ITU-R to study the sharing situations in the footnotes identified in this contribution and that WRC-03 reviews these situations with a view to clarify the regulatory situations in the corresponding bands and suppressing S5.43. The RRB should also be requested to revise its RoP on the basis of the decisions of the Conference on this issue.

Recent conferences have increasingly used in the footnotes of Article S5, a sentence which is a principle that has guided their decision (“shall not cause harmful interference”). In doing so, it means that the incumbent services (which are “protected” from harmful interference by these few words appearing in a footnote of Article S5), are in fact only protected by the application of Section VI of Article S15, which is the procedure to follow in case harmful interference occurs in practice. Since ITU-R has not defined any technical criteria to define such a level, this means that the whole burden of sharing is left to the administrations without any upfront examination by the Bureau or any guideline for the administration that may cause the interference.

Allocations subject to “not causing harmful interference” therefore do not provide for satisfactory protection of incumbent services, nor provide any status to new services, unless they are coupled with clearly defined criteria. If the current trend was to continue, it would mean that in the long term, the whole Radio Regulations may be reduced to S0.4. It is therefore suggested that a preferable way of making new allocations would be to clarify the obligations of each service and to specify the sharing criteria by appropriate power limitations, whenever possible, and to request ITU-R to conduct the relevant studies necessary to achieve this objective.

Proposals submitted by the following administrations

Germany, Austria, Bosnia and Herzegovina, Denmark, Spain, Estonia, Finland, France, Ireland, Iceland, Italy, Liechtenstein, Norway, Netherlands, San Marino, Slovenia, Sweden, Switzerland

PART 7F

Agenda items 7.1 and PP-98 Resolution 86

Report of the Director BR - Rules of Procedure - S11.44
Resolution 86 (PP-98) - S11.44

Add the following Part 7F in the European common proposals.

1 Background

The above administrations have noted a problem in the application of S11.44 and the Boards Rules of Procedure for the application of this provision.

The second part of paragraph 7.1 of the Rules deals with the case in which the network has not reached the stage where its frequencies can be notified. As is well known, coordination is becoming a very complex and long drawn out process and this is complicated when there are delays by the BR in the publication of the coordination requests. It is not unusual for the coordination process to take a number of years and therefore, it may not be possible to notify before the 5-year period even though the frequencies may been brought into use. No S11.32A provides for the notification of frequencies when the coordination **could not be successfully completed** by requesting BR to do an examination for the probability of harmful interference. In many cases the coordination process has not failed, it just takes more time to complete, and administrations are reluctant to use the provisions of S11.32A, while there is still a chance to complete the bilateral coordination successfully. Another approach to this problem has been to suggest that the technical examination under S11.32A could be deleted and the frequencies could be entered in the MIFR under a revised S11.41. The proposals in this document assume that there is no change to S11.32A.

The last phrase of the 2nd last sentence for rule for paragraph 7.1 ("provided that administration request to the Bureau to apply Nos. **S11.32A** and/or **S11.41**") would seem to indicate that the frequencies will be cancelled at the end of the 5-year period unless the BR is requested to intervene-even if the concerned administrations are continuing to try to resolve the problems. Considering that the intent of the Regulations is to foster the resolution of potential problems by the administrations concerned, the last phrase of this sentence seems to be contrary to the spirit of the Regulations.

For real networks that are in operation and can submit or have submitted the Resolution 49 data, it is necessary to have a regulatory environment that recognizes the real problems and time necessary to resolve all coordination issues. On the one hand it is desirable for administrations to arrive at their own coordination agreements, however, it is necessary that the regulatory status of networks not be left uncertain forever. On the other hand, it is necessary that with the long coordination times (including the publications delays by BR), we find a mechanism of not penalizing “real networks”, therefore, it is suggested that for systems that have been brought into use with the 5-year period, a further period of 2 years be allowed to complete the coordination. This would have the effect of providing a total period of 7 years (including the publication delays by BR) for all networks to complete the coordination. For networks that have received an extension of 2 years under S11.44 they already have 7 years to complete the coordination and to notify the assignments to the BR.

A proposed change to the Rules of Procedure was submitted to the 19th meeting of the RRB and this was not accepted by the RRB, consequently in accordance with No. S13.14 it is proposed to modify No. S11.44 to clarify its application in this type of case.

2 Proposals

MOD EUR/13/381

S11.44 The notified date[1] of bringing into use of any assignment to a space station of a satellite network shall be no later than five years following the date of receipt by the Bureau of the relevant information under No. **S9.1**. The notified date of bringing into use may be extended at the request of the notifying administration by not more than two years, only under the conditions specified under Nos. **S11.44B** to **S11.44I**. Any frequency assignment not brought into use within the required period shall be cancelled by the Bureau after having informed the administration at least three months before the expiry of this period.

ADD EUR/13/382

16 **S11.44.1** [1)]In the case of satellite frequencies that are brought into use prior to the completion of the coordination process and for which the Resolution **49 (WRC-97)** data has been submitted to the Bureau, the network frequencies shall continue to be taken into consideration for a maximum period of 7 years from the date of receipt of the relevant information under No. **S9.1**. If the frequencies have not been notified by the end of this 7-year period, the relevant frequencies shall be cancelled by the Bureau.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 1 to
Addendum 7 to
Document 13-E
10 February 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

ANNEX 1 TO PART 7C OF THE EUROPEAN COMMON PROPOSALS

(APPENDIX S7)

In EUR/13/269, it is proposed to replace the entire text of Appendix S7 by the text attached in Annex 1 of PART 7C of the European Common Proposals. This Annex contains the essential regulatory text derived from Recommendation ITU-R SM.[Doc. 1/1004], together with the modified material from Appendix S5 relating to predetermined coordination distances, as included in Annex 1 of Chapter 7 of the CPM Report. The changes from Document 1/1004 are the following:

1 The deletion of:

– earth station sharing scenarios not covered by the provisions of the Radio Regulations;

– procedures not permitted under the provisions of the Radio Regulations;

– an optional method for determining the horizon gain of earth stations operating to non-geostationary space stations;

– examples and other non-essential texts.

2 The addition of predetermined coordination distances (relocated from Appendix S5).

3 The editorial restructuring of the document into the format used within the Radio Regulations.

APPENDIX S7

Methods for the determination of the coordination area around an earth station in frequency bands between 100 MHz and 105 GHz

1 Introduction

This Appendix addresses the determination of the coordination area (see No. S1.171) around a transmitting or receiving earth station, that is sharing spectrum in frequency bands between 100 MHz and 105 GHz with terrestrial radiocommunication services, or with earth stations operating in the opposite direction of transmission.

The coordination area represents the area surrounding an earth station sharing the same frequency band with terrestrial stations, or the area surrounding a transmitting earth station that is sharing the same bidirectionally allocated frequency band with receiving earth stations, within which the permissible level of interference may be exceeded and hence, coordination is required. The coordination area is determined on the basis of known characteristics for the coordinating earth station and on conservative assumptions for the propagation path and for the system parameters for the unknown terrestrial stations (see Tables 1 and 2 of Annex VII), or the unknown receiving earth stations (Table 3 of Annex VII), that are sharing the same frequency band.

1.1 Overview

This Appendix contains procedures and system parameters for calculating an earth station's coordination area, including predetermined distances.

The procedures allow the determination of a distance in all azimuthal directions around a transmitting or receiving earth station, beyond which the predicted path loss would be expected to exceed a specified value for all but a specified percentage of the time. This distance is called the coordination distance (see No. S1.173). When the coordination distance is determined for each azimuth around the coordinating earth station it defines a distance contour, called the coordination contour (see No. S1.172), that encloses the coordination area.

It is important to note that although the determination of the coordination area is based on technical criteria it represents a regulatory concept. Its purpose is to identify the area within which detailed evaluations of the interference potential need to be performed in order to determine whether the coordinating earth station or any of the terrestrial stations, or in the case of a bidirectional allocation any of the receiving earth stations that are sharing the same frequency band, will experience unacceptable levels of interference. Hence, the coordination area is not an exclusion zone within which the sharing of frequencies between the earth station and other terrestrial stations or earth stations is prohibited, but a means for determining the area within which more detailed calculations need to be performed. In most cases a more detailed analysis will show that sharing within the coordination area is possible since the procedure for the determination of the coordination area is based on unfavourable assumptions with regard to the interference potential.

For the determination of the coordination area, two separate cases may have to be considered:

– for the earth station when it is transmitting and hence capable of interfering with receiving terrestrial stations or earth stations;

– for the earth station when it is receiving and hence it may be the subject of interference from transmitting terrestrial stations.

Calculations are performed separately for great circle propagation mechanisms (propagation mode (1)) and, if required by the sharing scenario (see § 1.4), for scattering from hydrometeors (propagation mode (2)). The coordination contour is then determined using the greater distance predicted by the propagation mode (1) and propagation mode (2) calculations for each azimuth around the coordinating earth station. Separate coordination contours are produced for each sharing scenario. Guidance and examples of the construction of coordination contours, and their component propagation mode (1) and propagation mode (2) contours are provided in § 1.6.

To facilitate bilateral discussion (see No. S9.53 and S9.53.1) it can be useful to calculate additional contours, defining smaller areas, that are based on less conservative assumptions than those used for the calculation of the coordination contour.

1.2 Appendix structure

In this Appendix the general principles are separated from the detailed text on methods. The former is contained in the main body of this Appendix and the latter are contained in a series of annexes, enabling the user to select only those sections that are relevant for a specific sharing scenario.

Table 1 is provided to help the user to navigate through the Appendix and Annexes, it also indicates the relevant sections that need to be explored for a specific coordination case.

TABLE 1

Cross-reference between sharing scenarios and calculation methods

Applicable sections of Appendix S7, Annexes to Appendix S7 ⇩ / haring scenarios of § 1.4 of Appendix S7 ⇨	1.4.1 Earth station operating to a eostationary space station	1.4.2 Earth stations operating to non-eostationary space stations *	1.4.3 Earth stations operating to both eostationary and non-geostationary space tations	1.4.4 Earth stations operating in idirectionally allocated frequency bands	1.4.5 Broadcasting satellite service earth tations	1.4.6 Mobile (except aeronautical mobile) arth stations	1.4.7 Aeronautical mobile earth stations
§ 1.3 Basic concepts	X	X	X	X	X	X	X
§ 1.5 Propagation model concepts and considerations	X	X	X	X	See § 1.4.1, § 1.4.2, § 1.4.3 or § 1.4.4 as applicable and § 1.6	See § 1.4.1, § 1.4.2, § 1.4.3 or § 1.4.4 as applicable and § 1.6	See § 1.4.1, § 1.4.2, § 1.4.3 or § 1.4.4 as applicable and § 1.6
§ 1.6 The coordination contour: concepts and requirements	X	X	X	X			
§ 2.1 The earth stations operate to geostationary space stations	X		X				
§ 2.2 The earth stations operate to non-geostationary space stations		X	X				
§ 3 Determination of the coordination area between earth stations operating in bidirectionally allocated frequency bands				X			
§ 4 General considerations for the determination of the propagation mode (1) required distance	X	X	X	X			
§ 5 General considerations for the determination of the propagation mode (2) required distance	X		X				
Annex I Determination of the required distance for propagation mode (1)	X	X	X	X			
Annex II Determination of the required distance for propagation mode (2)	X		X				
Annex III Antenna gain towards the horizon for earth stations operating to geostationary space stations	X		X				
Annex IV Antenna gain towards the horizon for earth stations operating to non-geostationary space stations		X	X	X			
Annex V Determination of the coordination area for a transmitting earth station with respect to receiving earth stations operating to geostationary space stations in bidirectionally allocated frequency bands				X			
Annex VI Determination of auxiliary contours for propagation mode (2)	X		X				
Annex VII System parameters and predetermined coordination distances for determination of the coordination area around an earth station	X	X	X	X			

* For an earth station using a non-tracking antenna the procedure of § 2.1 is used. For an earth station using a non-directional antenna the procedures of § 2.1.1 are used.

1.3 Basic concepts

Determination of the coordination area is based on the concept of the permissible interference power at the antenna terminals of a receiving terrestrial station or earth station. Hence, the attenuation required to limit the level of interference between a transmitting terrestrial station or earth station and a receiving terrestrial station or earth station to the permissible interference power for *p*% of the time is represented by the "minimum required loss". Where, the minimum required loss is the loss that needs to be equalled or exceeded by the predicted path loss for all but *p*% of the time*.

For propagation mode (1) the following equation applies:

$$L_b(p) = P_t + G_t + G_r - P_r(p) \qquad \text{dB} \tag{1}$$

where

- p: the maximum percentage of time for which the permissible interference power may be exceeded;
- $L_b(p)$: the propagation mode (1) minimum required loss (dB) for *p*% of the time; this value must be exceeded by the propagation mode (1) predicted path loss for all but *p*% of the time;
- P_t: the maximum available transmitting power level (dBW) in the reference bandwidth at the terminals of the antenna of a transmitting terrestrial station or earth station;
- $P_r(p)$: permissible interference power of an interfering emission (dBW) in the reference bandwidth to be exceeded for no more than *p*% of the time at the terminals of the antenna of a receiving terrestrial station or earth station that may be subject to interference, where the interfering emission originates from a single source;
- G_t: the gain (dB relative to isotropic) of the antenna of the transmitting terrestrial station or earth station. For a transmitting earth station, this is the antenna gain towards the physical horizon on a given azimuth; for a transmitting terrestrial station, the maximum main beam axis antenna gain is to be used;
- G_r: the gain (dB relative to isotropic) of the receiving antenna of the terrestrial or earth station that may be subject to interference. For a receiving earth station, this is the gain towards the physical horizon on a given azimuth; for a receiving terrestrial station, the maximum main beam axis antenna gain is to be used.

For propagation mode (2), a volume scattering process is involved and a modification of the above approach is necessary. Where the coordinating earth station antenna beam intersects a rain cell, a common volume may be formed with a terrestrial station beam or an earth station beam (operating in the opposite direction of transmission in bidirectionally allocated frequency bands). In the case of a terrestrial station, the assumptions are made that the terrestrial station beamwidth is relatively large in comparison with that of the coordinating earth station (terrestrial station gain values are given in Tables 1 and 2 of Annex VII) and that the terrestrial station is some distance from the common volume. The terrestrial station beam is therefore assumed to illuminate the whole rain cell, which is represented by a vertical cylinder filled with hydrometeors that give rise to isotropically

* When *p* is a small percentage of the time, in the range 0.001% to 1.0%, the interference is referred to as "short-term"; if *p* ≥ 20%, it is referred to as "long-term" (see § 1.5.3).

scattered signals. This scattering process may give rise to unwanted coupling between the coordinating earth station and terrestrial stations or earth stations operating in bidirectionally allocated frequency bands, via the common volume.

The earth station antenna gain and its beamwidth are inter-dependent. The size of the common volume, and the number of scattered signals arising within that volume, increases as the gain of the earth station antenna transmitting or receiving those signals decreases, the one effect compensating for the other. A term which approximates the full integral required to evaluate the volume scattering process within the earth station antenna beam is included in equation II-21. Therefore in the procedure for evaluation of interference that may arise from propagation mode (2) mechanisms a simplifying assumption can be made that the path loss is independent of the earth station antenna gain[1].

Hence for propagation mode (2), equation (1) reduces to:

$$L_x(p) = P_t + G_x - P_r(p) \qquad \text{dB} \tag{2}$$

where

$L_x(p)$: is the minimum loss required for propagation mode (2).

G_x: is the maximum antenna gain (dBi) assumed for the terrestrial station. Tables 1 and 2 of Annex VII give values of G_x for the various frequency bands.

To facilitate the calculation of propagation mode (2) auxiliary contours (see § 1.6.2.2) the calculation is further modified by placing the terrestrial network antenna gain G_x within the iterative loop for the propagation mode (2) required loss calculations[2].

Hence equation (2) further reduces to:

$$L(p) = P_t - P_r(p) \qquad \text{dB} \tag{3}$$

where

$L(p)$: the propagation mode (2) minimum required loss (dB) for p% of the time; this value must be exceeded by the propagation mode (2) predicted path loss for all but p% of the time.

For both modes of propagation, P_t and $P_r(p)$ are defined for the same radio-frequency bandwidth (the reference bandwidth). Further $L_b(p)$, $L(p)$ and $P_r(p)$ are defined for the same small percentage of the time, and that these values are set by the performance criteria of the receiving terrestrial, or receiving earth station, that may be subject to interference.

For an earth station operating to geostationary space stations, Annex III provides the numerical method for determining the minimum angle between the earth station antenna main beam axis and the physical horizon as a function of azimuth, and the corresponding antenna gain. In the case of a

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[1] If the earth station antenna has a wide beamwidth, the method can still be used to determine the propagation mode (2) contour. However, the fact that the antenna beam may be wider than the rain cell and hence not actually fully filled with hydrometeors will mean that the interference potential may be slightly over-estimated.

[2] See equation II-21.

space station in a slightly inclined geostationary orbit, the minimum elevation angle and corresponding horizon gain will depend on the maximum inclination angle to be coordinated.

For an earth station operating to non-geostationary space stations, the antenna gain in the direction of the horizon of the earth station varies as a function of time and Annex IV provides the numerical methods for its determination.

For an earth station operating in a frequency band with a bidirectional allocation, the antenna gain to be used in determining the propagation mode (1) minimum required loss is calculated using the methods in Annex III, or Annex IV, as appropriate.

Determination of the coordination area requires the calculation of the predicted path loss and its comparison with the minimum required loss, for every azimuth around the coordinating earth station, where:

1) the predicted path loss, is dependent on several factors including the length and general geometry of the interfering path (e.g., antenna pointing, horizon elevation angle), antenna directivity, radio climatic conditions, and the percentage of the time during which the predicted path loss is less than the minimum required loss; and

2) the minimum required loss is based on system and interference model considerations.

The required coordination distance is the distance at which these two losses are considered to be equal for the stated percentage of time.

In determining the coordination area the pertinent parameters of the coordinating earth station are known, but knowledge of the terrestrial stations or other earth stations sharing that frequency range is limited. Hence it is necessary to rely on assumed system parameters for the unknown terrestrial stations or the unknown receiving earth stations. Further, many aspects of the interference path between the coordinating earth station and the terrestrial stations or other earth stations (e.g. antenna geometry and directivity) are unknown.

The determination of the coordination area is based on unfavourable assumptions regarding system parameter values and interference path geometry. However, in certain circumstances, to assume that all the worst-case values will occur simultaneously is unrealistic, and leads to unnecessarily large values of minimum required loss. This could lead to unnecessarily large coordination areas. For propagation mode (1) detailed analyses, supported by extensive operational experience, have shown that the requirement for the propagation mode (1) minimum required loss can be reduced because of the very small probability that the worst case assumptions for system parameter values and interference path geometry will exist simultaneously. Therefore a correction is applied within the calculation for the propagation mode (1) predicted path loss in the appropriate sharing scenario to allow benefit to be derived from these mitigating effects. The application of this correction factor is described in more detail in § 4.4.

This correction applies to cases of coordination with the fixed service. It is frequency, distance and path dependent. It does not apply in the case of the coordination of an earth station with mobile stations, or with other earth stations operating in the opposite direction of transmission, nor in the case of propagation via hydrometeor scatter (propagation mode (2)).

A number of propagation models are used to cover the propagation mechanisms that exist in the full frequency range. These models predict the path loss as a monotonically increasing function of distance. Therefore, coordination distances are determined by calculating the path loss iteratively for an increasing distance until either the minimum required loss is achieved, or a maximum calculation distance limit is reached (see § 1.5.3).

The iteration method always starts at a defined value of minimum distance, d_{min} in km, and iteration is performed using a uniform step size (*s* km) for increasing the distance, a step size of 1 km is recommended.

1.4 Sharing scenarios

The following subsections describe the basic assumptions made for the various earth station sharing scenarios. These subsections need to be read in conjunction with the information contained in Table 1 and § 1.6 which contains guidance on the development of a coordination contour.

1.4.1 Earth stations operating to geostationary space stations

For an earth station operating to a space station in the geostationary orbit, the space station appears to be stationary with respect to the Earth. However variations in gravitational forces acting on the space station and limitations in positional control mean a geostationary space station's orbital parameters are not constant. Movement from the space station's nominal orbital position in an east/west direction (longitudinal tolerance) is limited within the Radio Regulations (see No. S22.6 to No. S22.18), but movement in the north/south direction (inclination excursion) is not specified.

Relaxation in the north/south station-keeping of a geostationary space station allows its orbit to become inclined with an inclination that increases gradually with time. Therefore the determination of the coordination area requires consideration of the range of movement of the earth station antenna. Although the direction of pointing of the earth station antenna may in practice vary with time, the earth station antenna may also be pointing in one direction for considerable periods of time. Hence the gain of the earth station antenna in the direction of the horizon is assumed to be constant. For an earth station operating to a space station in an orbit as described above, an assumption of constant horizon gain as the inclination angle increases may lead to a conservative estimation of the coordination area, the degree of conservatism increases with increasing inclination angle.

For an earth station operating to a geostationary space station the coordination area is determined using the procedures described in § 2.1.

1.4.2 Earth stations operating to non-geostationary space stations

Earth stations operating to a non-geostationary space station may use a directional or a non-directional antenna. Furthermore, earth stations using a directional antenna may track the orbital path of a non-geostationary space station.

While an earth station operating to a geostationary space station is assumed to have a constant antenna gain towards the horizon, for an earth station antenna that is tracking the orbital path of a non-geostationary space station, the antenna gain towards the horizon will vary with time. Therefore, it is necessary to estimate the variation of the antenna gain with time towards the horizon for each azimuth in order to determine the coordination area. The procedure is described in § 2.2.

For an earth station operating to a non-geostationary space station, the motion of a relatively high gain tracking antenna reduces the probability of interference due to propagation mode (2) mechanisms and hence the propagation mode (2) required distances will be relatively short. The minimum coordination distance d_{min} (see § 1.5.3) will provide adequate protection in these cases. The propagation mode (2) contour is therefore taken to be identical to a circle represented by the minimum coordination distance. Propagation mode (2) calculations are not required in these circumstances and the coordination area is determined using the propagation mode (1) procedure in § 2.2 only.

For an earth station operating to a non-geostationary space station using a non-directional antenna, a similar situation applies, and the low gain means that propagation mode (2) required distances will be less than the minimum coordination distance. Hence for the case of non-directional antenna the propagation mode (2) contour is also coincident with the circle represented by d_{min}, and the coordination area is determined using the propagation mode (1) procedures described in § 2.1.1, only.

For an earth station operating to a non-geostationary space station using a non-tracking directional antenna, the potential for interference arising from propagation mode (2) is identical to an earth station operating to a geostationary space station. Hence, for the case of non-tracking directional antenna the coordination area is determined using both the propagation mode (1) and propagation mode (2) procedures described in § 2.1.

1.4.3 Earth stations operating to both geostationary and non-geostationary space stations

For earth stations that are sometimes intended to operate to geostationary space stations and at other times to non-geostationary space stations, separate coordination areas are determined for each type of operation. In such cases, the coordination area for the geostationary space station is determined using the procedures described in § 2.1 and, in addition, the coordination area for the non-geostationary space station is determined using the procedure described in § 2.2.

1.4.4 Earth stations operating in bidirectionally allocated frequency bands

For earth stations operating in some frequency bands there may be equal primary allocations to space services operating in both the Earth-to-space and space-to-Earth directions. In this case, where two earth stations are operating in opposite directions of transmission it is only necessary to establish the coordination area for the transmitting earth station, as receiving earth stations will automatically be taken into consideration. Hence, a receiving earth station operating in a bidirectionally allocated frequency band will only be involved in coordination with a transmitting earth station if it is located within the transmitting earth station's coordination area.

For a transmitting earth station operating to either geostationary or non-geostationary satellites in a bidirectionally allocated frequency band, the coordination area is determined using the procedures described in § 3.

1.4.5 Broadcasting-satellite service earth stations

For earth stations in the broadcasting-satellite service operating in the unplanned bands, the coordination area is determined by extending the periphery of the specified service area, within which the earth stations are operating, by the coordination distance which is based on a typical BSS earth station. In calculating the coordination distance no additional protection can be assumed to be available from the earth station horizon elevation angle, i.e. $A_h = 0$ dB in Annex I, for all azimuth angles around the earth station.

1.4.6 Mobile (except aeronautical mobile) earth stations

For a mobile (except aeronautical mobile) earth station, the coordination area is determined by extending the periphery of the specified service area, within which the mobile (except aeronautical mobile) earth stations are operating, by the coordination distance. The coordination distance may be represented by a predetermined coordination distance (see § 4 of Annex VII), or it may be calculated. In calculating the coordination distance no additional protection can be assumed to be available from the earth station horizon elevation angle, i.e. $A_h = 0$ dB in Annex 1, for all azimuth angles around the earth station.

1.4.7 Aeronautical mobile earth stations

For aeronautical mobile earth stations the coordination area is determined by extending the periphery of the specified service area, within which the aeronautical mobile earth station operates, by an appropriate predetermined coordination (see § 4 of Annex VII) distance for the respective services.

1.5 Propagation model concepts

For each mode of propagation, according to the requirements of the specific sharing scenario (see § 1.4) it is necessary to determine the predicted path loss. The determination of this predicted path loss is based on a number of propagation mechanisms.

Interference may arise through a range of propagation mechanisms whose individual dominance depends on climate, radio frequency, time percentage of interest, distance and path topography. At any one point in time, one or more mechanisms may be present. The propagation mechanisms that are considered within this Appendix in the determination of the interference potential are as follows:

– *Diffraction*: In as far as it relates to diffraction losses occurring over the earth station's local physical horizon. This effect is referred to below as "site shielding". The remainder of the path along each radial is considered to be flat and therefore free of additional diffraction losses.

– *Tropospheric scatter*: This mechanism defines the "background" interference level for paths longer than about 100 km beyond which the diffraction field becomes very weak.

– *Surface ducting*: This is the most important short-term interference mechanism over water and in flat coastal land areas, and can give rise to high signal levels over longer distances, sometimes more than 500 km. Such signals can exceed the equivalent "free-space" level under certain conditions.

– *Elevated layer reflection and refraction*: The treatment of reflection and/or refraction from layers at heights up to a few hundred metres is an important mechanism that enables signals to by-pass any diffraction losses due to the underlying terrain under favourable path geometry situations. Again the impact can be significant over long distances.

– *Hydrometeor scatter*: Hydrometeor scatter can be a potential source of interference between terrestrial link transmitters and earth stations because it may act isotropically, and can therefore have an impact irrespective of whether the common volume is on or off the great-circle interference path between the coordinating earth station and terrestrial stations, or receiving earth stations operating in bidirectionally allocated frequency bands.

In this Appendix propagation phenomena are classified into two modes as follows:

– *Propagation mode (1)*: propagation phenomena in clear air, (tropospheric scatter, ducting, layer reflection/refraction, gaseous absorption and site shielding). These phenomena are confined to propagation along the great-circle path;

– *Propagation mode (2)*: hydrometeor scatter.

1.5.1 Propagation mode (1)

For the determination of the propagation mode (1) required distances, the applicable frequency range has been divided into three parts:

– For VHF/UHF frequencies between 100 MHz and 790 MHz and for time percentages from 1% to 50% of an average year.

– From 790 MHz to 60 GHz and for time percentages from 0.001% to 50% of an average year.

– From 60 GHz to 105 GHz and for time percentages from 0.001% to 50% of an average year.

The variation in predicted path loss due to the horizon elevation angle around an earth station is calculated by the method described in § 1 of Annex I using the horizon elevation angles and distances along different radials from the earth station. For all frequencies between 100 MHz and 105.0 GHz the attenuation arising from the horizon characteristics is included in the value of propagation mode (1) predicted path loss, unless its use is specifically prohibited for a particular sharing scenario (see § 1.4.5, § 1.4.6, § 1.4 and § 1.4.9).

In the determination of the propagation mode (1) required distance, the world is divided into four basic radio-climatic zones. These zones are defined as follows.

– Zone A1: coastal land, i.e. land adjacent to a Zone B or a Zone C area (see below), up to an altitude of 100 m relative to mean sea or water level, but limited to a maximum distance of 50 km from the nearest Zone B or Zone C area; in the absence of precise information on the 100 m contour, an approximation (e.g. 300 feet) may be used. Large inland areas of at least 7 800 km^2 which contain many small lakes, or a river network, comprising more than 50% water, and where more than 90% of the land is less than 100 m above the mean water level may be included in Zone A1*.

– Zone A2: all land, other than coastal land as defined in Zone A1 above.

– Zone B: “cold” seas, oceans and large bodies of inland water situated at latitudes above 30^o, with the exception of the Mediterranean Sea and the Black Sea. A “large” body of inland water is defined, for the administrative purpose of coordination, as one having an area of at least 7 800 km^2, but excluding the area of rivers. Islands within such bodies of water are to be included as water within the calculation of this area if they have elevations lower than 100 m above the mean water level for more than 90% of their area. Islands that do not meet these criteria should be classified as land for the purposes of calculating the area of the water.

– Zone C: “warm” seas, oceans and large bodies of inland water situated at latitudes below 30^o, as well as the Mediterranean Sea and the Black Sea.

1.5.2 Propagation mode (2)

For the determination of the propagation mode (2) required distance, interference arising from hydrometeor scatter can be ignored at frequencies below 1 000 MHz and above 40.5 GHz outside the minimum coordination distance (see § 1.5.3.1). Below 1 000 MHz the level of the scattered signal is very low and above 40.5 GHz, although significant scattering occurs, the scattered signal is then highly attenuated on the path from the scatter volume to the receiving terrestrial station or earth station. Site shielding is not relevant to propagation mode (2) mechanisms as the interference path is via the main beam of the coordinating earth station antenna.

* These additional areas may be declared as coastal Zone A1 areas by Administrations for inclusion in the ITU Digital World Map (IDWM).

1.5.3 Distance limits

The effect of interference on terrestrial and space systems often needs to be assessed by considering long and short term interference criteria. These criteria are generally represented by a permissible interference power not to be exceeded for more than a specified percentage of time.

The long-term criterion (typically associated with percentages of time ≥ 20%) protects the error performance objective (for digital systems) or noise performance objective (for analogue systems) objectives to meet specified long-term interference criteria. This criterion will generally represent a low level of interference and hence require a high degree of isolation between the coordinating earth station and terrestrial stations, or receiving earth stations operating in bidirectionally allocated bands.

The short-term criterion is a higher level of interference, typically associated with time percentages in the range 0.001% to 1% of time, which will either make the interfered-with system unavailable, or cause its specified short-term interference objectives (error rate or noise) to be exceeded.

This Appendix addresses only the protection of the short-term criterion. There is therefore an implicit assumption that if the short-term criterion is satisfied, then any associated long-term criteria will also be satisfied. This assumption may not remain valid at short distances because additional propagation effects (diffraction, building/terrain scattering etc.) requiring a more detailed analysis become significant. A minimum coordination distance is therefore needed to avoid this difficulty. This minimum coordination distance is always the lowest value of coordination distance used. At distances equal to or greater than the minimum coordination distance, it can be assumed that interference due to continuous (long-term) propagation effects will not exceed levels permitted by the long-term criteria.

In addition to the minimum coordination distance, it is also necessary to set an upper limit to the calculation distance. Hence the coordination distance, on any azimuth, must lie within the range between the minimum coordination distance and the maximum calculation distance.

1.5.3.1 Minimum coordination distance

For reasons stated in § 1.5.3 it is necessary to set a lower limit to the coordination distance (d_{min}). The iterative calculation of the coordination distance starts at this specified minimum distance and this distance varies according to radio-meteorological factors and the frequency band, (see § 4.2). The same minimum coordination distance applies to both propagation mode (1) and propagation mode (2) calculations.

1.5.3.2 Maximum calculation distance

Maximum calculation distances are required for propagation modes (1) and (2). In the case of mode (1) this distance corresponds to the maximum coordination distance, d_{max1}, given in § 4.3 for each of the four radioclimatic Zones. The propagation mode (1) maximum calculation distance is therefore dependent on the mixture of radioclimatic Zones in the propagation path. This dependency is described in § 4.3.

The maximum calculation distance for propagation mode (2) is given in § 2 of Annex II.

1.6 The coordination contour: concepts and construction

The coordination distance, determined for each azimuth around the coordinating earth station, defines the coordination contour that encloses the coordination area. The coordination distance lies within the range defined by the minimum coordination distance and the maximum calculation distance.

In this Appendix the procedures determine the distance at which the minimum required loss is equal to the predicted path loss. In addition some procedures[3] require that, for any azimuth, the greater of the distances determined for propagation mode (1) and propagation mode (2) is the distance to be used in determining the coordination contour. In both these cases, the distance at which the minimum required loss is equal to the predicted path loss may or may not be within the range of valid values that define the limits for the coordination distance. Hence the distance determined from the application of all the procedures is referred to as the required distance.

The coordination area is determined by one of the following methods:

– calculating, in all directions of azimuth from the earth station, the coordination distances and then drawing to scale on an appropriate map the coordination contour; or

– extending the service area in all directions by the calculated coordination distance(s); or

– for some services and frequency bands extending the service area in all directions by a predetermined coordination distance.

Where a coordination contour includes the potential interference effects arising from both propagation mode (1) and propagation mode (2), the required distance used for any azimuth is the greater of the propagation mode (1) and propagation mode (2) required distances.

The sharing scenarios and the various procedures contained in this Appendix are based on different assumptions. Hence the coordination area developed for one sharing scenario is likely to be based on different sharing considerations, interference paths and operational constraints than the coordination area developed under a different sharing scenario. Separate coordination areas are therefore required for each sharing scenario described in § 1.4. and each coordination area is specific to the radiocommunication services covered by the sharing scenario under which it was developed. Further, the coordination area developed for one sharing scenario cannot be used to determine the extent of any impact on the radiocommunication services covered by a different sharing scenario. Thus a coordinating earth station operating in a bidirectionally allocated frequency band and also sharing with terrestrial stations will have two separate coordination areas:

– one coordination area for determining those administrations with terrestrial services that may be affected by the operation of the coordinating earth station; and

– one coordination area for determining those administrations with receiving earth stations that may be affected by the operation of the coordinating (transmitting) earth station.

This means that the establishment of the coordination area for an earth station will generally require the determination of several individual coordination areas, each drawn on a separate map.

In addition separate coordination contours are produced if the earth station both transmits and receives in bands shared with terrestrial services. However, for earth stations in bidirectionally allocated frequency bands, the coordination contours with respect to other earth stations are only produced for a transmitting earth station (see § 1.4.4).

An example of the coordination area for each of the sharing scenarios in § 1.4 is provided in Figure 1. It will be noticed that for some of the sharing scenarios there is a commonality to the construction of the coordination contour (shown by a solid line) that encompasses each coordination area. For those sharing scenarios where both propagation mode (1) and propagation mode (2)

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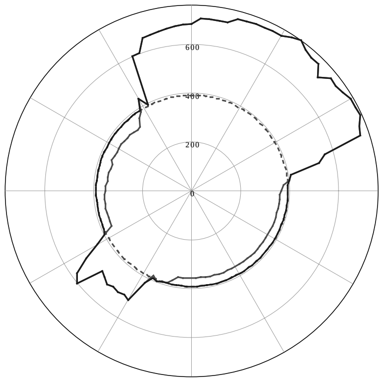
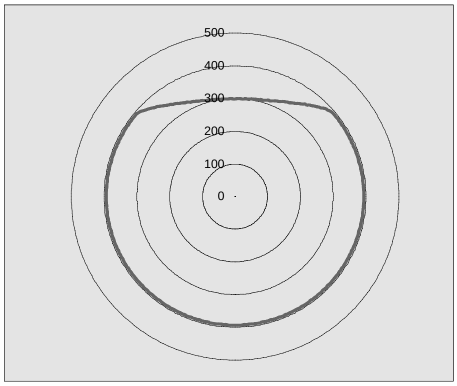
[3] The same procedures are also used to develop supplementary and auxiliary contours (see § 1.6.1 and § 1.6.2).

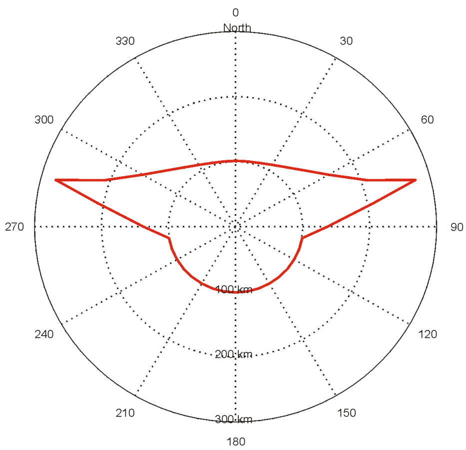
interference paths need to be taken into consideration, the parts of the propagation mode (1) contour and that part of the propagation mode (2) contour located within the overall coordination contour may be drawn using dashed lines.



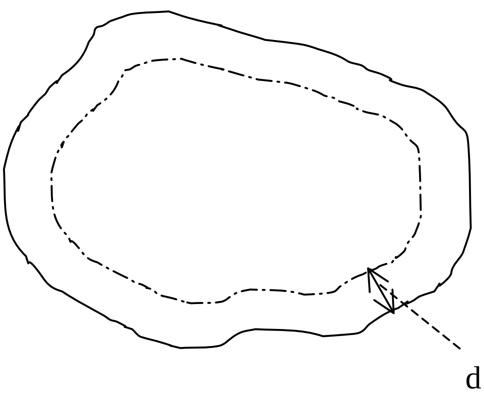
The coordination contour is an example of an earth station operating to a GSO space station in § 1.4.1 and § 1.4.3. The coordination contour is marked by the outer line and is comprised of a propagation mode (1) contour and a circular propagation mode (2) contour. The propagation mode (1) contour could also be an example of an earth station with a non-tracking directional antenna operating to a non-GSO space station in § 1.4.2.



The coordination contour is an example of an earth station with a tracking antenna operating to a non-GSO space station in § 1.4.2 and § 1.4.3.



The coordination contour is an example of an earth station operating in bidirectionally allocated frequency bands in § 1.4.4. The coordination contour has been developed from a propagation mode (1) contour for a coordinating earth station operating to a non-GSO space station with respect to unknown earth stations operating to GSO space stations. For a propagation mode (2) contour for the GSO-GSO case see Annex V.



The coordination contour is an example of an earth station operating in a specified service area in § 1.4.5, § 1.4.6, § 1.4.7. The coordination contour is marked by the solid outer line and the specified service area by the broken inner line. The coordination distance, d, may be a constant value, or vary with azimuth, depending on the sharing scenario and the type of radiocommunication service.

FIGURE 1

Examples of coordination contours for the sharing scenarios listed in § 1.4

In addition to the coordination contour, supplementary contours (see No. S9.53.1) and auxiliary contours (see § 1.6.1 and § 1.6.2) may be drawn to facilitate more detailed sharing discussions. Supplementary contours are based on the coordinating earth station sharing frequency bands with other radiocommunication services, or other types of radio systems in the same service, that have less onerous sharing criteria than the radio system used for developing the coordination area. These supplementary contours may be developed by the same method used to determine the coordination contour, or by other methods as agreed on a bilateral basis between administrations. Auxiliary contours are based on less conservative assumptions, with regard to the interference path and operational constraints, for the unknown terrestrial stations, or earth stations. Auxiliary contours are developed separately for propagation mode (1) and propagation mode (2) interference paths. In this context, the contours from which the coordination contour was developed are called main contours, and the auxiliary contours for propagation mode (1) and propagation mode (2) are referenced to the appropriate main contour. The variations in the assumptions used for developing auxiliary contours to the propagation mode (1) contour, or the propagation mode (2) contour, can also be applied to supplementary contours. Hence, auxiliary contours may be drawn for both a main, or a supplementary, contour.

Supplementary contours are always drawn on a separate map as they apply to other types of radio system within the same radiocommunication service, or to radio systems in different radiocommunication services. However, as auxiliary contours apply to variations in the assumptions used in developing the main, or supplementary, contour they are always drawn on the same map that contains the corresponding main, or supplementary, contour.

While the use of supplementary or auxiliary contours allows less conservative assumptions with regard to the interference path and operational constraints to be taken into consideration, earth stations may transmit or receive a variety of classes of emissions. Hence, the earth station parameters to be used in the determination of the coordination contour, and any supplementary or auxiliary contours, are those which lead to the greatest distances for each earth station antenna beam and each allocated frequency band which the coordinating earth station shares with other radiocommunication systems.

1.6.1 Supplementary contours

The coordination area is determined with respect to the type of terrestrial station (or in a frequency band with a bidirectional space allocation, an earth station operating in the opposite direction of transmission) that would yield the largest coordination distances. Therefore, in the case of terrestrial services: fixed stations using tropospheric scatter have been assumed to be operating in frequency bands that may typically be used by such radiocommunication systems; and fixed stations operating in line-of-sight configurations and using analogue modulation have been assumed to be operating in other frequency bands. However, other radiocommunication systems (e.g. other terrestrial stations), that have typically lower antenna gains, or otherwise less stringent system parameters, than those on which the coordination area is based, may also operate in the same frequency range. Therefore it is possible for the coordinating administration to identify a supplementary contour using either the methods in § 2 or § 3, where they are applicable, or other agreed methods. Subject to bilateral agreement between administrations, these supplementary contours can assume the role of the coordination contour for an alternative type of radio system in the same services, or another radiocommunication service.

When a supplementary contour is to be developed for other types of systems, for example digital fixed systems, the necessary system parameters may be found in one of the adjacent columns in Tables 1, 2 and 3 of Annex VII. If no suitable system parameters are available then the value of the permissible interference power ($P_r(p)$) may be calculated using equation (1) of § 2 in Annex VII.

In addition, supplementary contours may be prepared by the administration seeking coordination to define smaller areas, based on more detailed methods, for consideration when agreed bilaterally between the concerned administrations. These contours can be a useful aid to the rapid exclusion of terrestrial stations or earth stations from further consideration. Supplementary contours may be comprised of propagation mode (1) interference paths and, depending on the sharing scenario, propagation mode (2) interference paths. In addition, the propagation mode (1) element of a supplementary contour may, if appropriate for the radiocommunication service, utilise the same level of correction factor (see § 4.4) that was applied in the determination of the coordination contour. However, all parts of each supplementary contour must fall on or between the contour defined by the minimum coordination distance and the corresponding propagation mode (1) or propagation mode (2) main contour.

1.6.2 Auxiliary contours

Practical experience has shown that, in many cases, the separation distance required for the coordinating earth station, on any azimuth, can be substantially less than the coordination distance since the worst-case assumptions do not apply to every terrestrial station or earth station. There are two main mechanisms that contribute to the difference between the separation distance in this context and the coordination distance:

– the terrestrial station antenna gain (or e.i.r.p.), or receiving earth station antenna gain, in the direction of the coordinating earth station is less than that assumed in calculating the coordination contour;

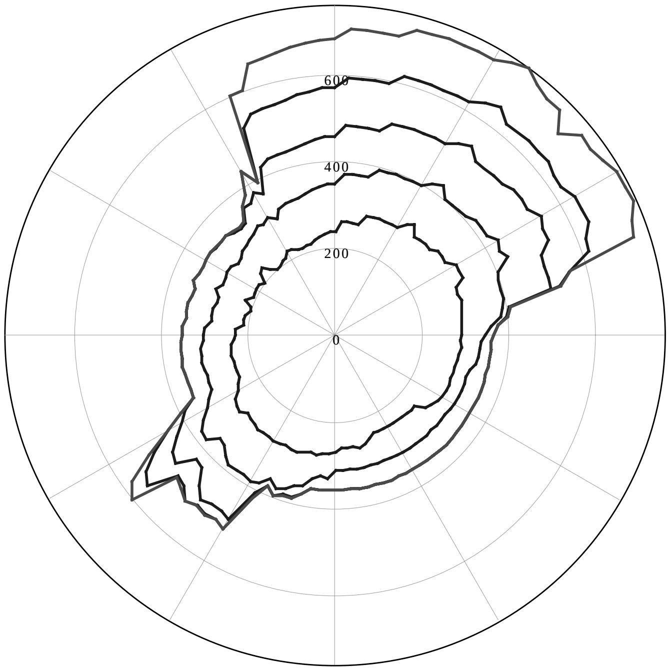
– appropriate allowance can be made, for example, for the effects of site shielding not included in the coordination distance calculations.

Auxiliary contours must use the same method as that used to determine the corresponding main or supplementary contour. In addition all parts of each auxiliary contour must fall on or between the contour defined by the minimum coordination distance and the corresponding main or supplementary contour. Auxiliary contours may assist in the elimination from detailed coordination of terrestrial stations or earth stations that are located in the coordination area and hence have been identified as potentially affected by the coordinating earth station. Any terrestrial station or earth station that lies outside an auxiliary contour and has an antenna gain towards the coordinating earth station that is less than the gain represented by the relevant auxiliary contour need not be considered further as a significant source, or subject, of interference.

1.6.2.1 Auxiliary contours for propagation mode (1)

Propagation mode (1) auxiliary contours are calculated with values for the propagation mode (1) minimum required loss, in equation (22) in § 4.4, that are progressively reduced by 5, 10, 15, 20 dB, etc., below the value assumed in Tables 1, 2 and 3 of Annex VII for the corresponding main or supplementary propagation mode (1) contour, until the minimum coordination distance is reached. Propagation mode (1) auxiliary contour distances are calculated without the correction factor (see § 4.4), and hence could be larger, on any azimuth, than the corresponding main, or supplementary, propagation mode (1) distance. To prevent this happening, in those cases where a correction factor applies to the main or supplementary contour, the maximum propagation mode (1) auxiliary contour distances on any azimuth is limited to the corresponding main or supplementary propagation mode (1) distance. In effect this means that the correction factor will limit the possible range of auxiliary contour values so that only those auxiliary contours with values greater than the applied correction factor will be shown within the main, or supplementary, contour (see Figure 2). For example, if the value of correction factor applicable to the propagation mode (1) main, or supplementary, contour is 10 dB, then the first auxiliary contour drawn would be for a reduction in minimum required loss of 5 dB and hence the auxiliary contour value would be –15 dB (by convention auxiliary contours are shown as negative quantities as they represent a reduction in the terrestrial, or receiving earth station, antenna gain, or the terrestrial station e.i.r.p).

Propagation mode (2) interference effects may still need to be considered even if propagation mode (1) interference effects have been eliminated from detailed coordination, as the propagation models are based on different interference mechanisms.



The propagation mode (1) auxiliary contours are shown for –10, –20, –30 and –40 dB adjustments in the minimum required loss.

FIGURE 2

Propagation mode (1) main contour and auxiliary contours

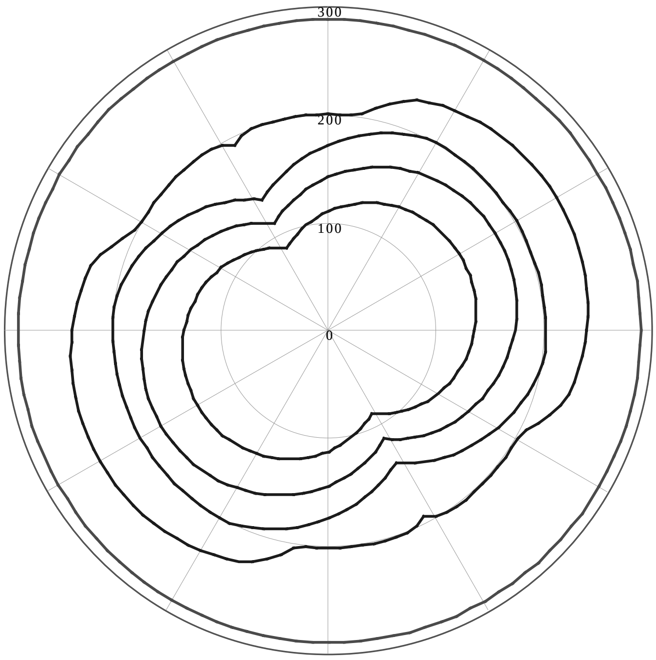
1.6.2.2 Auxiliary contours for propagation mode (2)

The propagation mode (2) contour around an earth station is calculated assuming the main beams of the coordinating earth station and the terrestrial station intersect exactly (see § 1.3). However, it is unlikely that these antenna main beams will intersect exactly. It is therefore possible to generate propagation mode (2) auxiliary contours that take account of any offset in the pointing of the terrestrial station antenna beam from the direction of the coordinating earth station. This offset would result in partial beam intersections and hence a reduced interference potential. These propagation mode (2) auxiliary contours are calculated according to the method described in Annex VI.

Propagation mode (2) auxiliary contours are not generated for different values of antenna gain or e.i.r.p. but for different values of beam avoidance angle. Hence, if there is a need to consider both a lower value of antenna gain, or e.i.r.p., for the terrestrial station and propagation mode (2) auxiliary contours, it is first essential to consider the impact of the reduction in antenna gain, or e.i.r.p., on the propagation mode (2) contour. This is achieved by generating a supplementary contour (see § 1.6.1) corresponding to the lower value of antenna gain or e.i.r.p. for the terrestrial station, which is drawn on a separate map. Auxiliary mode (2) contours can then be generated inside this propagation mode (2) supplementary contour for different values of the beam avoidance angle. Hence, propagation mode (2) auxiliary contours may be most frequently applied in conjunction with a supplementary contour rather than with the coordination contour.

The correction factor discussed in § 1.3 does not apply to propagation mode (2) interference paths and hence is also not applicable to propagation mode (2) auxiliary contours. In addition propagation mode (2) auxiliary contours cannot be developed for the bidirectional case.

Propagation mode (2) auxiliary contours are prepared for appropriate values of terrestrial station main beam avoidance angle (see Figure 3). When the antenna characteristics of the terrestrial stations are known, the appropriate antenna pattern[4] should be used when determining the propagation mode (2) auxiliary contours. If this not available, the reference antenna pattern given in § 3 of Annex VI may be used.



The propagation mode (2) auxiliary contours are shown for terrestrial station main beam avoidance angles of 2.0, 2.7, 3.2 and 4.0 degrees respectively.

FIGURE 3

Propagation mode (2) main contour and auxiliary contours

2 Determination of the earth station coordination area with respect to terrestrial stations

This section contains the procedures for determining the coordination area for the case of earth stations sharing frequency bands with terrestrial stations. These procedures cover the cases for earth

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[4] The method requires the antenna pattern to be monotonic in terms of the reduction in gain either side of the main beam axis.

stations operating to space stations in the geostationary orbit, or in non-geostationary orbits, and are described in the following subsections.

For earth stations operating to space stations in non-geostationary orbits, consideration has to be given to the potential time-varying nature of the earth station's antenna gain towards the horizon.

2.1 The earth stations operate to geostationary space stations

For an earth station operating to a geostationary space station the value of G_t and G_r towards the horizon is considered to be constant with time. The percentage of time associated with L_b in equation (1) is the same as the time percentage, p, associated with $P_r(p)$. When determining the coordination area between a coordinating earth station operating to a geostationary space station and terrestrial systems, the coordination distance on any azimuth is the greater of the propagation mode (1) and propagation mode (2) required distances. The required distances for propagation mode (1) and propagation mode (2) are determined using the procedures described in § 2.1.1 and § 2.1.2 respectively, after taking into consideration the following discussion on station-keeping.

When the north/south station-keeping of a geostationary space station is relaxed, the orbit of the space station becomes inclined with an inclination that increases gradually with time. This movement of the space station from its nominal position may require small corresponding adjustments in the elevation angle of the earth station antenna beam. Hence, to avoid considering the time variation in antenna gain in the direction of the horizon, the coordination area of an earth station operating to a space station in a slightly inclined geostationary orbit is determined for the minimum angle of elevation and the associated azimuth at which the space station is visible to the earth station (see Annex III).

2.1.1 Determination of the coordinating earth station's propagation mode (1) contour

Determination of the propagation mode (1) contour is based on great circle propagation mechanisms and it is assumed, for the interference path, that all the terrestrial stations are pointing directly at the coordinating earth station's location. The required distance, on each azimuth, for propagation mode (1) is that distance which will result in a value of propagation mode (1) predicted path loss that is equal to the propagation mode (1) minimum required loss, $L_b(p)$ dB, as defined in § 1.3.

$$L_b(p) = P_t + G_e + G_x - P_r(p) \qquad \text{dB} \qquad (4)$$

where

- P_t: and $P_r(p)$ are as defined in § 1.3;
- G_e: the gain of the coordinating earth station antenna (dBi) towards the horizon at the horizon elevation angle and azimuth under consideration;
- G_x: the maximum antenna gain (dBi) assumed for the terrestrial station. Tables 1 and 2 of Annex VII give values for G_x for the various frequency bands.

The propagation mode (1) required distance is determined using the procedures described in § 4, and the detailed methods in Annex I. Specific guidance relevant to the application of the procedures is provided in § 4.4.

2.1.2 Determination of the coordinating earth station's propagation mode (2) contour

The required distance for hydrometeor scatter is that distance that will result in a propagation mode (2) predicted path loss equal to the propagation mode (2) minimum required loss L (p), as defined in equation (3). This propagation mode (2) required distance is determined using the guidance in § 5, and the detailed methods in Annex II.

For an earth station operating to a geostationary space station having a slightly inclined orbit, the rain-scatter coordination contour for each of the satellite's two most extreme orbit positions are determined individually, using the relevant elevation angles and their associated azimuths to the satellite. The rain scatter area is the total area contained within the two resulting overlapping coordination contours.

2.2 The earth stations operate to non-geostationary space stations

For earth stations that operate to non-geostationary space stations and track the space station, the antenna gain in the direction of the horizon on any azimuth varies with time.

The method used provides ease of implementation since it is not dependent on the availability of the distribution of the values for the horizon gain of the earth station antenna.

In the case of a receiving earth station, the permissible interference power $P_r(p)$ is specified with respect to the actual percentage of time the receiver is in operation, rather than the total elapsed time. Thus, the percentage of time p is specified for all the operational time that the receiving earth station is expected to spend in reception from non-geostationary space stations, but excludes any reception time involving geostationary space stations.

In considering the horizon gain of the antenna for either a transmitting or a receiving earth station, only the horizon gain values during the operational time are to be considered. Thus, there may be periods, or percentages, of time for which no horizon gain is specified. This presents no problem in the implementation of this method, and it is consistent with the permissible interference power for the unknown receiving stations specified in Table 1 of Annex VII and with the permissible interference powers for receiving earth stations, as discussed in the preceding paragraph, in Table 2 of Annex VII.

The horizon antenna gain may be determined using Annex IV. Reference or measured antenna radiation patterns may be used as described in Annex III.

The method uses fixed values of antenna gain based on the maximum assumed variation in horizon antenna gain on each azimuth under consideration. The values of horizon antenna gain defined below are used for each azimuth when applying equation (4) to determine the propagation mode (1) required distances:

$$\begin{array}{lll} G_e = G_{max} & \text{for} & (G_{max} - G_{min}) \leq 20\,\text{dB} \\ G_e = G_{min} + 20 & \text{for} & 20\,\text{dB} < (G_{max} - G_{min}) < 30\,\text{dB} \\ G_e = G_{max} - 10 & \text{for} & (G_{max} - G_{min}) \geq 30\,\text{dB} \end{array} \tag{5}$$

where

G_e: the gain of the coordinating earth station antenna (dBi) towards the horizon at the horizon elevation angle and azimuth under consideration in equation (4);

G_{max}, G_{min}: maximum and minimum values of the horizon antenna gain (dBi), respectively, on the azimuth under consideration.

The maximum and minimum values of the horizon antenna gain, on the azimuth under consideration, are derived from the antenna pattern and the maximum and minimum angular separation of the antenna main beam axis from the direction of the physical horizon at the azimuth under consideration.

Where a single value of minimum elevation angle for the main beam axis of the earth station antenna is specified for all azimuths, the minimum and maximum values of horizon gain can be determined, for each azimuth under consideration, from the antenna pattern and the horizon elevation angle at that azimuth. The plot of the horizon elevation angle against azimuth is called the horizon profile of the earth station.

Additional constraints maybe included in the determination of the maximum and minimum values of the horizon antenna gain where an earth station is operating to a constellation of non-geostationary satellites at a latitude for which no satellite is visible at the earth station's specified minimum elevation angle over a range of azimuth angles. Over this range of azimuth angles, the minimum elevation angle of the earth station antenna main beam axis is given by the minimum elevation angle at which any satellite of the constellation is visible at that azimuth. The azimuthal dependence of this minimum satellite visibility elevation angle may be determined from consideration of the orbital altitude and inclination of the satellites in the constellation, without recourse to simulation, using the procedure in § 1.1 of Annex IV. In this case, the horizon gain to be used in the method depends on the profile of the composite minimum elevation angle. This minimum composite elevation angle at any azimuth is the greater of the minimum satellite visibility elevation angle, at the azimuth under consideration, and the specified minimum elevation angle for the earth station which is independent of the azimuth.

Thus, at each azimuth under consideration, the maximum horizon antenna gain will be determined from the minimum value of the angular separation from the earth station horizon profile at this azimuth to the profile of the minimum composite elevation angle. Similarly, the minimum horizon antenna gain will be determined from the maximum value of the angular separation from the earth station horizon profile at this azimuth to the profile of the minimum composite elevation angle. The procedure for calculating the minimum and maximum angular separations from the profile of the minimum composite elevation angle is given in § 1.2 of Annex IV.

The propagation mode (1) required distance is then determined using the procedures described in § 4, and the detailed methods in Annex I. Specific guidance relevant to the application of the propagation calculations is provided in § 4.4.

3 Determination of the coordination area between earth stations operating in bidirectionally allocated frequency bands

This section describes the procedures to be used for the determination of the bidirectional coordination area for an earth station transmitting in a frequency band allocated to space services in both Earth-to-space and space-to-Earth directions.

There are various coordination scenarios involving only non-time-varying antenna gains, or only time-varying antenna gains (both earth stations operate to non-geostationary space stations) or, one time-varying antenna gain and one non time-varying antenna gain.

The following subsections describe the methods for the determination of coordination area which are specific to each of these bidirectional cases. The procedures applicable to the coordination scenario where both earth stations operate to geostationary space stations are given in § 3.1. The other bidirectional coordination scenarios are considered in § 3.2, where particular attention is given to the approaches for using the horizon gain of the receiving earth station for each of the possible coordination scenarios in the appropriate procedure of § 2.

Table 3 of Annex VII provides the parameters that are to be used in the determination of the coordination area. Table 3 of Annex VII also indicates whether, in each band, the receiving earth stations operate to geostationary or non-geostationary space stations. In some bands, receiving earth stations may operate to both geostationary and non-geostationary space stations. Table 2 below indicates the number of coordination contours, which needs to be drawn for each coordination scenario and the section(s) containing the applicable calculation methods. When drawn, each coordination contour must be appropriately labelled.

TABLE 2

Coordination contours required for each bidirectional scenario

Coordinating earth station operating to a space station in the	Unknown receiving earth station operating to a space station in the	Section containing the method to determine G_t and G_r	Contours required	
			No.	Details
Geostationary orbit	Geostationary orbit	§ 3.1	1	A coordination contour comprising both propagation mode (1) and propagation mode (2) contours.
	Non-geostationary orbit	§ 3.2.1	1	A propagation mode (1) coordination contour.
	Geostationary or non-geostationary orbits*	§ 3.1.1 and § 3.2.1	2	Two separate coordination contours, one for the geostationary orbit (propagation mode (1) and mode (2) contours) and one for the non-geostationary orbit (propagation mode (1) contour).
Non-geostationary orbit	Geostationary orbit	§ 3.2.2	1	A propagation mode (1) coordination contour.
	Non-geostationary orbit	§ 3.2.3	1	A propagation mode (1) coordination contour.
	Geostationary or non-geostationary orbits*	§ 3.2.2 and § 3.2.3	2	Two separate propagation mode (1) coordination contours, one for the geostationary orbit and one for the non-geostationary orbit.

* In this case the bidirectional frequency band may contain allocations in the earth to space direction for space stations in both the geostationary orbit and non-geostationary orbits. Hence the coordinating administration will not know if the unknown receiving earth stations are operating to space stations in the geostationary orbit or non-geostationary orbit.

3.1 The coordinating and unknown earth stations operate to geostationary space stations

When both earth stations operate to space stations in the geostationary orbit, it is necessary to develop a coordination contour, comprising both propagation mode (1) and propagation mode (2) contours, using the procedures described in § 3.1.1 and § 3.1.2, respectively.

3.1.1 Determination of the coordinating earth station's propagation mode (1) contour

The procedure for the determination of the propagation mode (1) contour in this case differs from that described in § 2.2 in two ways. First, the parameters to be used for the unknown receiving earth station are those in Table 3 of Annex VII. Second and more significantly, the knowledge that both earth stations operate to geostationary satellites can be used to calculate the worst-case value of the horizon gain of the receiving earth station toward the transmitting earth station for each azimuth at the transmitting earth station. The propagation mode (1) required distance is that distance, which will result in a value of propagation mode (1) predicted path loss which is equal to the propagation mode (1) minimum required loss, $L_b(p)$ dB, as defined in § 1.3, and repeated here for convenience.

$$L_b(p) = P_t + G_t + G_r - P_r(p) \quad \text{(dB)} \tag{6}$$

where

P_t and $P_r(p)$: are as defined in § 1.3;

G_t: gain of the coordinating (transmitting) earth station antenna (dBi) towards the horizon at the horizon elevation angle and the azimuth under consideration;

G_r: the horizon gain of the unknown receiving earth station on the azimuth toward the transmitting earth station on the specific azimuth from the coordinating earth station. Values are determined by the procedure in § 2.1 of Annex V, based on parameters from Table 3 of Annex VII.

To facilitate the determination of the values of G_r to be used at an azimuth from the transmitting earth station, several simplifying approximations must be made:

– that the horizon elevation of the receiving earth station is zero degrees on all azimuths;

– that the receiving earth station operates to a space station that has zero degrees orbital inclination and may be located anywhere on the geostationary orbit that is above the minimum elevation angle, given in Table 3 of Annex VII, for the location of the receiving earth station;

– that the latitude of the receiving earth station is the same as that of the transmitting earth station;

– that plane geometry can be used to inter-relate the azimuth angles at the respective earth stations, rather than using the great circle path.

The first three assumptions provide the basis for determining the horizon gain of the receiving earth station on any azimuth. The assumption of 0° horizon elevation angle is conservative since the increase in horizon antenna gain due to a raised horizon would, in practice, be more than offset by any real site shielding[5]. The last two assumptions in the list simplify the calculation of the sum of G_t and G_r along any azimuth. Since the propagation mode (1) required distances are small, in global geometric terms, these approximations may introduce a small error in the determination of the horizon gain of the receiving earth station antenna that, in any case, will not exceed 2 dB. Because of the assumption of plane geometry, for a given azimuth at the transmitting earth station the appropriate value of the horizon gain of the receiving earth station is the value on the reciprocal (i.e., ±180 degrees, see § 2.1 of Annex V) azimuth at the receiving earth station.

The propagation mode (1) required distance is then determined using the procedures described in § 4, and the detailed methods in Annex I. Specific guidance relevant to the application of the propagation calculations is provided in § 4.4.

3.1.2 Determination of the coordinating earth station's propagation mode (2) contour

The procedure for the determination of the propagation mode (2) contour for a transmitting earth station operating to a geostationary space station uses the same simplifying approximations made in § 3.1.1, but it is based on a geometrical construction that avoids the requirement for a complex propagation model (see § 3 of Annex V). Auxiliary contours cannot be used in this method, as the calculations are not based on the propagation mode (2) required loss.

[5] While no site shielding can be assumed for the receiving earth station, any site shielding that may exist at the transmitting earth station is considered by taking into account the horizon elevation angle in accordance with § 1 of Annex I.

The propagation mode (2) contour is determined using the elevation angle and the azimuth from the coordinating transmitting earth station to the space station, together with the following two considerations:

i) the minimum coordination distance (see § 4.2), which will be the required distance for some azimuths; and

ii) a worst-case required distance determined by the hydrometeor scatter geometry for a receiving earth station located in either of two 6 degree azimuth sectors. Within these sectors the receiving earth station is assumed to be operating at the minimum elevation angle to a space station in the geostationary orbit and its main beam intersects the beam for the coordinating transmitting earth station at the point where the latter beam passes through the rain height (h_R). Although the scattering can occur anywhere between the coordinating earth station and this point, the intersection of the two beams at this point represents the worst-case interference scenario. Hence, it results in the worst-case distance requirement for receiving earth stations located in the two azimuth sectors.

For an earth station operating to a space station in an inclined orbit, the lowest expected operational antenna elevation angle and its associated azimuth are used in the calculations.

The propagation mode (2) contour is determined using the method in § 3 of Annex V.

3.2 The coordinating or unknown earth stations operate to non-geostationary space stations

For the cases where a coordinating (transmitting) earth station operates to non-geostationary space stations, the following procedures assume that the earth station is tracking the space station, otherwise see § 1.4.2. Hence to determine of the coordination area, the method described in § 2.2 is used.

Table 3 of Annex VII provides values of horizon antenna gain to be used in the calculations.

One or more of the following three procedures may be needed to determine the required propagation mode (1) coordination contours of Table 2. Propagation mode (2) contours are not required for any of the cases where either of the earth stations operates to space stations in non-geostationary orbits.

3.2.1 A coordinating earth station operates to geostationary space station with respect to unknown earth stations operating to non-geostationary space stations

When the coordinating earth station operates to a space station in the geostationary orbit and the unknown earth stations operate to space stations in non-geostationary orbits, the propagation mode (1) coordination area is determined using the procedures described in § 2.1.1. The only modification needed is to use the horizon antenna gain (G_r) of the unknown receiving earth station in place of the terrestrial station gain (G_x). The appropriate values for this gain and the appropriate system parameters are contained in Table 3 of Annex VII.

3.2.2 A coordinating earth station operates to non-geostationary space station with respect to unknown earth stations operating to geostationary space stations

When the coordinating earth station operates to space stations in non-geostationary orbits and the unknown earth stations operate to space stations in the geostationary orbit, the horizon antenna gain (G_r) for the unknown receiving earth station is determined in accordance with the simplifying approximations of § 3.1.1, as elaborated in § 1.1 of Annex V, and the parameters of Table 3 of Annex VII. Determination of the propagation mode (1) coordination area then follows the procedure of § 2.2 by using the appropriate horizon gain of the receiving earth station at each azimuth under consideration and the appropriate system parameters from Table 3 of Annex VII.

3.2.3 The coordinating and unknown earth stations operate to non-geostationary space stations

When the coordinating earth station operates to space stations in non-geostationary orbits and the unknown earth stations operate to space stations in non-geostationary orbits, the propagation mode (1) coordination area is determined using the procedure described in § 2.2. The only modification is to use the horizon antenna gain (G_r) of the unknown receiving earth station in place of the terrestrial station antenna gain. The appropriate values for this gain and the appropriate system parameters are given in Table 3 of Annex VII.

4 General considerations for the determination of the propagation mode (1) required distance

For the determination of the propagation mode (1) required distances, the applicable frequency range has been divided into three parts. The propagation calculations for the VHF/UHF frequencies between 100 MHz and 790 MHz are based upon propagation mode (1) predicted path loss curves. From 790 MHz to 60 GHz the propagation modelling uses tropospheric scatter, ducting and layer reflection/refraction models. At higher frequencies up to 105 GHz the model is based on a free-space loss and a conservative assumption for gaseous absorption. The possible range of time percentages is different in the different propagation models.

After taking site shielding (§ 1 of Annex I) into consideration, for the coordinating earth station only, the following methods are used to determine the propagation mode (1) required distances:

– For frequencies between 100 MHz and 790 MHz the method described in § 2 of Annex I.

– For frequencies between 790 MHz and 60 GHz the method described in § 3 of Annex I.

– For frequencies between 60 GHz and 105 GHz the method described in § 4 of Annex I.

The three methods referred to above rely on a value of propagation mode (1) minimum required loss, determined according to the appropriate system parameters in Table 1, 2 and 3 of Annex VII.

4.1 Radio-climatic information

For the calculation of the propagation mode (1) required distance, the world has been classified in terms of a radio-meteorological parameter representing clear-air anomalous propagation conditions. The percentage of time β_e for which these clear-air anomalous propagation conditions exist, is latitude dependent and is given by:

$$\beta_e = \begin{cases} 10^{1.67-0.015\,\zeta_r} & \text{for } \zeta_r \le 70^\circ \quad (7) \\ 4.17 & \text{for } \zeta_r > 70^\circ \quad (8) \end{cases}$$

with:

$$\zeta_r = \begin{cases} |\zeta| - 1.8 & \text{for } |\zeta| > 1.8^{\circ} \qquad (9) \\ 0 & \text{for } |\zeta| \le 1.8^{\circ} \qquad (10) \end{cases}$$

where

ζ (in degrees) is the latitude of the earth station's location

For frequencies between 790 MHz and 60 GHz the path centre sea level surface refractivity (N_0) is used in the propagation mode (1) calculations. This can be calculated using:

$$N_0 = 330 + 62.6 \exp^{-\left(\frac{\zeta - 2}{32.7}\right)^2} \qquad (11)$$

4.2 Minimum coordination distance for propagation modes (1) and (2)

The minimum coordination distance can be calculated in two steps. First calculate distance d_x using:

$$dx = 100 + \frac{(\beta_e - 40)}{2} \text{ km} \qquad (12)$$

where

β_e is given in § 4.1

Then calculate the minimum coordination distance at any frequency (f in GHz) in the range 100 MHz - 105 GHz using:

$$d_{min} = \begin{cases} 100 + \frac{(\beta_e - f)}{2} & \text{km} & \text{for } f < 40 \text{ GHz} & (13) \\ \frac{(54 - f)dx + 10(f - 40)}{14} & \text{km} & \text{for } 40 \text{ GHz} \le f < 54 \text{ GHz} & (14) \\ 10 & \text{km} & \text{for } 54 \text{ GHz} \le f < 66 \text{ GHz} & (15) \\ \frac{10(75 - f) + 45(f - 66)}{9} & \text{km} & \text{for } 66 \text{ GHz} \le f < 75 \text{ GHz} & (16) \\ 45 & \text{km} & \text{for } 75 \text{ GHz} \le f < 90 \text{ GHz} & (17) \\ 45 - \frac{(f - 90)}{1.5} & \text{km} & \text{for } 90 \text{ GHz} \le f \le 105 \text{ GHz} & (18) \end{cases}$$

The distance from which all iterative calculations start (for both propagation mode (1) and propagation mode (2)), is the minimum coordination distance (d_{min}) as given in equations (13) to (18).

4.3 Maximum coordination distance for propagation mode (1)

In the iterative calculation described in Annex I, it is necessary to set an upper limit (d_{max1}) to the propagation mode (1) coordination distance.

For frequencies less than or equal to 60 GHz and propagation paths entirely within a single Zone, the distance shall not exceed the maximum coordination distance given in Table 3 for that Zone.

For mixed paths, the required distance can comprise one or more contributions from Zones A1, A2, B and C. The aggregate distance for any one zone must not exceed the value given in Table 3. The overall required distance must not exceed the value in Table 3 for the zone in the mixed path having the largest Table 3 value. Thus a path comprising both Zones A1 and A2 must not exceed 500 km.

TABLE 3

Maximum coordination distances for propagation mode (1) for frequencies below 60 GHz

Zone	d_{max1} (km)
A1	500
A2	375
B	900
C	1 200

For frequencies above 60 GHz the maximum coordination distance d_{max1} is given by:

$$d_{max\,1} = 80 - 10 \log\left(\frac{p}{50}\right) \tag{19}$$

where

p is defined in § 1.3.

4.4 Guidance on application of propagation mode (1) procedures

As explained in § 1.3, for those cases where earth stations are sharing with terrestrial stations, it is appropriate to apply a correction factor (C_i in dB) to the worst case assumptions on system parameters and interference path geometry. This correction factor takes into account that the assumption that all the worst-case values will occur simultaneously is unrealistic when determining the propagation mode (1) required distances.

The characteristics of terrestrial systems depend on the frequency band, and the value of the correction factor to be applied follows the frequency dependence given in equation (20). At frequencies between 100 MHz and 400 MHz, and between 60 GHz and 105 GHz, sharing between earth stations and terrestrial systems is a recent development and there is little established practical experience, or opportunity to analyse operational systems. Hence, the value of the correction factor is 0 dB in these bands. Between 400 MHz and 790 MHz and between 4.2 GHz and 60 GHz the value of the correction factor is reduced in proportion to the logarithm of the frequency, as indicated in equation (20).

The value of the nominal correction to be used at any frequency f (GHz) is therefore given by:

$$X(f) = \begin{cases} 0, & f \le 0.4 \\ 3.3833X\left(\log f + 0.3979\right), & 0.4 < f \le 0.79 \\ X, & 0.79 < f \le 4.2 \\ -0.8659X\left(\log f - 1.7781\right), & 4.2 < f \le 60 \\ 0, & f > 60 \end{cases} \quad \text{dB} \qquad (20)$$

where

X: is 15 dB for a transmitting earth station and 25 dB for a receiving earth station.

In principle the value of the nominal correction, *X(f),* is distance and path independent. However, there are a number of issues relating to interference potential at the shorter distances, and it is not appropriate to apply the full nominal correction at these distances. The correction factor is therefore applied proportionally with distance along the azimuth under consideration, starting with 0 dB at d_{min}, such that the full value of *X(f)* is achieved at a nominal distance of 375 km from the earth station.

Hence, the correction is applied using the correction constant *Z(f)* dB/km where

$$Z(f) = \frac{X(f)}{375 - d_{\min}} \quad \text{dB/km} \qquad (21)$$

The correction factor C_i (dB) is calculated in equations (I-6b) and (I-31) from the correction constant Z(*f*) (dB/km).

At distances greater than 375 km, the correction factor C_i to be applied is the value of C_i at 375 km distance.

In addition, the correction factor is applied to its highest value only on land paths. The correction factor is 0 dB for wholly sea paths. A proportion of the correction factor is applied on mixed paths. The amount of correction to be applied to a particular path is determined by the path description parameters used for the propagation mode (1) calculation (correction factors C_i and C_{2i} in § 2 and § 3 respectively of Annex I). As the correction factor is distance dependent it is applied automatically within the iterative calculation used to determine the propagation mode (1) required distance (see Annex I).

The correction factor does not apply to the bidirectional case and therefore in the determination of the bidirectional coordination contour:

$$Z(f) = 0 \text{ dB/km}$$

For the determination of propagation mode (1) auxiliary contours, the propagation mode (1) minimum required loss $L_b(p)$ for p per cent of time (see § 1.3) equation (1) is replaced by:

$$L_{bq}(p) = L_b(p) + Q \quad \text{dB} \qquad (22)$$

where

Q: is the auxiliary contour value in dB

Note that auxiliary contour values are assumed to be negative (i.e. –5, –10, –15, –20 dB etc.).

5 General considerations for the determination of the propagation mode (2) required distance

The determination of the contour for scattering from hydrometeors (e.g., rain scatter) is predicted on a path geometry that is substantially different from that of the great-circle propagation mechanisms. Hydrometeor scatter can occur where the beams of the earth station and the terrestrial station intersect (partially or completely) at, or below, the rain height h_R (see § 3 of Annex II). It is assumed that at heights above this rain height the effect of scattering will be suppressed by additional attenuation, and it will not, therefore, contribute significantly to the interference potential. For the determination of the propagation mode (2) contour, it is assumed that the main beams of any terrestrial stations exactly intersect the main beam of the coordinating earth station. The mitigating effects of partial beam intersections can be determined using propagation mode (2) auxiliary contours.

Since, to a first approximation, microwave energy is scattered isotropically by rain, interference can be considered to propagate equally at all azimuths around the common volume centred at the beam intersection (see § 1.3). Generally, the beam intersection will not lie on the great-circle path between the two stations. The common volume can therefore result from terrestrial stations located anywhere around the earth station, including those behind the earth station.

The propagation mode (2) contour is a circle with a radius equal to the propagation mode (2) required distance. Unlike the case for propagation mode (1), the propagation mode (2) contour is not centred on the earth station’s physical location, instead it is centred on a point on the earth’s surface immediately below the centre of the common volume.

A common volume can exist, with equal probability, at any point along the earth station beam between the earth station’s location and the point at which the beam reaches the rain height. To provide appropriate protection for/from terrestrial stations[6], the centre of the common volume is assumed to be half way between the earth station and the point at which its beam intersects the rain height. The distance between the projection of this point on to the earth surface and the location of the earth station is known as Δd (see § 4 of Annex II). The centre of the propagation mode (2) contour is therefore Δd km from the earth station on the azimuth of the earth station’s main beam axis.

5.1 The required distance for propagation mode (2)

Propagation mode (2) required distances are measured along a radial originating at the centre of the rain scatter common volume. The calculation requires iteration for distance, starting at the same minimum distance defined for propagation mode (1) until either the required propagation mode (2) minimum required loss, or a latitude-dependent propagation mode (2) maximum calculation distance, is achieved. The propagation mode (2) calculations use the method described in Annex II. The calculations only need to be performed in the frequency range 1 000 MHz to 40.5 GHz. Outside this frequency range, rain scatter interference can be neglected and the propagation mode (2) required distance is set to the minimum coordination distance given by equations (13) to (18).

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[6] This procedure does not apply for the case of an earth sharing a frequency band with other earth station operating in the opposite direction of transmission, as for that specific case the propagation mode (2) contour is based on a geometric construction.

ANNEX I

Determination of the required distance for propagation mode (1)

1 Adjustments for earth station horizon elevation angle and distance

For propagation mode (1), the required distance depends on the characteristics of the physical horizon around the earth station. The horizon is characterised by the horizon distance d_h (see below), and the horizon elevation angle θ_h. The horizon elevation angle is defined here as the angle (in degrees), viewed from the centre of the earth station antenna, between the horizontal plane and a ray that grazes the physical horizon in the direction concerned. The value of θ_h is positive when the physical horizon is above the horizontal plane and negative when it is below.

It is necessary to determine horizon elevation angles and distances for all azimuths around an earth station. In practice it will generally suffice to do this in azimuth increments of 5°. However, every attempt should be made to identify, and take into consideration, minimum horizon elevation angles that may occur between those azimuths examined in 5° increments.

For the purposes of the determination of the propagation mode (1) required distance it is useful to separate the propagation effects related to the local horizon around the earth station which, on some or all azimuths, may be determined by nearby hills or mountains, from the propagation effects on the remainder of the path. This is achieved by referencing the propagation model to a 0° horizon elevation angle for the coordinating earth station, and then to include a specific term A_h to deal with the known horizon characteristics of the earth station being coordinated. Where appropriate, A_h modifies the value of the path loss, on each azimuth, from which the propagation mode (1) required distance is derived.

There are two considerations to be taken into account that can change the level of attenuation for the propagation mode (1) path loss for the reference 0° case.

- The first is where the coordinating earth station has a positive horizon elevation angle (on a particular azimuth). In this case it will benefit from additional diffraction propagation losses over the horizon (generally referred to as site shielding). In this case the attenuation A_h is positive and reduces the value of path loss that is required, compared to the reference 0° horizon elevation angle case (see equations (I-5a) and (I-5b)).
- The second situation is where the coordinating earth station is at a location above the local foreground, and has a negative (downward) horizon elevation angle on a particular azimuth. In this case a measure of additional protection is necessary because the path angular distance along the radial is reduced and hence the path loss for a given distance will be lower than for the zero degree elevation angle case. It is convenient to deal with this effect as part of the site shielding calculation. Hence, in this case the attenuation A_h will be negative and it increases the value of the path loss that is required, compared to the reference 0° horizon elevation angle case.

The contribution made by the attenuation arising from the coordinating earth station's horizon characteristics to the propagation mode (1) minimum required loss modifies the value of path loss that then needs to be determined in the three propagation mode (1) models. The attenuation A_h is calculated for each azimuth around the coordinating earth station as follows.

The distance of the horizon (d_h), from the earth station's location, is determined by:

$$d_h = \begin{cases} 0.5\text{ km} & \text{if no information is available about the horizon distance, or if the distance is} < 0.5\text{ km.} \\ \text{horizon distance (km)} & \text{if this is within the range } 0.5\text{ km} \le \text{horizon distance} \le 5.0\text{ km.} \\ 5.0\text{ km} & \text{if the horizon distance is} > 5.0\text{ km.} \end{cases}$$

The contribution made by the horizon distance d_h to the total site shielding attenuation is given by A_d in dB for each azimuth using:

$$A_d = 15\left[1 - \exp\left(\frac{0.5 - d_h}{5}\right)\right]\left[1 - \exp\left(-\varepsilon_h f^{1/3}\right)\right] \qquad \text{dB} \qquad \text{(I-1)}$$

where

f: throughout this appendix is in GHz.

The total site shielding attenuation along each azimuth from the coordinating earth station is given by:

$$A_h = \begin{cases} 20\log(1 + 4.5\varepsilon_h f^{1/2}) + \varepsilon_h f^{1/3} + A_d & \text{dB} & \text{for } \varepsilon_h \ge 0^{\circ} & \text{(I-2a)} \\ 3[(f+1)^{1/2} - 0.0001 f - 1.0487]\varepsilon_h & \text{dB} & \text{for } 0^{\circ} > \varepsilon_h \ge -0.5^{\circ} & \text{(I-2b)} \\ -1.5[(f+1)^{1/2} - 0.0001 f - 1.0487] & \text{dB} & \text{for } \varepsilon_h < -0.5^{\circ} & \text{(I-2c)} \end{cases}$$

The value of A_h must be limited to satisfy the conditions:

$$-10 \le A_h \le (30 + \varepsilon_h) \qquad \text{(I-3)}$$

In equations I-1, I-2 and I-3 the value of ε_h must always be expressed in degrees. The limits defined in equation (I-3) are specified because protection outside these limits may not be realized in practical situations.

2 Frequencies between 100 MHz and 790 MHz

The propagation model given in this section is limited to an average annual time percentage (*p*) in the range 1% to 50%.

An iterative process is used to determine the propagation mode (1) required distance. First, equation I-5 is evaluated. Then commencing at the minimum coordination distance, d_{min}, given by the method described in § 1.5.3 of the main body of the Appendix, equations I-6 to I-9 are iterated for distances d_i (where i = 0,1,2..etc.) incremented in steps of s (km) as described in § 1.3 of the main body of the Appendix. In each iteration d_i is referred to as the current distance. This process is continued until either of the following expressions becomes true:

$$L_2(p_1) \geq \begin{cases} L_1(p) & \text{for the main, or supplementary, contour} \\ L_{1q}(p) & \text{for the auxiliary contour} \end{cases} \tag{I-4a}$$

or:

$$d_i \geq \begin{cases} d_{max1} & \text{for the main, or supplementary, contour} \\ d_1 & \text{for the auxiliary contour} \end{cases} \tag{I-4b}$$

The required distance, d_1, or the auxiliary contour distance d_q are then given by the current distance for the last iteration: i.e.

$$d_1 = d_i \tag{I-4c}$$

or:

$$d_q = d_i \tag{I-4d}$$

As the eventual mix of zones along a path is unknown, all paths are treated as if they are potential land and sea paths. Parallel calculations are undertaken, the first assuming the path is all land and a second assuming it is all sea. A non-linear interpolation is then performed, the output of which depends upon the current mix of land and sea losses in the distance d_i. Where the current mix along the path includes sections of both warm sea and cold sea zones, all the sea along that path is assumed to be warm sea.

For the main, or supplementary, contour:

$$L_1(p) = L_b(p) - A_h \tag{I-5a}$$

For an auxiliary contour:

$$L_{1q}(p) = L_{bq}(p) - A_h \tag{I-5b}$$

where

$L_b(p)$ dB and $L_{bq}(p)$ Db are the minimum required loss required for p% of the time for the main, or supplementary, contour and the auxiliary contour of value Q dB respectively (see § 1.3 and § 1.6 of the main body of the Appendix).

Iterative calculations:

At the start of each iteration calculate the current distance for i = 0,1,2, etc.:

$$d_i = d_{\min} + i.s \tag{I-6a}$$

The correction factor, C_i dB, (see § 4.4 of the main body of the Appendix) for the distance d_i is given by:

$$C_i = \begin{cases} Z(f)(d_i - d_{min})\ (\text{dB}) & \text{for the main, or supplementary, contour} \\ 0\ (\text{dB}) & \text{for the auxiliary contour} \end{cases} \tag{I-6b}$$

where

$Z(f)$ is given by equation (21) in § 4.4 of the main body of the Appendix.

At distances greater than 375 km the value of the correction factor (C_i in equation I-6b) to be applied, is the value of C_i at the 375 km distance.

The loss, $L_{bl}(p)$ for the assumption of the path being wholly land (Zones A1 or A2) is evaluated successively using:

$$L_{bl}(p) = 142.8 + 20\log f + 10\log p + 0.1 d_i + C_i \tag{I-7}$$

The loss, $L_{bs}(p)$, for the assumption of the path being wholly cold sea (Zone B) or warm sea (Zone C) is evaluated successively using:

$$L_{bs}(p_1) = \begin{cases} \left.\begin{array}{l} 49.91\log(d_i + 1840 f^{1.76}) + 1.195 f^{0.393} (\log p)^{1.38} d_i^{0.597} \\ \quad + (0.01 d_i - 70)(f - 0.1581) + (0.02 - 2\,\mathrm{x}10^{-5} p^2) d_i \\ \qquad + 9.72\ 10^{-9} d_i^2 p^2 + 20.2 \end{array}\right\} \text{for Zone (B)} & \text{(I-8a)} \\ \left.\begin{array}{l} 49.343\log(d_i + 1840 f^{1.58}) + 1.266(\log p)^{(0.468+2.598 f)} d_i^{0.453} \\ + (0.037 d_i - 70)(f - 0.1581) + 1.95\,\mathrm{x}10^{-10} d_i^2 p^3 + 20.2 \end{array}\right\} \text{for Zone (C)} & \text{(I-8b)} \end{cases}$$

The predicted path loss at the current distance is then given by:

$$L_2(p) = L_{bs}(p) + \left[1 - \exp\left(-5.5\left(\frac{d_{tm}}{d_i}\right)^{1.1}\right)\right] \cdot \left(L_{bl}(p) - L_{bs}(p)\right) \tag{I-9}$$

where

d_{tm} (km): is the longest continuous land (inland + coastal) distance, i.e. Zone A1 + Zone A2 within the current path distance.

3 Frequencies between 790 MHz and 60 GHz

The propagation model given in this section is limited to an average annual time percentage (p_1) in the range 0.001% to 50%.

An iterative process is used to determine the propagation mode (1) required distance. First, equations I-11 to I-21 are evaluated. Then, commencing at the minimum coordination distance, d_{min}, equations I-22 to I-32 are iterated for distances d_i, where i = 0,1,2..etc., incremented in steps of s (km) as described in § 1.3 of the main body of the Appendix. For each iteration d_i is referred to as the current distance. This process is continued until either of the following expressions becomes true:

$$\begin{cases} (L_5(p) \geq L_3(p)) \text{ AND } (L_6(p) \geq L_4(p)) & \text{for the main, or supplementary, contour} \\ (L_5(p) \geq L_{3q}(p)) \text{ AND } (L_6(p) \geq L_{4q}(p)) & \text{for the auxiliary contour} \end{cases} \tag{I-10a}$$

or:

$$d_i \geq \begin{cases} d_{max1} & \text{for the main, or supplementary, contour} \\ d_1 & \text{for the auxiliary contour} \end{cases} \tag{I-10b}$$

The required distance, d_1, or the auxiliary contour distance, d_q is then given by the current distance for the last iteration, i.e.

$$d_1 = d_i \tag{I-10c}$$

or:

$$d_q = d_i \tag{I-10d}$$

The specific attenuation due to gaseous absorption

Calculate the specific attenuation (dB/km) due to dry air:

$$\gamma_o = \begin{cases} \left[7.19 \times 10^{-3} + \dfrac{6.09}{f^2 + 0.227} + \dfrac{4.81}{(f - 57)^2 + 1.50} \right] f^2 \times 10^{-3} & \text{for } f \leq 56.77 \text{ GHz} \quad \text{(I-11a)} \\ 10 & \text{for } f > 56.77 \text{ GHz} \quad \text{(I-11b)} \end{cases}$$

The specific attenuation due to water vapour is given as a function of ρ (the water vapour density in units of g/m^3) by the following equation:

$$\gamma_w(\rho) = \left(0.050 + 0.0021\rho + \frac{3.6}{(f - 22.2)^2 + 8.5} \right) f^2 \rho \times 10^{-4} \tag{I-12}$$

Calculate the specific attenuation (dB/km) due to water vapour for the troposcatter propagation model using a water vapour density of 3.0 g/m^3:

$$\gamma_{wt} = \gamma_w\,(3.0) \tag{I-13a}$$

Calculate the specific attenuation (dB/km) due to water vapour for the ducting propagation model using a water vapour density of 7.5 g/m^3 for paths over land, Zones A1 and A2, using:

$$\gamma_{wdl} = \gamma_w\,(7.5) \tag{I-13b}$$

Calculate the specific attenuation (dB/km) due to water vapour for the ducting propagation model using a water vapour density of 10.0 g/m^3 for paths over sea, Zones B and C, using:

$$\gamma_{wds} = \gamma_w\,(10.0) \tag{I-13c}$$

Note that the value of 10 g/m^3 is used for both zones B and C in view of the lack of data on the variability of water vapour density on a global basis, particularly the minimum values.

Calculate the frequency-dependent ducting specific attenuation (dB/km):

$$\gamma_d = 0.05 f^{1/3} \tag{I-14}$$

For the ducting model:

Calculate the reduction in attenuation arising from direct coupling into over-sea ducts (dB):

$$A_c = \frac{-6}{(1 + d_c)} \qquad \text{(I-15)}$$

where

d_c (km): is the distance from a land based earth station to the coast in the direction being considered;

d_c: is zero in other circumstances.

Calculate the minimum loss to be achieved within the iterative calculations:

$$A_1 = 122.43 + 16.5 \log f + A_h + A_c \qquad \text{(I-16)}$$

For the main, or supplementary, contour:

$$L_3(p) = L_b(p) - A_1 \qquad \text{(I-17a)}$$

For an auxiliary contour:

$$L_{3q}(p) = L_{bq}(p) - A_1 \qquad \text{(I-17b)}$$

where

$L_b(p)$ dB and L_{bq} (p) dB are the minimum required loss required for p% of the time for the main, or supplementary, contour and the auxiliary contour of value Q dB respectively (see § 1.3 and § 1.6 of the main body of the Appendix).

For the tropospheric scatter model:

Calculate the frequency-dependent part of the losses (dB):

$$L_f = 25 \log(f) - 2.5 \left[\log\left(\frac{f}{2} \right) \right]^2 \qquad \text{(I-19)}$$

Calculate the non-distance-dependent part of the losses (dB):

$$A_2 = 187.36 + 10\varepsilon_h + L_f - 0.15\, N_0 - 10.1 \left(-\log\left(\frac{p}{50} \right) \right)^{0.7} \qquad \text{(I-20)}$$

where

ε_h: is the earth station horizon elevation angle in degrees;

N_0: is the path centre sea level surface refractivity (see equation 11, § 4.1 to the main body of the Appendix).

Calculate the minimum required value for the distance dependent losses (dB):

For the main, or supplementary, contour:

$$L_4(p) = L_b(p) - A_2 \qquad \text{(I-21a)}$$

For an auxiliary contour:

$$L_{4q}(p) = L_{bq}(p) - A_2 \qquad \text{(I-21b)}$$

where

$L_b(p)$ dB and L_{bq} (p) dB are the minimum required loss required for p% of the time for the main, or supplementary, contour and the auxiliary contour of value Q dB respectively (see § 1.3 and § 1.6 of the main body of the Appendix).

Iterative calculations:

At the start of each iteration calculate the current distance for i = 0,1,2..etc.:

$$d_i = d_{\min} + i.s \qquad \text{(I-22)}$$

Calculate the specific attenuation due to gaseous absorption (dB/km):

$$\gamma_g = \gamma_o + \gamma_{wdl}\left(\frac{d_t}{d_i}\right) + \gamma_{wds}\left(1 - \frac{d_t}{d_i}\right) \qquad \text{(I-23)}$$

where

d_t (km): is the current aggregate land distance, Zone A1 + Zone A2, within the current path distance.

Calculate the following zone-dependent parameters:

$$\tau = 1 - \exp\left(-\left(4.12 \times 10^{-4}\,(d_{lm})^{2.41}\right)\right) \qquad \text{(I-24)}$$

where

d_{lm} (km): is the longest continuous inland distance, Zone A2, within the current path distance;

$$\mu_1 = \left[10^{\frac{-d_{tm}}{16-6.6\tau}} + \left[10^{-(0.496+0.354\tau)}\right]^5\right]^{0.2} \qquad \text{(I-25)}$$

where

d_{tm} (km): is the longest continuous land (i.e. inland + coastal) distance, Zone A1 + Zone A2 within the current path distance.

μ_1 shall be limited to $\mu_1 \leq 1$.

$$\sigma = -0.6 - 8.5 \times 10^{-9}\, d_i^{3.1}\, \tau \qquad \text{(I-26)}$$

σ shall be limited to $\sigma \geq -3.4$.

$$\mu_2 = \left(2.48 \times 10^{-4} \, d_i^2\right)^{\sigma} \tag{I-27}$$

μ_2 shall be limited to $\mu_2 \leq 1$.

$$\mu_4 = \begin{cases} 10^{(-0.935 + 0.0176\,\zeta_r)\log \mu_1} & \text{for } \zeta_r \leq 70^{\text{o}} \quad \text{(I-28a)} \\ 10^{0.3 \log \mu_1} & \text{for } \zeta_r > 70^{\text{o}} \quad \text{(I-28b)} \end{cases}$$

where

ζ_r: is given in equations 9 and 10, § 4.1 to the main body of the Appendix.

Calculate the path-dependent incidence of ducting (β) and a related parameter (Γ_1) used to calculate the time dependency of the path loss:

$$\beta = \beta_e . \mu_1 . \mu_2 . \mu_4 \tag{I-29}$$

where

β_e is given in equations 7 and 8, § 4.1 to the main body of the Appendix.

$$\Gamma_1 = \frac{1.076}{(2.0058 - \log \beta)^{1.012}} \exp\left(-(9.51 - 4.8 \log \beta + 0.198 (\log \beta)^2) \times 10^{-6} d_i^{1.13}\right) \tag{I-30}$$

Calculate the correction factor, C_{2i} dB, (see § 4.4 to the main body of the Appendix) using:

$$C_{2i} = \begin{cases} Z(f)(d_i - d_{min})\tau \quad \text{(dB)} & \text{for the main, or supplementary, contour} \\ 0 \quad \text{(dB)} & \text{for the auxiliary contour} \end{cases} \tag{I-31}$$

where

$Z(f)$ is calculated using (equation 21) in § 4.4 to the main body of the Appendix.

At distances greater than 375 km the value of the correction factor (C_{2i} in equation I-31) to be applied, is the value of C_{2i} at the 375 km distance.

Calculate the distance-dependent part of the losses (dB) for ducting:

[illegible] $+ \, C_{2i}$ (I-32)

and for tropospheric scatter:

$$L_6(p) = 20 \log(d_i) + 5.73 \times 10^{-4} (112 - 15 \cos(2\zeta)) d_i + (\gamma_o + \gamma_{wt}) d_i + C_{2i} \tag{I-33}$$

For the determination of distances for auxiliary contours, $C_{2i} = 0$ dB.

4 Frequencies between 60 GHz and 105 GHz

This propagation model is valid for average annual percentage time (p) in the range from 0.001% to 50%.

An iterative process is used to determine the propagation mode (1) required distance. First, equations I-34 to I-38 are evaluated. Then commencing at the minimum coordination distance, d_{min}, equations I-39 and I-40 are iterated for distances d_i, where i = 0,1,2..etc., incremented in steps of s km as described in § 1.3 of the main body of the Appendix. For each iteration d_i is referred to as the current distance.

This process is continued until either of the following expressions becomes true:

$$L_9(p) \geq \begin{cases} L_8(p) & \text{for the main, or supplementary, contour} \\ L_{8q}(p) & \text{for the auxiliary contour} \end{cases} \qquad \text{(I-33a)}$$

or:

$$d_i \geq \begin{cases} d_{max1} & \text{for the main, or supplementary, contour} \\ d_1 & \text{for the auxiliary contour} \end{cases} \qquad \text{(I-33b)}$$

The required distance, d_1, or the auxiliary contour distance d_q are then given by the current distance for the last iteration: i.e.

$$d_1 = d_i \qquad \text{(I-33c)}$$

or:

$$d_q = d_i \qquad \text{(I-33d)}$$

Calculate the specific attenuation in dB/km for dry air in the frequency range 60 GHz to 105 GHz using:

$$\gamma_{om} = \begin{cases} \left[2 \times 10^{-4} \left(1 - 1.2 \times 10^{-5} f^{\,1.5}\right) + \dfrac{4}{(f-63)^2 + 0.936} + \dfrac{0.28}{(f-118.75)^2 + 1.771} \right] f^2\, 6.24 \times 10^{-4} \text{ dB/km} & \text{for } f > 63.26 \text{ GHz} \qquad \text{(I-34a)} \\ 10 \text{ dB/km} & \text{for } f \leq 63.26 \text{ GHz} \qquad \text{(I-34b)} \end{cases}$$

Calculate the specific attenuation in dB/km for an atmospheric water vapour density of 3 g/m^3 using:

$$\gamma_{wm} = \left(0.039 + 7.7 \times 10^{-4} f^{\,0.5}\right) f^2\, 2.369 \times 10^{-4} \qquad \text{(I-35)}$$

Calculate a conservative estimate of the specific attenuation in dB/km for gaseous absorption using:

$$\gamma_{gm} = \gamma_{om} + \gamma_{wm} \quad \text{dB/km} \qquad \text{(I-36)}$$

For the required frequency, and the value of earth station site shielding, A_h dB, as calculated using the method described in § 1 of this Annex, calculate the minimum loss to be achieved in the iterative calculations.

$$L_7 = 92.5 + 20 \log(f) + A_h \quad \text{dB} \qquad \text{(I-37)}$$

For the main, or supplementary, contour:

$$L_8(p) = L_b(p) - L_7 \qquad \text{dB} \qquad \text{(I-38a)}$$

For an auxiliary contour:

$$L_{8q}(p) = L_{bq}(p) - L_7 \qquad \text{dB} \qquad \text{(I-38b)}$$

where

$L_b(p)$ dB and $L_{bq}(p)$ dB are the minimum required loss required for p% of the time for the main or supplementary contour and the auxiliary contour of value Q dB respectively (see § 1.3 and § 1.6 of the main body of the Appendix).

Iterative calculations:

At the start of each iteration calculate the current distance for i = 0,1,2 etc.:

$$d_i = d_{min} + i.s \qquad \text{(I-39)}$$

Calculate the distance-dependent losses for the current distance:

$$L_9(p) = \gamma_{gm} d_i + 20\log(d_i) + 2.6\left[1 - \exp\left(\frac{-d_i}{10}\right)\right]\log\left(\frac{p}{50}\right) \qquad \text{(I-40)}$$

For frequencies above 60 GHz the correction factor (see § 4.4 of the main body of the Appendix) is 0 dB. Therefore a correction term has not been added to equation (I-40).

ANNEX II

Determination of the required distance for propagation mode (2)

1 Overview

The algorithm given below allows propagation mode (2) path loss, $L_r(p)$ (dB), to be obtained as a monotonic function of rainfall rate, $R(p)$ (mm/h), and with the hydrometeor scatter distance, r_i (km), as a parameter. The model is valid for average annual time percentage (p) in the range 0.001 to 10%. The procedure to determine the hydrometeor scatter contour is as follows:

a) The value of $R(p)$, is determined for the appropriate rain climatic Zones A to Q.

b) Values of $L_r(p)$, are then calculated for incremental values of r_i, starting at the minimum coordination distance d_{min}, in steps of s (km), as described in § 1.3 of the main body of the Appendix. The correct value of r_i is that for which the corresponding value of $L_r(p)$ equals or exceeds the propagation mode (2) minimum required loss L(p). This value of r_i is the propagation mode (2) required distance and is denoted d_r .

c) If the iterative calculation results in r_i equalling or exceeding the appropriate maximum calculation distance (d_{max2}) given in § 2, then the calculation is terminated and d_r is assumed to be equal to d_{max2}. Hence the iteration stops when either of the following expressions becomes true:

$$L_r(p) \geq L(p) \qquad \text{(II-1a)}$$

or:

$$r_i \geq d_{\max 2} \qquad \text{(II-1b)}$$

d) The contour for propagation mode (2) is a circle of radius d_r (km) centred on a point along the azimuth of the earth station antenna main beam at a horizontal distance of Δd (km) from the earth station.

2 Maximum calculation distance

As discussed in § 1.5.3 of the main body of the Appendix, it is necessary to set upper limits to the maximum distance used in the iterative calculation of the required distance. The maximum calculation distance to be used for propagation mode (2) (d_{max2}) is latitude dependent and is given in the following equation:

$$d_{max2} = \sqrt{17\,000(h_R + 3)} \text{ (km)}$$

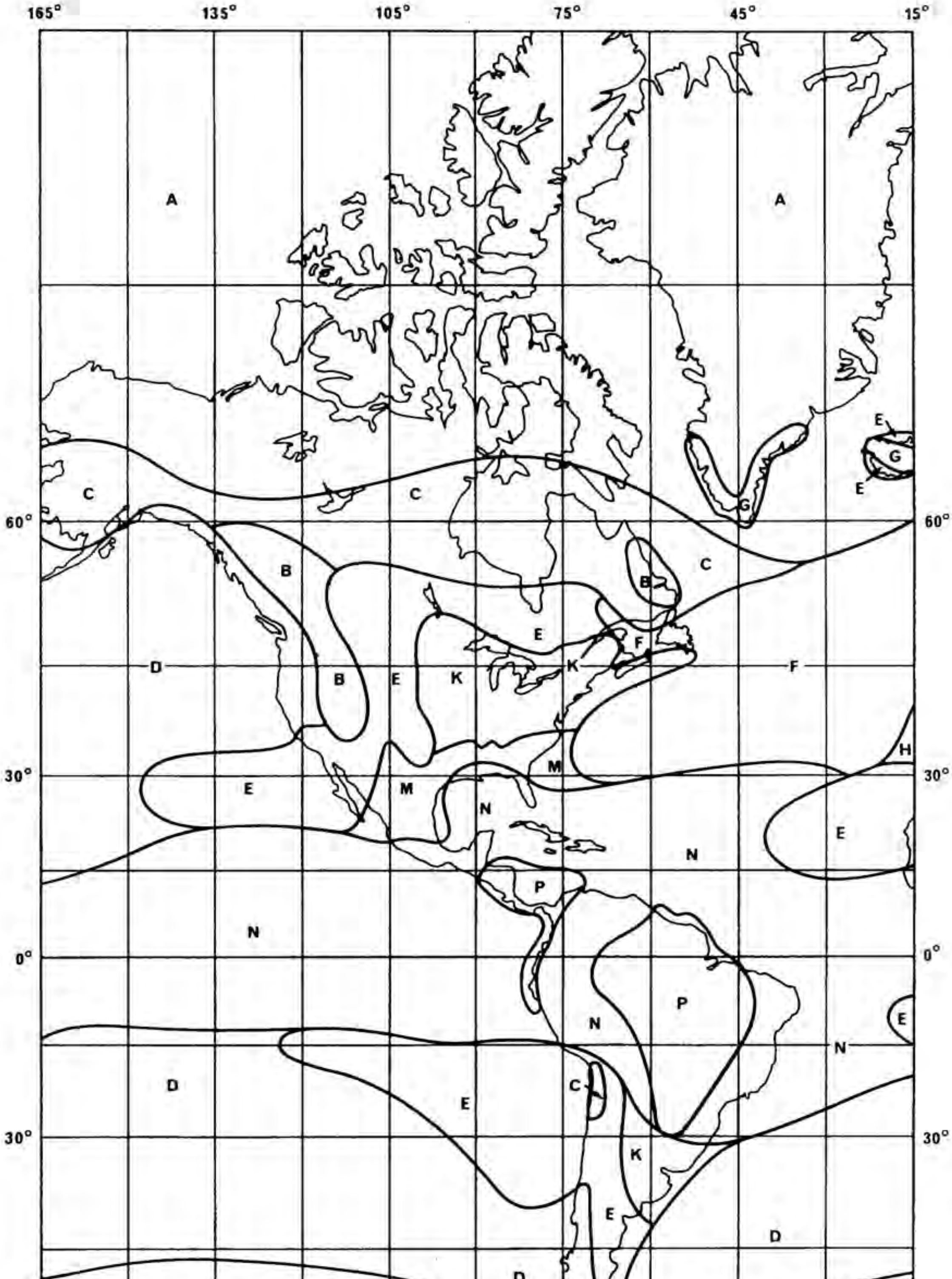
where

h_R is defined in equations II-13 and II-14.

3 Calculation of the propagation mode (2) contour

Determine $R(p)$, the rainfall rate (mm/h) exceeded on average for p% of a year. The world has been divided into a number of rain climatic zones (see Figures II-1, II-2 and II-3) which show different precipitation characteristics.

FIGURE II-1



D01-sc

FIGURE II-2

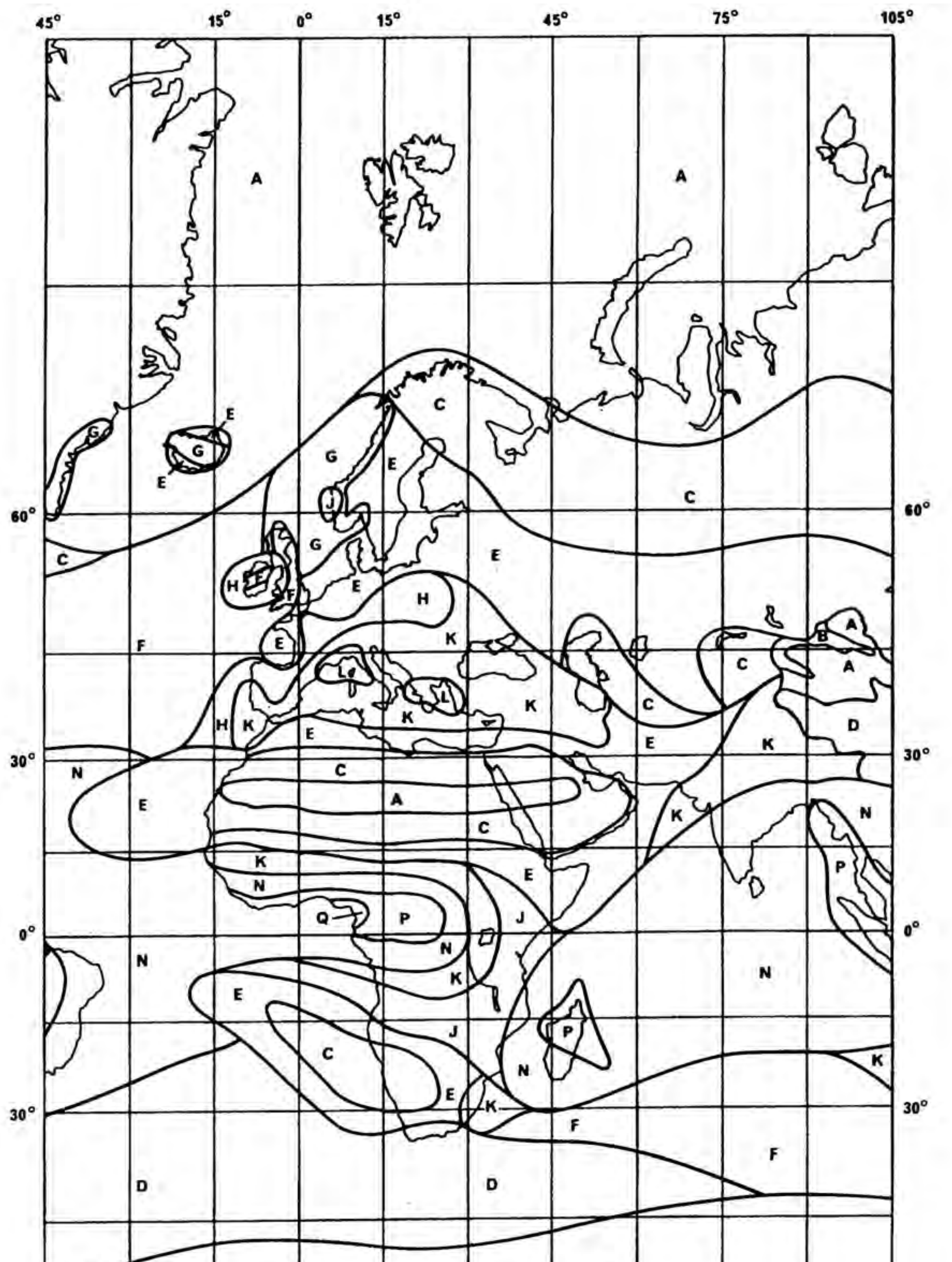
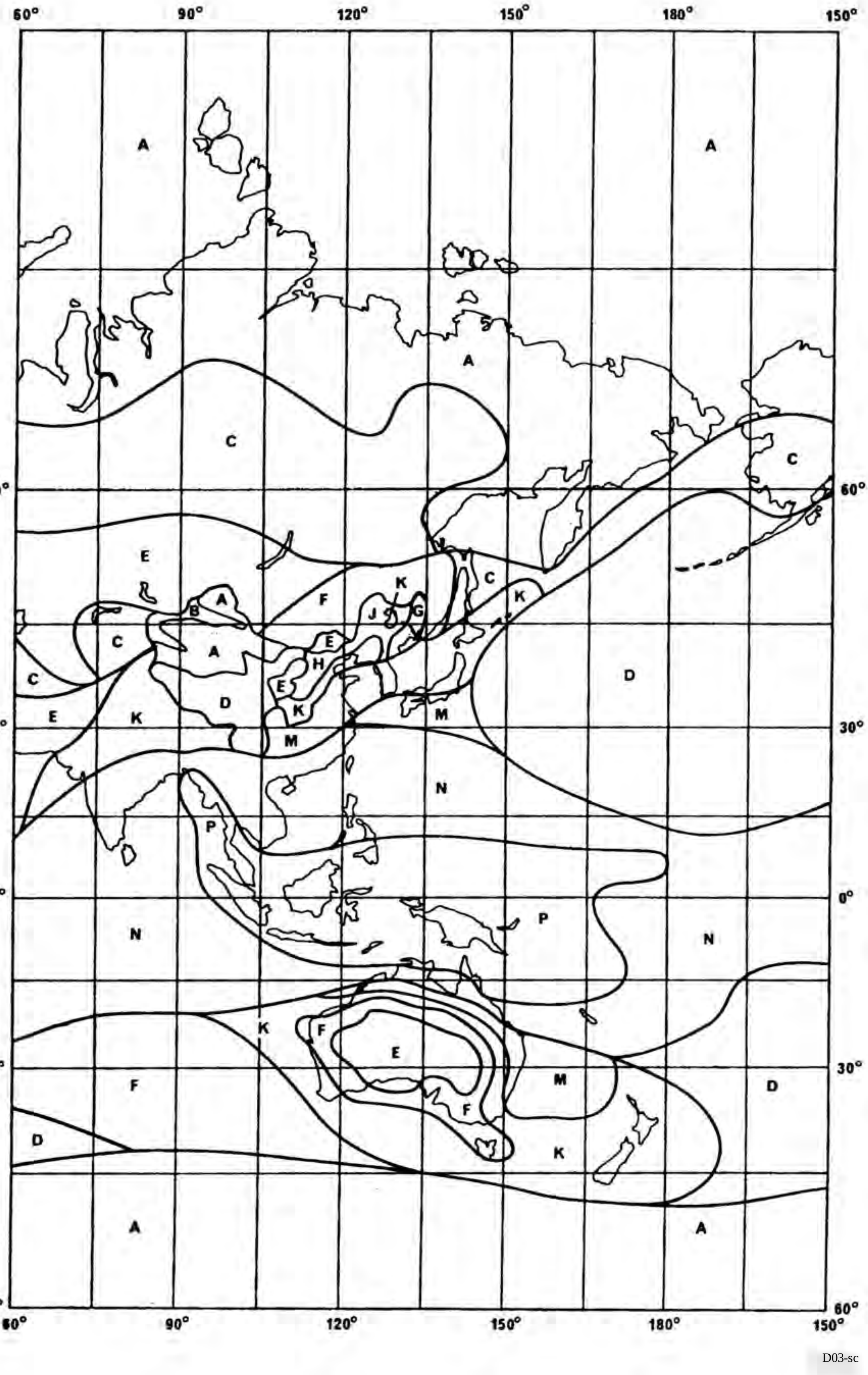


FIGURE II-3


60°
90°
120°
150°
180°
150°
60°
30°
0°
30°
60°
A
C
E
F
K
J
G
B
H
D
M
N
P
E
F
M
K
D
A
N
A
D03-sc

The curves shown in Figure II-4 represent consolidated rainfall-rate distributions, each applicable to several of these rain climatic Zones.

Determine which rain climatic Zone is applicable to the location of the earth station:

– For 0.001% < p < 0.3% and the applicable rain climatic Zone:

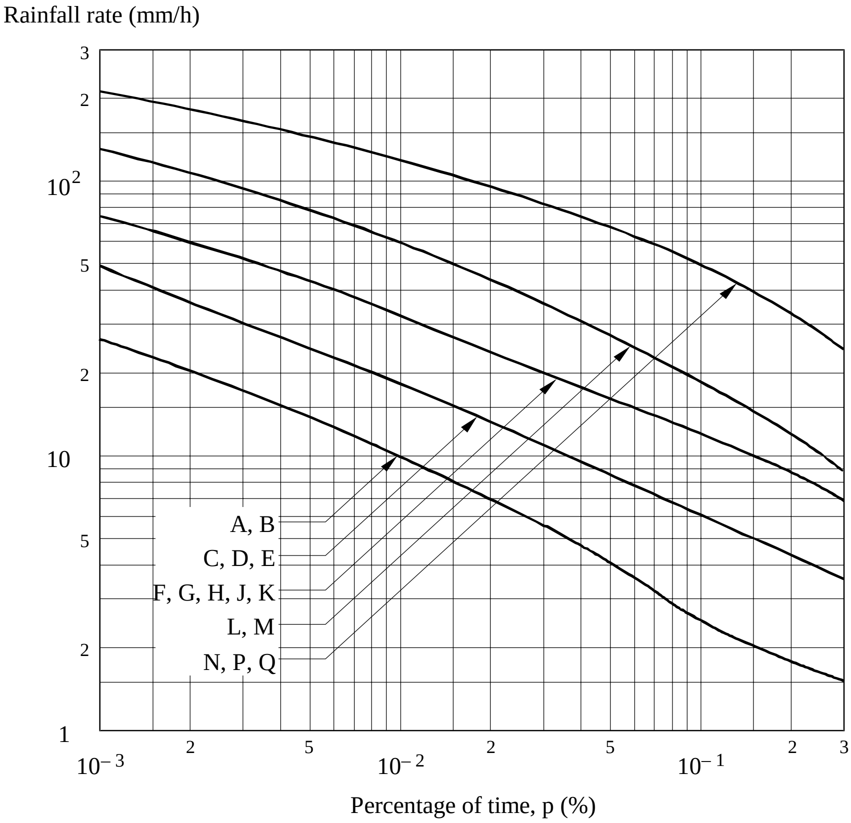
Determine $R(p)$ either from Figure II-4 or from equations (II-2, II-3, II-4, II-5, II-6).

– For $p \geq 0.3\%$:

Use equation (II-7) with values of $R(0.3\%)$ and p_c obtained from Table II-1.

FIGURE II-4

Consolidated cumulative distributions of rainfall rate for the rain climatic zones shown in Figures II-1, II-2 & II-3



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Rain climatic Zones A, B

$$R(p) = 1.1p^{-0.465} + 0.25\left[\log(p/0.001)\log^3(0.3/p)\right] - \left[\left|\log(p/0.1)\right| + 1.1\right]^{-2} \quad \text{(II-2)}$$

Rain climatic Zones C, D, E

$$R(p) = 2\ p^{-0.466} + 0.5\left[\log(p/0.001)\log^3(0.3/p)\right] \quad \text{(II-3)}$$

Rain climatic Zones F, G, H, J, K

$$R(p) = 4.17\ p^{-0.418} + 1.6\left[\log(p/0.001)\log^3(0.3/p)\right] \quad \text{(II-4)}$$

Rain climatic Zones L, M

$$R(p) = 4.9\ p^{-0.48} + 6.5\left[\log(p/0.001)\log^2(0.3/p)\right] \qquad \text{(II-5)}$$

Rain climatic Zones N, P, Q

$$R(p) = 15.6\left(p^{-0.383} + \left[\log(p/0.001)\log^{1.5}(0.3/p)\right]\right) \qquad \text{(II-6)}$$

TABLE II-1

Values of R and p_c for the different rain climatic Zone

Rain climatic zone	R (0.3%) (mm/h)	p_C (%)
A, B	1.5	2
C, D, E	3.5	3
F, G, H, J, K	7.0	5
L, M	9.0	7.5
N, P, Q	25.0	10

where

p_C %: is the reference time percentage above which the rainfall rate R(p) can be assumed to be zero.

$$R(p) = R(0.3\%)\left[\frac{\log(p_c/p)}{\log(p_c/0.3)}\right]^2 \qquad \text{(II-7)}$$

Determine the specific attenuation (dB/km) due to rain using values of k and α from Table II-2 in equation II-9. Values of k and α at frequencies other than those in Table II-2 can be obtained by interpolation using a logarithmic scale for frequency, a logarithmic scale for k and a linear scale for α.

TABLE II-2

Values of k and α for vertical polarization as a function of the frequency

Frequency (GHz)	k	α
1	0.000 0352	0.880
4	0.000 591	1.075
6	0.001 55	1.265
8	0.003 95	1.31
10	0.008 87	1.264
12	0.016 8	1.20
14	0.029	1.15
18	0.055	1.09
20	0.069 1	1.065
22.4	0.090	1.05
25	0.113	1.03
28	0.150	1.01
30	0.167	1.00
35	0.233	0.963
40	0.310	0.929
40.5	0.318	0.926

let: $$R = R(p) \qquad \text{(II-8)}$$

Then the specific attenuation (dB/km) due to rain is given by:

$$\gamma_R = k\, R^{\alpha} \tag{II-9}$$

Calculate the effective diameter of the rain cell.

$$d_s = 3.5\, R^{-0.08} \tag{II-10}$$

Then, calculate the effective scatter transfer function.

$$R_{cv} = \frac{2.17}{\gamma_R d_s}\left(1 - 10^{\frac{-\gamma_R d_s}{5}}\right) \tag{II-11}$$

Calculate the additional attenuation outside the common volume.

$$\Gamma_2 = 631 k R^{(\alpha - 0.5)} \times 10^{-(R+1)^{0.19}} \tag{II-12}$$

Determine the rain height above ground, h_R (km):

For North America and Europe west of 60° E longitude:

$$h_R = 3.2 - 0.075\,(\zeta - 35) \qquad \text{for} \quad 35 \le \zeta \le 70 \tag{II-13}$$

where

ζ is the latitude of the coordinating earth station.

For all other areas of the world:

$$h_R = \begin{cases} 5 - 0.075(\zeta - 23) & \text{for } \zeta > 23 \text{ northern hemisphere} \quad \text{(II-14a)} \\ 5 & \text{for } 0 \le \zeta \le 23 \text{ northern hemisphere} \quad \text{(II-14b)} \\ 5 & \text{for } 0 \ge \zeta \ge -21 \text{ southern hemisphere} \quad \text{(II-14c)} \\ 5 + 0.1(\zeta + 21) & \text{for } -71 \le \zeta < -21 \text{ southern hemisphere} \quad \text{(II-14d)} \\ 0 & \text{for } \zeta < -71 \text{ southern hemisphere} \quad \text{(II-14e)} \end{cases}$$

Determine the specific attenuation due to water vapour absorption (a water vapour density of 7.5 g/m^3 is used):

$$\gamma_{wr} = \left[0.06575 + \frac{3.6}{(f - 22.2)^2 + 8.5}\right] f^2\, 7.5 \times 10^{-4} \tag{II-15}$$

3.1 Iterative calculations:

Evaluate equations II-16 to II-21 inclusive for increasing values of r_i , where r_i is the current distance (km) between the region of maximum scattering and the possible location of a terrestrial station and i = 0,1,2..etc. Continue this process until either of the conditions given in equations II-1a and II-1b is true. Then the rain-scatter required distance d_r is the current value of r_i .

$$r_i = d_{\min} + i.s \tag{II-16}$$

Determine the loss above the rain height, L_{ar} (dB), applicable to scatter coupling:

$$L_{ar} = \begin{cases} 6.5\left[6(r_i - 50)^2 \times 10^{-5} - h_R\right] & \text{for } 6(r_i - 50)^2 \times 10^{-5} > h_R \quad \text{(II-17a)} \\ 0 & \text{for } 6(r_i - 50)^2 \times 10^{-5} \le h_R \quad \text{(II-17b)} \end{cases}$$

Calculate the additional attenuation for the departure from Rayleigh scattering.

$$A_b = \begin{cases} 0.005\,(f - 10)^{1.7}\,R^{0.4} & \text{for } 10 \text{ GHz} < f < 40.5 \text{ GHz} \quad \text{(II-18a)} \\ 0 & \text{for } f \le 10 \text{ GHz or when } L_{ar} \ne 0 \quad \text{(II-18b)} \end{cases}$$

Calculate the effective path length for oxygen absorption.

$$d_0 = \begin{cases} 0.7\,r_i + 32 & \text{for } r_i < 340 \text{ km} \quad \text{(II-19a)} \\ 270 & \text{for } r_i \ge 340 \text{ km} \quad \text{(II-19b)} \end{cases}$$

Calculate the effective path length for water vapour absorption.

$$d_v = \begin{cases} 0.7\,r_i + 32 & \text{for } r_i < 240 \text{ km} \quad \text{(II-20a)} \\ 200 & \text{for } r_i \ge 240 \text{ km} \quad \text{(II-20b)} \end{cases}$$

Determine the propagation mode (2) path loss, L_r (dB):

$$L_r = 168 + 20\log r_i - 20\log f - 13.2\log R - G_x + A_b - 10\log R_{cv} + \Gamma_2 + L_{ar} + \gamma_o d_0 + \gamma_{wr} d_v \quad \text{(II-21)}$$

where

γ_o: is given in equation I-11 and

G_x: is the terrestrial network antenna gain in Tables 1 or 2 of Annex VII.

4 Construction of the propagation mode (2) contour

In order to determine the centre of the circular propagation mode (2) contour, it is necessary to calculate the horizontal distance to this point from the earth station, along the azimuth of the earth station antenna main beam axis. The distance, Δd (km), to the centre of the propagation mode (2) contour is given by:

$$\Delta d = \frac{h_R}{2 \tan \varepsilon_s} \quad \text{(II-23)}$$

where

ε_s: is the earth station antenna main beam axis elevation angle and Δd shall be limited to the distance (d_r – 50) km.

The propagation mode (2) required distance d_r must lie within the range between the minimum coordinating distance d_{min}, and the propagation mode (2) maximum calculation distance d_{max2}.

Draw the propagation mode (2) contour as a circle of radius d_r km around the centre determined above. The propagation mode (2) contour is the locus of points on this circle. However, if any part of the propagation mode (2) contour falls within the contour defined by the minimum coordination distance, this arc of the propagation mode (2) contour is taken to be identical to the contour based on the minimum coordination distance and the propagation mode (2) contour is then no longer circular.

ANNEX III

Antenna gain toward the horizon for earth stations operating to geostationary space stations

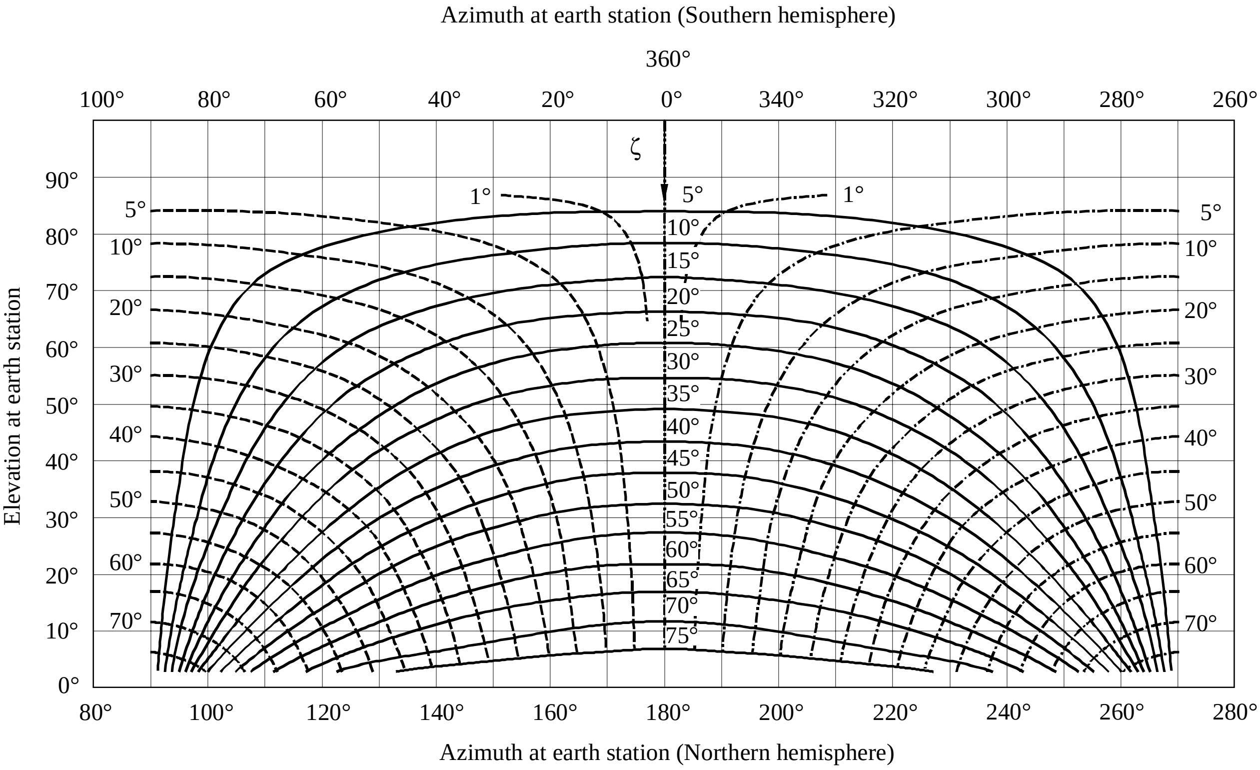
1 General

The gain component of the earth station antenna in the direction of the physical horizon around an earth station is a function of the angular separation between the antenna main beam axis and the horizon in the direction under consideration. When the earth station is used to transmit to a space station in a slightly inclined orbit, all possible pointing directions of the antenna main beam axis need to be considered. For earth station coordination, knowledge of $\varphi(\alpha)$, the minimum possible value of the angular separation that will occur during the operation of the space station, is required for each azimuth.

When a geostationary space station maintains its location close to its nominal orbital position, the earth station's main beam axis elevation angle ε_S and azimuth angle α_S to the space station from the earth station's latitude ζ are uniquely related. Figure III-1 shows the possible location arcs of positions of a space station on the geostationary orbit in a rectangular azimuth/elevation plot. It shows arcs corresponding to a set of earth station latitudes and the intersecting arcs correspond to points on the orbit with a fixed difference in longitude east or west of the earth station.

FIGURE II-1

Position arcs of geostationary satellites



——— Arc of geostationary-satellite orbit visible from earth station at terrestrial latitude ζ

Difference in longitude between the earth station and the sub-satellite point:

- - - - Satellite longitude E of earth station longitude

-·-·-·- Satellite longitude W of earth station longitude

-··-··- Satellite longitude equal to the earth station longitude

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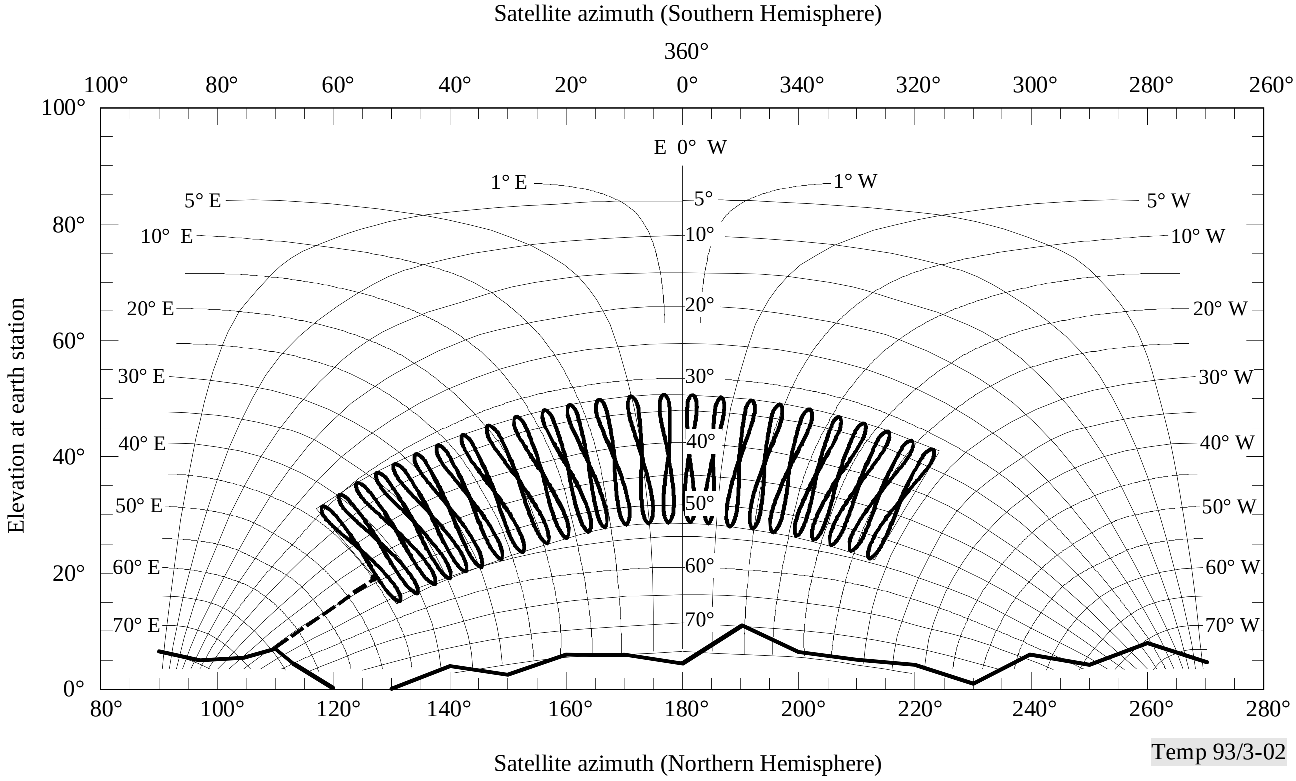
When the north/south station-keeping of a geostationary satellite is relaxed, the orbit of the satellite becomes inclined with an inclination that increases gradually with time. As viewed from the earth, the position of the satellite traces a figure eight during each 24-hour period. Figure III-2 shows the variations in the trajectories of a set of satellites, each with 10° inclination, spaced by 3° along the geostationary orbit from 28° W to 44° E with respect to an earth station at 43° N longitude. Figure III-2 also shows, with a dashed curve, the great-circle arc corresponding to the minimum off-axis angle φ(α) between this envelope and the horizon profile at an azimuth of 110°.

FIGURE III-2

Position arcs of geostationary satellites with horizon and the arc from the horizon at azimuth 110° to the envelope of satellites with 10° inclination on the geostationary orbital arc from 28° W to 44° E of an earth station at 43° N latitude



For a transmitting earth station operating in a frequency band that is also allocated for bidirectional use by receiving earth stations operating to geostationary space stations, refer to § 1.1 of Annex V.

2 Determination of the angular separation φ(α)

For the determination of the off-axis angle φ(α), two cases are distinguished. These depend on whether or not the earth station will operate to a space station in a slightly inclined orbit. The following equations may be used both of these cases:

$$\psi_s(i, \delta) = \text{arc cos } (\sin \zeta \sin i + \cos \zeta \cos i \cos \delta) \qquad \text{(III-1)}$$

$$\varepsilon_S(i,\delta) = \arcsin\left[\frac{K\cos\psi_S(i,\delta) - 1}{\left(1 + K^2 - 2K\cos\psi_S(i,\delta)\right)^{1/2}}\right] \qquad \text{(III-2)}$$

$$\alpha'_{os}(i,\delta) = \arccos\left[\frac{\sin i - \cos\psi_s \sin\zeta}{\sin\psi_s \cos\zeta}\right] \tag{III-3}$$

$\alpha_s(i, \delta) = \alpha_{os}(i, \delta)$ for a space station located east of the earth station ($\delta \geq 0$) (III-4)

$\alpha_s(i, \delta) = 360° - \alpha_{os}(i, \delta)$ for a space station located west of the earth station ($\delta \leq 0$) (III-5)

$\varphi(\alpha, i, \delta) = \arccos\,[\cos \varepsilon_h(\alpha) \cos \varepsilon_s(i, \delta) \cos (\alpha - \alpha_s(i, \delta)) + \sin \varepsilon_h(\alpha) \sin \varepsilon_s(i, \delta)]$ (III-6)

where

ζ: latitude of the earth station (positive for north; negative for south)

δ: difference in longitude from the earth station to a space station

i: latitude of a sub-satellite point (positive for north; negative for south)

$\psi_s(i, \delta)$: great-circle arc between the earth station and a sub-satellite point

$\alpha_s(i, \delta)$: space station azimuth as seen from the earth station

$\varepsilon_s(i, \delta)$: space station elevation angle as seen from the earth station

$\varphi(\alpha, i, \delta)$: angle between the main beam and the horizon direction corresponding to the azimuth (α) under consideration when the main beam is steered towards a space station with a sub-satellite point at latitude i and longitude difference δ

α: azimuth of the direction under consideration

ε_h: elevation angle of the horizon at the azimuth, α under consideration

$\varphi(\alpha)$: angle to be used for horizon gain calculation at the azimuth under consideration, α

K: orbit radius/earth radius, which for the geostationary orbit is assumed to be 6.62.

All arcs mentioned above are in degrees.

Case 1: **Single space station, no orbital inclination**

For a space station operating with no orbital inclination at an orbital position with difference in longitude δ_0, equations (III-1) to (III-6) may be applied directly using $i = 0$ to determine $\varphi(\alpha)$ for each azimuth α. Thus:

$$\varphi(\alpha) = \varphi(\alpha, 0, \delta_0) \tag{III-7}$$

where

δ_0: longitude difference from the earth station to the space station.

Case 2: Single space station, in a slightly inclined orbit

For a space station operating in a slightly inclined orbit on a portion of the geostationary arc with nominal longitude difference of δ_0, the maximum orbital inclination over its lifetime, i_s, must be considered. Equations (III-1) to (III-6) may be applied to develop the minimum off-axis angle to each of four arcs in azimuth/elevation that bound the trajectory of the space station in angle and elevation. The bounding arcs correspond to the maximum and minimum latitudes of the sub-satellite points and the extremes of the difference in longitude between the earth and space stations when the space station is operating at its maximum inclination.

The determination of the minimum off-axis angles in equations (III-8), (III-9), (III-10), (III-11) and (III-12) may be made by taking increments along a bounding contour. The step size in inclination i or longitude δ should be between 0.5° and 1.0° and the end points of the respective ranges should be included in the calculation.

The horizon profile $\varepsilon_h(\alpha)$ used in the determination of $\varphi(\alpha)$ is specified at increments in azimuth α that do not exceed 5°.

Thus:

$$\varphi(\alpha) = \min_{n = 1 \text{ to } 4} \varphi_n(\alpha) \tag{III-8}$$

with:

$$\varphi_1(\alpha) = \min \varphi(\alpha, -i_s, \delta) \quad \delta_0 - \delta_s \le \delta \le \delta_0 + \delta_s \tag{III-9}$$

$$\varphi_2(\alpha) = \min \varphi(\alpha, i_s, \delta) \quad \delta_0 - \delta_s \le \delta \le \delta_0 + \delta_s \tag{III-10}$$

$$\varphi_3(\alpha) = \min \varphi(\alpha, i, \delta_0 - \delta_s) \quad -i_s \le i \le i_s \tag{III-11}$$

$$\varphi_4(\alpha) = \min \varphi(\alpha, -i_s, \delta_0 + \delta_s) \quad -i_s \le i \le i_s \tag{III-12}$$

$$\delta_s = (i_s / 15)^2 \tag{III-13}$$

where

i_s: maximum operational inclination angle of the satellite orbit

δ_s: maximum longitude change from nominal value of the sub-satellite point of a satellite with orbital inclination i_s.

3 Determination of antenna gain

The relationship $\varphi(\alpha)$ is used to derive a function for the horizon antenna gain, G (dB) as a function of the azimuth α, by using the actual earth station antenna pattern, or a formula giving a good approximation. For example, in cases where the ratio between the antenna diameter and the wavelength is equal to or greater than 35, the following equation is used:

$$G(\varphi) = \begin{cases} G_{amax} - 2.5 \times 10^{-3}\left(\dfrac{D}{\lambda}\varphi\right)^2 & \text{for } 0 < \varphi < \varphi_m \\ G_1 & \text{for } \varphi_m \le \varphi < \varphi_r \\ 29 - 25\log\varphi & \text{for } \varphi_r \le \varphi < 36^\circ \\ -10 & \text{for } 36^\circ \le \varphi \le 180^\circ \end{cases} \tag{III-14}$$

$$G_1 = \begin{cases} -1 + 15\log\left(D/\lambda\right) & \text{dBi} \quad \text{for } D/\lambda \ge 100 \\ -21 + 25\log\left(D/\lambda\right) & \text{dBi} \quad \text{for } 35 \le D/\lambda < 100 \end{cases}$$

$$\varphi_m = \frac{20\lambda}{D}\sqrt{G_{amax} - G_1} \qquad \text{degrees}$$

$$\varphi_r = \begin{cases} 15.85\left(D/\lambda\right)^{-0.6} & \text{degrees} \qquad \text{for } D/\lambda \geq 100 \\ 100\left(\lambda/D\right) & \text{degrees} \qquad \text{for } 35 \leq D/\lambda < 100 \end{cases}$$

Where a better representation of the actual antenna pattern is available, it may be used.

In cases where D/λ is not given, it may be estimated from the expression:

$$20\log\frac{D}{\lambda} \approx G_{amax} - 7.7$$

where

G_{amax}: main beam axis antenna gain (dBi).

D: is the antenna diameter and λ is the wavelength: both expressed in metres.

G_1: gain of the first side lobe

ANNEX IV

Antenna gain toward the horizon for earth stations operating to non-geostationary space stations

This Annex presents methods which may be used to determine the antenna gain towards the horizon for earth stations operating to non-geostationary satellites using the method described in § 2.2 of the main body of the Appendix.

1 Determination of the horizon antenna gain

In its simplest implementation, this method depends on the minimum elevation angle of the beam axis of the earth station antenna (ε_{sys}), which is a system parameter that has the same value on all azimuths from the earth station. If the horizon elevation angle at an azimuth under consideration is ε_h degrees, the minimum separation angle from the horizon at this azimuth to any possible pointing angle for the main beam axis of the antenna (φ_{min}) is equal to the difference between these two angles ($\varepsilon_{sys} - \varepsilon_h$), but it is not less than zero degrees. The maximum separation angle from the horizon at this azimuth to any possible pointing angle for the main beam axis of the antenna (φ_{max}) is equal to the difference between the sum of these two angles and 180 degrees ($180 - \varepsilon_{sys} - \varepsilon_h$). The maximum and minimum values of horizon gain for the azimuth under consideration are obtained from the gain pattern of the earth station antenna at these off-axis angles. Where no pattern is available the pattern of § 3 of Appendix III may be used.

Additional constraints may be included in the determination of the maximum and minimum values of horizon antenna gain where an earth station operates with a constellation of non-geostationary satellites that are not in near-polar orbit. In this case, depending on the latitude of the earth station, there may be portions of the hemisphere above the horizontal plane at the earth station in which no satellite will appear. To include these visibility limitations within this method, it is first necessary to determine, for a closely spaced set of azimuth angles around the earth station, the minimum elevation angle at which a satellite may be visible. This minimum satellite visibility elevation angle (ε_v) may be determined from consideration of the visibility of the edge of the shell formed by all possible orbits having the orbital inclination and altitude of the satellites in the constellation.

The lowest elevation angle toward which the main-beam axis of the earth station antenna will point on any azimuth is the minimum composite elevation angle (ε_c), which is equal to the greater of the minimum satellite visibility elevation angle (ε_v) and the minimum elevation angle of the earth station (ε_{sys}). After the minimum composite elevation angle has been determined for all azimuths by the procedure of § 1.1 of this Annex, the resulting profile of the minimum composite elevation angles can be used, in the procedure of § 1.2 of this Annex, to determine the maximum and minimum values of horizon gain at any azimuth.

1.1 Determination of satellite visibility limits

The visibility limits of a constellation of satellites can be determined from the inclination angle of the most inclined satellite and the altitude of the lowest satellite in the constellation. For this determination, six cases may be distinguished, but not all of these may be applicable for a given constellation and a given earth station latitude. The azimuth and the corresponding lower limit on the elevation angle are developed by a parametric method using a set of points on the edge of the orbital shell of the constellation. The approach is to develop this relationship for azimuths to the east of a station in the northern hemisphere. Elevation angles for azimuths to the west of the station and for all azimuths for stations in the southern hemisphere are obtained by symmetry. The following equations, which are applicable to circular orbits only, may be used for the complete determination of the horizon antenna gain in all practical cases:

$$\psi(\delta) = \text{arc cos } (\sin \zeta \sin i + \cos \zeta \cos i \cos \delta) \qquad \text{(IV-1)}$$

$$\varepsilon_V(\delta) = \arcsin\left[\frac{K_1 \cos[\psi(\delta)] - 1}{\left(1 + K_1^2 - 2K_1 \cos[\psi(\delta)]\right)^{1/2}}\right] \qquad \text{(IV-2)}$$

$$\alpha_0(\delta) = \arccos\left[\frac{\sin i - \cos[\psi(\delta)] \ \sin\zeta}{\sin[\psi(\delta)] \ \cos\zeta}\right] \qquad \text{(IV-3)}$$

with

$$\alpha(\delta) = \begin{cases} \alpha_0(\delta) \quad \text{and} & \\ 360 - \alpha_0(\delta) & \text{for earth stations north of the Equator} \\ 180 - \alpha_0(\delta) \quad \text{and} & \\ 180 + \alpha_0(\delta) & \text{for earth stations south of the Equator} \end{cases} \qquad \text{(IV-4)}$$

where

- i: the orbital inclination of the satellites in the constellation assumed to be positive and between 0° and 90°
- ζ: modulus of the latitude of the earth station
- δ: difference in longitude from the earth station to a point on the edge of the orbital shell of the constellation
- $\psi(\delta)$: great-circle arc between the earth station and a point on the surface of the earth directly below the point on the edge of the orbital shell of the constellation
- $\alpha(\delta)$: azimuth from the earth station to a point on the edge of the orbital shell
- $\alpha_0(\delta)$: the principle azimuth, an azimuth between 0 and 180 degrees, from an earth station north of the Equator to a point on the edge of the orbital shell
- $\varepsilon_V(\delta)$: elevation angle from the earth station to a point on the edge of the orbital shell
- K_1: orbit radius/earth radius for the lowest altitude satellite in the constellation (earth radius = 6 378.14 km)

$$\psi_m = \arccos(1/K_1)$$

All arcs mentioned above are in degrees.

For any latitude on the surface of the earth, the azimuth for which the minimum elevation angle to a satellite can be greater than zero, and the corresponding elevation angles, may be determined by implementing the calculations under the following case(s). No more than two of these cases will be applicable for any latitude. For situations not specifically addressed in the following cases, no satellite is visible at elevation angles at or below 90° on any azimuth.

Case 1: For: $\zeta \le i - \psi_m$

For this case a satellite may be visible to the horizon for all azimuths about the earth station ($\varepsilon_v = 0$).

Case 2: For: $i - \psi_m < \zeta \le \arcsin(\sin i \cos \psi_m)$

For this case the azimuth angles and elevation are developed parametrically by choosing a set of values of δ, uniformly spaced on the interval 0 to δ_1, and applying equations IV-1 to IV-4. For this purpose the spacing between values is not to exceed 1.0 degree, and the endpoints are to be included.

$$\delta_1 = \arccos\left[\frac{\cos\psi_m - \sin\zeta \sin i}{\cos\zeta \cos i}\right]$$

At any principal azimuth ($\alpha_0(\delta)$) that is not included in the set, the minimum elevation angle is zero ($\varepsilon_v = 0$), except for azimuths where Case 6 additionally applies.

Case 3: For: $\arcsin(\sin i \cos \psi_m) < \zeta < i$, and $\zeta < 180 - \psi_m - i$

For this case the azimuth angles and elevation are developed parametrically by choosing a set of values of δ, uniformly spaced on the interval 0 to δ_2, and applying equations IV-1 to IV-4. For this purpose the spacing between values is not to exceed 1.0 degree, and the endpoints are to be included.

$$\delta_2 = 2\arctan\left[\frac{\sqrt{\sin^2\psi_m - \cos^2 i \sin^2 \delta_i}}{\sin\zeta \cos i \sin\delta i}\right] - \delta i$$

At any principal azimuth ($\alpha_0(\delta)$) that is not included in the set, the minimum elevation angle is zero ($\varepsilon_v = 0$), except for azimuths where Case 6 additionally applies.

Case 4: For: $i \le \zeta < i + \psi_m$, and $\zeta < 180 - i - \psi_m$

For this case, the minimum elevation angle is given explicitly in terms of the principal azimuth angle α_0 as follows:

$$\varepsilon_v = \begin{cases} 90 & \text{for} \quad 0 \le \alpha_0 < \alpha_2 \\ 0 & \text{for} \quad \alpha_2 \le \alpha_0 \le 180 \end{cases}$$

where

$$\alpha_2 = \arccos\left[\frac{\sin i - \cos\psi_m \sin\zeta}{\sin\psi_m \cos\zeta}\right]$$

Note that a minimum elevation angle of 90 degrees in this formulation indicates that no satellite is visible at elevation angles at or below 90 degrees on these azimuths, furthermore, within the range of principal azimuths where the minimum elevation angle is zero, Case 6 may additionally apply.

Case 5: For $180 - i - \psi_m \le \zeta \le 90$

For this case, a satellite may be visible to the horizon for all azimuths about the earth station $(\varepsilon_v = 0)$.

Case 6: For $\zeta < \psi_m - i$

This case may occur additionally with Case 2, Case 3 or Case 4 and a satellite may be visible only above a minimum elevation angle for other principal azimuths.

For this case the other principal azimuths and the corresponding elevation angles are developed parametrically by choosing a set of values δ, uniformly spaced on the interval 0 to δ_3, and applying equations (IV-1) to (IV-4) with i replaced by –i. For this purpose the spacing between values is not to exceed 1.0 degree and the end points are to be included.

$$\delta_3 = \arccos\left[\frac{\cos\psi_m + \sin\zeta \sin i}{\cos\zeta \cos i}\right]$$

1.2 Determination of minimum and maximum horizon gain from the minimum visible elevation angle profile

The horizon gain of the earth station antenna is determined from the profile of values of the minimum composite elevation angle (ε_c). At any azimuth the minimum composite elevation angle is the greater of the minimum satellite visibility elevation angle at that azimuth(ε_v) and the minimum elevation angle for the earth station (ε_{sys}). The following procedure may be used to determine the maximum and minimum values of horizon antenna gain for each azimuth under consideration.

The following equation may be used to determine the angular separation from the horizon profile, at an azimuth angle α and horizon elevation angle ε_h, to a point on the profile of the minimum composite elevation angle, where the minimum composite elevation angle is ε_c at an azimuth angle of α_c:

$$\varphi(\alpha, \alpha_c) = \arccos\left[\sin \varepsilon_h(\alpha) \sin(\varepsilon_c(\alpha_c)) + \cos \varepsilon_h(\alpha) \cos(\varepsilon_c(\alpha_c)) \cos(\alpha - \alpha_c)\right] \qquad \text{(IV-5)}$$

where

- α: azimuth of the direction under consideration
- $\varepsilon_h(\alpha)$: elevation angle of the horizon at the azimuth, α, under consideration
- $\varepsilon_c(\alpha_c)$: minimum composite elevation angle at the azimuth, α_c
- α_c: azimuth corresponding to ε_c.

The minimum value of the separation angle φ_{min}, for the azimuth under consideration, is determined by finding the minimum value of $\varphi(\alpha, \alpha_c)$ for any azimuth α_c, and the maximum value, φ_{max}, is determined by finding the maximum value of $\varphi(\alpha, \alpha_c)$ for any azimuth α_c. The azimuth angles (α) are usually taken in increments of 5 degrees; however, to accurately determine the minimum separation angle, the values of the minimum composite elevation angle, ε_c, needs to be determined for a spacing of 1 degree or less in the azimuth α_c. Where the procedure in § 1.1 of this Annex do not provide a profile of minimum composite elevation angle with a close enough spacing in azimuth angles, linear interpolation may be used to develop the necessary intermediate values. The maximum and minimum horizon antenna gains, G_{max} and G_{min}, to be used in the equations of § 2.2 of the main body of the Appendix for the azimuth under consideration, are obtained by applying the off-axis angles, φ_{min} and φ_{max}, respectively, in the earth station antenna pattern. If the earth station antenna pattern is not known then the antenna pattern in § 3 of Annex III is used. In many cases, φ_{max} will be large enough on all azimuths so that G_{min} will be equal to the minimum gain of the antenna pattern at all azimuths.

ANNEX V

Determination of the coordination area for a transmitting earth station with respect to receiving earth stations operating to geostationary space stations in bidirectionally allocated frequency bands

1 Introduction

The propagation mode (1) coordination area of a transmitting earth station, with respect to unknown receiving earth stations that operate to geostationary space stations, requires the determination of the horizon gain of the antenna of the receiving earth station at each azimuth of the transmitting earth station. Different methods then need to be applied to determine the coordination area of the coordinating earth station depending on whether it operates to geostationary or non-geostationary space stations. When both the coordinating earth station and the unknown receiving earth stations operate to geostationary space stations, it is also necessary to determine a propagation mode (2) coordination contour.

The coordination area of a transmitting earth station, with respect to unknown receiving earth stations that operate to non-geostationary space stations, can be determined by minor modifications to the methods applicable to the determination of coordination area of transmitting earth stations with respect to terrestrial stations. (See § 3.2.1 and 3.2.3 of the main body of the Appendix.)

2 Determination of the bidirectional coordination contour for propagation mode (1)

For a transmitting earth station operating in a frequency band that is also allocated for bidirectional use by receiving earth stations operating to geostationary space stations, further development of the procedures in Annex III is needed. It is necessary to determine the horizon gain of the unknown receiving earth station, the horizon gain to be used at each azimuth at the coordinating (transmitting) earth station, for the determination of the bidirectional coordination area.

2.1 Calculation of horizon gain for unknown receiving earth stations operating to geostationary space stations

The value of G_r , the horizon gain of the receiving earth station, for each azimuth (α) at the transmitting earth station is found by the following steps:

1) The receiving earth station may be operating to any satellite in the geostationary orbit above a minimum elevation angle, (ε_s) contained in Table 3 to Annex VII. The maximum difference in longitude (δ_b in degrees) between the receiving earth station and its associated space station occurs at this minimum elevation angle (ε_s) and is given by:

$$\delta_b = \arccos\left(\frac{\sin\left(\varepsilon_s + \arcsin\left(\frac{\cos(\varepsilon_s)}{K}\right)\right)}{\cos(\zeta)}\right) \qquad \text{(V-1)}$$

where

ζ : is the latitude of the receiving earth station, which is assumed to be the same as the transmitting earth station, and

K is the ratio of the radius of the satellite orbit to the radius of the earth and equals 6.62.

2) For each azimuth (α) at the transmitting earth station:

a) determine the azimuth α_r from the receiving earth station to the transmitting earth station:

$$\alpha_r = \alpha + 180° \qquad \text{for } \alpha < 180$$

$$\alpha_r = \alpha - 180° \qquad \text{for } \alpha \geq 180$$

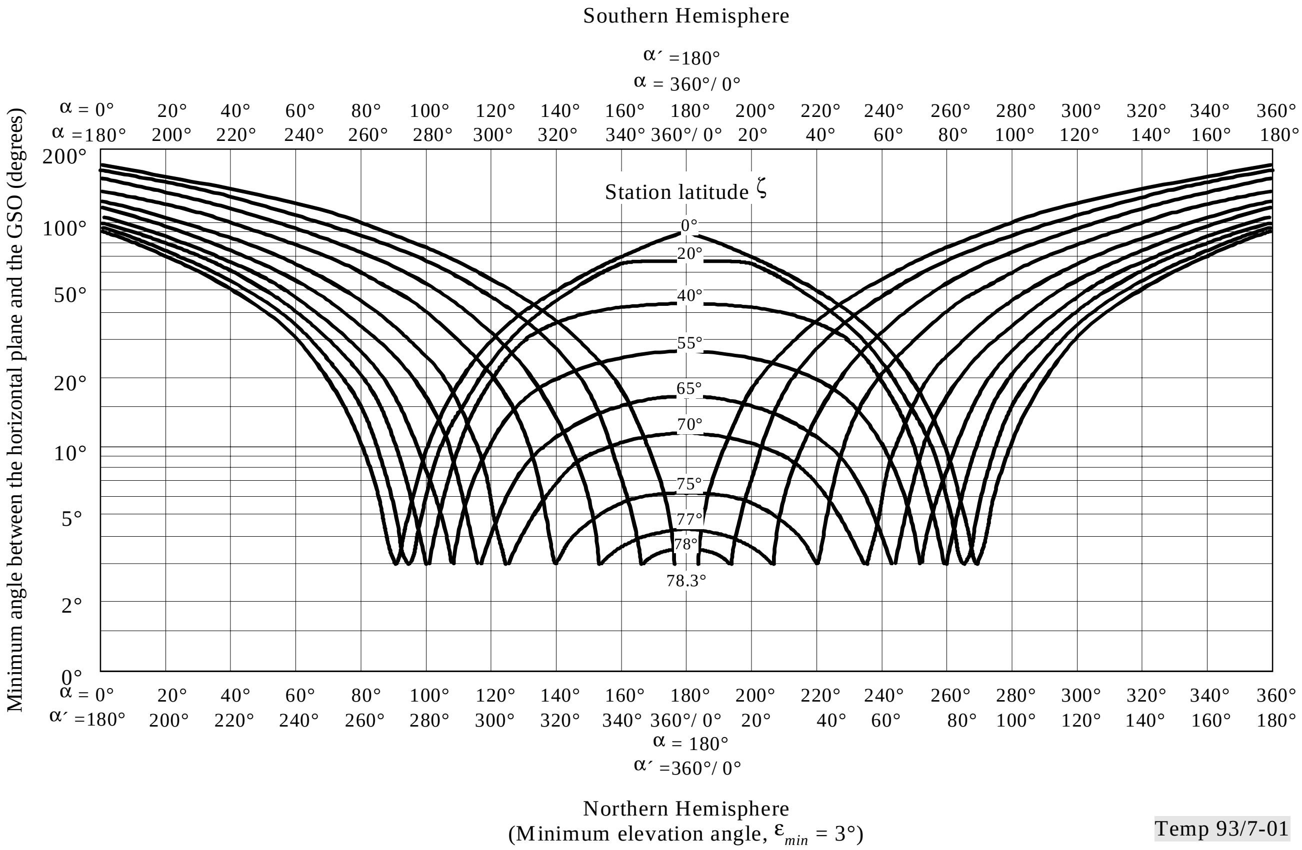
b) for each azimuth, α_r determine the minimum angular separation, $\varphi(\alpha_r)$ between the receiving earth station main beam axis and the horizon at this azimuth using Case 1 in § 2 of Annex III. For this evaluation $\varphi(\alpha_r)$ is the minimum value of $\varphi(\alpha_r, 0, \delta_0)$ where the values of δ_0 are between $-\delta_b$ and $+\delta_b$ in steps of 1 degree or less making sure to include the end points.

The minimum angular separation, $\varphi(\alpha_r)$, may be used with the gain pattern in § 3 of Annex III to determine the horizon gain for this azimuth (α), unless a different gain pattern is referenced in Table 3 of Annex VII.

Figure V-1 shows plots of the minimum angular separation between the horizon at zero degrees elevation on an azimuth α_r and a satellite on the geostationary orbit at an elevation above 3 degrees. Plots are shown for a set of values of the station latitude (ζ), which is assumed to be the same for both transmitting and receiving earth stations. Figure V-1 also provides a scale showing the corresponding azimuth (α) of the transmitting earth station.

Figure V-1

Illustration of minimum angular distance between points on the geostationary-satellite orbit (GSO) and the horizontal plane



3 Determination of the bidirectional rain scatter contour

The procedure for the determination of the bidirectional rain scatter area, as described in § 3.1.2 of the main body of the Appendix, is as follows:

The horizontal distance d_t (km) from the coordinating earth station to the point at which the main beam axis attains the rain height h_R is calculated by:

$$d_t = 8\,500\left(\sqrt{\tan^2 \varepsilon_s + h_R / 4\,250} - \tan \varepsilon_s\right) \text{ km} \qquad \text{(VI-2)}$$

where the rain height, h_R, can be determined from equations (II-13) or (II-14) in Annex II.

The maximum calculation distance, d_{emax}, to be used in the determination of the propagation mode (2) contour, for the case of a coordinating earth station operating in bidirectionally allocated frequency bands, is dependent on the rain height. It is the greater distance determined from:

$$d_{emax} = 130.4\sqrt{h_R} \text{ km or } d_{min}$$

where the minimum coordination distance, d_{min}, is given in § 4.2 of the main body of the Appendix.

The point, at the distance d_s from the earth station, on the azimuth α_s of the coordinating earth station's main beam axis, is the geographic point immediately below the main beam axis intersection with the rain height, and is the reference point from which the maximum calculation distance d_{emax} is measured (see Figure V-2).

If the maximum calculation distance, d_{emax}, is greater than the minimum coordination distance, d_{min}, then, calculate the maximum latitude at which a receiving earth station may operate to a geostationary satellite with a minimum elevation angle ε_s:

$$\zeta_{\max} = \arccos\left[\frac{\cos(\varepsilon_s)}{K}\right] - \varepsilon_s \qquad \text{(VI-3)}$$

where

ε_s: is given in Table 3 of Annex VII and

K: is the ratio of the radius of the satellite orbit to the radius of the earth and equals 6.62.

If the coordinating earth station latitude in the northern hemisphere is greater than ζ_{max}, or if the coordinating earth station latitude in the southern hemisphere is less than $-\zeta_{max}$ or –71°, then the rain scatter contour is a circle of radius d_{min}, centred on the transmitting earth station.

For all other cases, the coordination area is developed by the following procedure:

Step 1: The unknown receiving earth station is assumed to be operating to a satellite at the minimum elevation angle ε_s. It is also assumed that the receiving earth station is relatively close to the coordinating earth station in geometric terms hence, a plane geometry approximation can be applied within the coordination area. If the receiving earth station's main beam axis passes through the intersection of the coordinating earth station's main beam axis with the rain height, the azimuths from the point on the ground, immediately below this intersection, to the possible locations of a receiving earth station are given by:

$$\alpha_{w1} = \arccos\left[\frac{\tan\zeta}{\tan\zeta_{\max}}\right]$$

and

$$\alpha_{w2} = 360 - \alpha_{w1}$$

where

ζ is the latitude of the transmitting earth station.

Step 2: Mark on a map of an appropriate scale the coordinating earth station's location and draw from this location a line of distance, d_s, along the azimuth, α_s, to the point below the coordinating earth station's main beam axis intersection with the rain height.

Step 3: From the main beam axis intersection point in step 2, mark on the map the distance, d_{emax}, along the two azimuths, α_{w2} and α_{w1}, and on each azimuth at the distance, d_{emax}, draw two equal distance arcs of width 3° clockwise and counter-clockwise. The two arcs, each having a total width of 6°, are the first boundary elements of the bidirectional rain scatter area.

Step 4: Mark a circle of radius equal to the minimum coordination distance, d_{min}, around the coordinating earth station's location, and then draw straight lines from the northern edges of the two arc segments tangential to the northern rim of the circle, and from the southern edges of the two arc segments tangential to the southern rim of the circle.

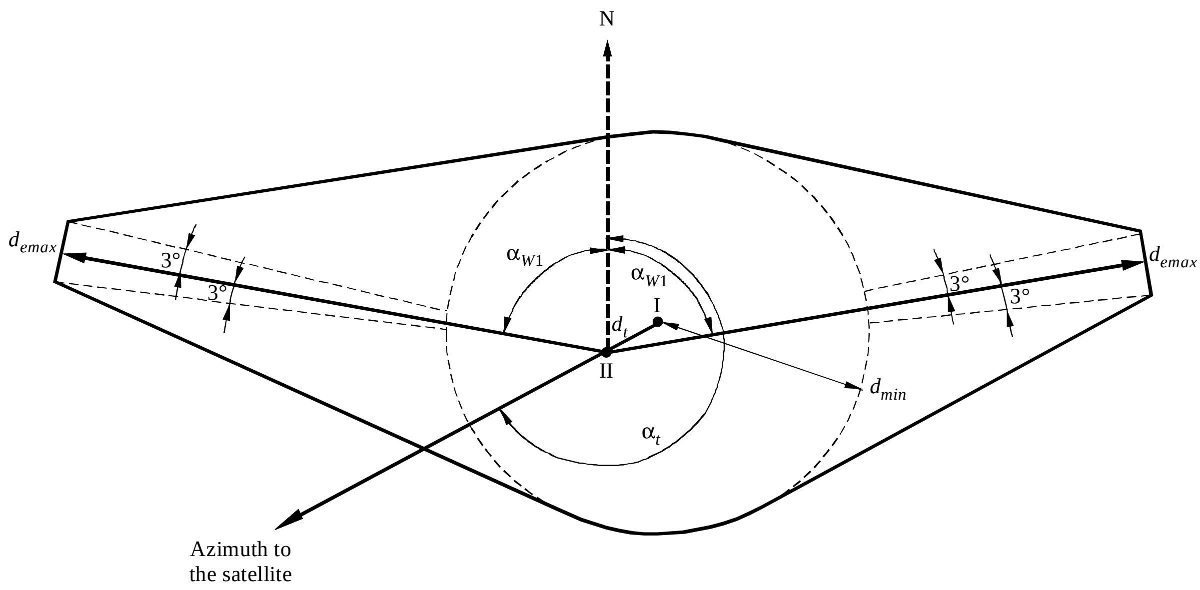
The area bounded by the two 6° wide arcs, the four straight lines, and the circular sections (of which there is always at least one) between the two northern and the two southern tangent points with the straight lines, constitutes the bidirectional rain scatter area.

Figure V-2 illustrates the construction of the bidirectional rain scatter area for a coordinating earth station. (The resulting rain scatter area contains the possible loci of all receiving earth station locations from which a beam path towards the geostationary-satellite orbit will intersect the main beam of the transmitting earth station antenna.)

FIGURE V-2

Example of the bidirectionnal rain scatter area

(Not to scale)



I: location of the transmitting earth station

II: point where the earth station antenna main-beam axis reaches the altitude h_R

Assumptions:

ζ = 40° N

ε_s = 10°

α_s = 254°

Temp 99/6-05

ANNEX VI

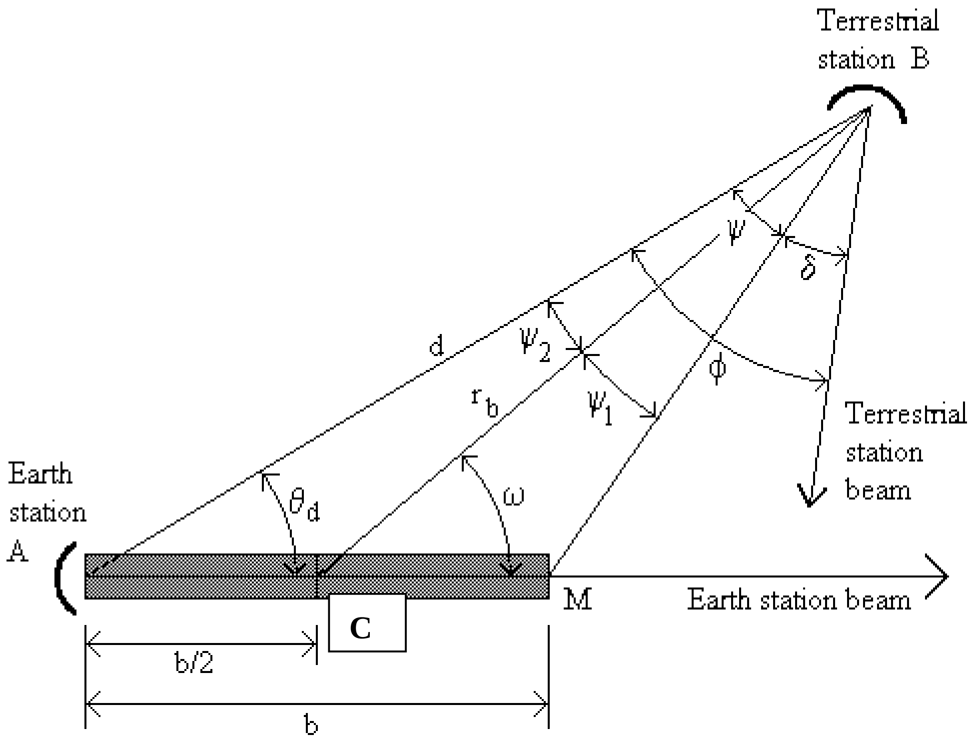
Determination of auxiliary contours for propagation mode (2)

1 Determination of auxiliary contours for propagation mode (2)

Propagation mode (2) auxiliary contours allow the azimuthal offset of a terrestrial station antenna beam from the coordinating earth station's location to be taken into consideration. Figure VI-1 shows the hydrometeor scatter region projected on to the horizontal plane. In this figure the earth station and the terrestrial station are located at the points A and B respectively, where the terrestrial station is on a radial defined by the angle ω from the point C at the centre of the propagation mode (2) main, or supplementary, contour. Point C is also the centre of the auxiliary contour.

FIGURE VI-1

Propagation geometry in the horizontal plane



The shaded area in Figure VI-1 represents the critical region, along the earth station's main beam axis, between the earth station and the rain height. Within this critical region a common volume can be formed between the earth station beam and the beam of any terrestrial stations within the propagation mode (2) main, or supplementary, contour. This critical region's length is *b* and its maximum horizontal extent is at point M. Intersection of this critical region by the terrestrial station main beam axis, would result in significant hydrometeor scatter interference via main lobe to main lobe coupling.

For a given point within the propagation mode (2) main, or supplementary, contour, the angle subtended by the critical region is termed the critical angle, ψ. The protection angle, υ, represents the angle of the terrestrial station main beam axis away from the critical region. The beam avoidance angle between the terrestrial station's main beam axis and the earth station's location is φ. It is the sum of the two angles ψ and υ and it is this quantity that has a fixed value for a specific auxiliary contour. Each auxiliary contour is generated by varying the angle, ω, and deriving the distance (r_b) from point C to the auxiliary contour. As the angle ω increases from 0° to 360°, the angles ψ and υ change, but their sum remains the same.

The algorithm in § 2 of this Annex can be used to calculate the auxiliary propagation mode (2) contour for a given value of beam avoidance angle φ.

The method is based on iteratively decrementing the distance, r_b, between terrestrial station and the centre of the common volume, and starting at the main contour distance d_r, until either the shortest value of r_b is found for which the required minimum loss is achieved, or the minimum coordination distance is reached. For each value of r_b the critical angle ψ is determined and then the protection angle υ is calculated. The terrestrial station antenna gain corresponding to υ and the current distance r_b are then used in equation (II-21) to obtain the propagation mode (2) path loss.

The above process is repeated for each angle ω, to generate a complete auxiliary contour for a given value of beam avoidance angle φ. For some combinations of beam avoidance angle and angle ω an auxiliary contour may coincide with the main, or supplementary, propagation mode (2) contour.

2 The step-by-step algorithm

Auxiliary propagation mode (2) contours are constructed by calculating distances along radials from the centre of the circular mode (2) main, or supplementary, contour, which is the point C, at the distance b/2 from the earth station along the azimuth of its main beam axis. The distance b/2 is equal to Δd, where Δd is given by equation (II-23), see Annex II.

For the selected value of beam avoidance angle, φ, generate the auxiliary contour for values of angle, ω, ranging from 0° to 180° in steps of 1° as follows:

a) Set r_b to the main, or supplementary, mode (2) contour distance d_r calculated as described in § 3.1 of Annex II.

b) Compute ψ from:

$$\psi_1 = \text{arc tan}\left(\frac{b\sin\omega}{2r_b - b\cos\omega}\right) \quad \text{(VI-1)}$$

$$\psi_2 = \text{arc tan}\left(\frac{b\sin\omega}{2r_b + b\cos\omega}\right) \quad \text{(VI-2)}$$

$$\psi = \psi_1 + \psi_2 \quad \text{(VI-3)}$$

c) If $\psi > \varphi$ then the auxiliary mode (2) contour coincides with the main or supplementary mode (2) contour for the current value of ω, and the calculation for that value of ω is completed, and go to step J. Otherwise proceed through the following steps d) to i) until one of the terminating conditions described in step f) and step i) are satisfied.

d) Decrement r_b by subtracting 0.2 km from its value.

e) Recalculate the critical angle ψ using equations (VI-1), (VI-2) and (VI-3).

f) If (0.5 b sin ω/sin ψ_2) < d_{min} the auxiliary mode (2) contour coincides with the minimum coordination distance d_{min} and the calculation for the current value of ω is completed and go to step J. Otherwise proceed to step g).

g) Compute the protection angle $\upsilon = \varphi - \psi$.

h) Calculate $G(\upsilon)$ the terrestrial station antenna gain at the angle υ relative to the beam axis using the reference antenna pattern given in this Annex.

i) In equation (II-21) use the gain calculated in step h) in place of G_x and the current value of r_b in place of r_i and calculate the corresponding propagation mode (2) path loss L_r. If $L_r < L(p)$ then increment r_b by adding 0.2 km to its value and take this as the distance for the current radial. Otherwise repeat from step d).

j) Once the value of r_b has been found for the current value of angle ω, calculate the angle θ_d from the location of the earth station, and if appropriate the distance, d, to that contour point using:

$$d = 0.5\ b \sin \omega / \sin \psi_2 \qquad \text{(VI-4)}$$

$$\theta_d = \omega - \psi_2 \qquad \text{(VI-5)}$$

An auxiliary propagation mode (2) contour is symmetrical about the earth station main beam axis. Thus values of d and θ_d corresponding to the values of ω from 181° to 359° can be found by noting that results for a given value of ω are the same as for ($-\omega$) or (360°$-\omega$).

The step size for incrementing r_b used above, 0.2 km, is suitable for most situations. It controls the granularity of the result when viewed as a set of r_b values. For low values of earth station beam elevation the granularity becomes more noticeable in the values of d and θ_d, and a smaller step size may be used.

3 Reference radiation patterns for line-of-sight radio-relay system antennas

The reference radiation pattern for line-of-sight radio-relay system antennas in this section is used for the unknown terrestrial station antenna in the propagation mode (2) contour calculations when the actual antenna pattern is not available. This antenna pattern can be used in the frequency range 1 000 MHz - 40.5 GHz to determine the main or supplementary contours, or for developing auxiliary contours.

a) In cases where the ratio between the antenna diameter and the wavelength is greater than 100, the following equation is used:

$$G(\varphi) = G_{amax} - 2.5 \times 10^{-3} \left(\frac{D}{\lambda}\varphi\right)^2 \quad \text{for} \quad 0 < \varphi < \varphi_m \qquad \text{(VI-13)}$$

$$G(\varphi) = G_1 \quad \text{for} \quad \varphi_m \leq \varphi < \varphi_r \qquad \text{(VI-14)}$$

$$G(\varphi) = 32 - 25 \log \varphi \quad \text{for} \quad \varphi_r \leq \varphi < 48° \qquad \text{(VI-15)}$$

$$G(\varphi) = -10 \quad \text{for} \quad 48° \leq \varphi \leq 180° \qquad \text{(VI-16)}$$

$$G_1 = 2 + 15 \log \frac{D}{\lambda} \qquad \text{(VI-17)}$$

$$\varphi_m = \frac{20\lambda}{D} \sqrt{G_{\mathrm{amax}} - G_1} \qquad \text{(VI-18)}$$

$$\varphi_r = 15.85 \left(\frac{D}{\lambda} \right)^{-0.6} \qquad \text{(VI-19)}$$

b) In cases where the ratio between the antenna diameter and the wavelength is less than or equal to 100, the following equation should be used:

$$G(\varphi) = G_{amax} - 2.5 \times 10^{-3} \left(\frac{D}{\lambda} \varphi \right)^2 \quad \text{for} \quad 0 < \varphi < \varphi_m \qquad \text{(VI-20)}$$

$$G(\varphi) = G_1 \quad \text{for} \quad \varphi_m \leq \varphi < 100 \frac{\lambda}{D} \qquad \text{(VI-21)}$$

$$G(\varphi) = 52 - 10 \log \frac{D}{\lambda} - 25 \log \varphi \quad \text{for} \quad 100 \frac{\lambda}{D} \leq \varphi < 48° \qquad \text{(VI-22)}$$

$$G(\varphi) = 10 - 10 \log \frac{D}{\lambda} \quad \text{for} \quad 48° \leq \varphi \leq 180° \qquad \text{(VI-23)}$$

c) In cases where only the maximum antenna gain is known, D/λ can be estimated from the following expression:

$$20 \log \frac{D}{\lambda} \approx G_{a\max} - 7.7 \qquad \text{(VI-24)}$$

where

G_{amax}: is the main beam axis antenna gain (dBi).

D: is the antenna diameter and λ is the wavelength: both expressed in metres.

G_1: is the gain of the first side lobe.

ANNEX VII

System parameters and predetermined coordination distances for determination of the coordination area around an earth station

1 System parameters introduction

Tables 1-3 contain the system parameter values required by the methods in the main body of the Appendix to determine the coordination area around a coordinating earth station in the space services when the band is shared with terrestrial radiocommunication services or other earth stations operating in the opposite direction of transmission.

Table 1 is limited to those system parameter values required for the case of a transmitting earth station sharing with terrestrial services; Table 2 is limited to those parameter values required for the case of a receiving earth station sharing with terrestrial services; Table 3 is limited to those parameter values required for the case of a coordinating transmitting earth station which is sharing in a bidirectionally allocated band with other earth stations operating in the opposite direction of transmission.

These system parameter Tables include primary allocations to the space and terrestrial services in Article S5 of the Radio Regulations in all bands between 100 MHz and 105 GHz. Some of the columns have incomplete information. In some cases, this is because there is no requirement to calculate coordination distances as pre-determined coordination distances apply. In other cases, the service allocations are new and the systems may not be introduced for some years. Hence, the system parameters are the subject of ongoing development within the ITU-R Study Groups.

Parameters specific to the coordinating earth station, are provided to the BR in the format specified in RR Appendix S4 as part of the notification and coordination processes.

The row in each Table entitled “method to be used” directs the user to the appropriate section of the main body of the Appendix which describes the methods to be followed for the determination of the coordination area.

Note that the earth station for which the coordination area is to be determined is identified by the service designation given in the first row of each Table.

When a supplementary contour is to be developed, for example for digital fixed systems, the necessary system parameters may be found in one of the adjacent columns in Tables 1, 2 and 3 of this annex. If no suitable system parameters are available then the value of the permissible interference power ($P_r(p)$) may be calculated using equation 1 of § 2.

2 Calculation of the permissible interference power of an interfering emission

Tables 1, 2 and 3 contain values for the parameters which are required for the calculation of the permissible interference power of the interfering emission (dBW), in the reference bandwidth, to be exceeded for no more than *p*% of the time at the receiving antenna terminal of a station subject to interference, from a single source of interference, using the general formula:

$$P_r(p) = 10 \log (k\, T_e\, B) + N_L + 10 \log (10^{M_S/10} - 1) - W \qquad \text{dBW} \qquad (1)$$

where

- k: Boltzmann's constant, 1.38×10^{-23} J/K
- T_e: the thermal noise temperature of the receiving system (K), at the terminal of the receiving antenna (see § 2.1 of this annex)
- N_L: link noise contribution (see § 2.2 of this annex)
- B: the reference bandwidth (Hz), i.e., the bandwidth in the receiving station that is subject to the interference and over which the power of the interfering emission can be averaged
- p: the percentage of the time during which the interference from one source may exceed the permissible interference power value; since the entries of interference are not likely to occur simultaneously: $p = p_0/n$
- p_0: the percentage of the time during which the interference from all sources may exceed the threshold value
- n: the number of equivalent equal level, equal probability entries of interference, assumed to be uncorrelated for small percentages of the time
- M_s: link performance margin (dB) (see § 2.3 of this annex)
- W: a thermal noise equivalence factor (dB) for interfering emissions in the reference bandwidth. It is positive when the interfering emissions would cause more degradation than thermal noise (see § 2.4 of this annex).

In certain cases, an administration may have reason to believe that, for its receiving earth station, a departure from the values associated with the earth station, as listed in Table 2, may be justified. Attention is drawn to the fact that for specific systems the bandwidths B or, for example in the case of demand assignment systems, the percentages of the time p and p_0 may have to be changed from the values given in Table 2.

2.1 Calculation of the noise temperature of the receiving system

The noise temperature, in degrees Kelvin, of the receiving system, referred to the output terminals of the receiving antenna, may be determined (unless specifically given in Table 1) from:

$$T_e = T_a + (l_{tl} - 1)290 + l_{tl} T_r \qquad (K) \tag{2}$$

where

- T_a: noise temperature contributed by the receiving antenna
- ℓ_{tl}: numerical loss in the transmission line (e.g. a waveguide) between the antenna terminal and the receiver front end
- T_r: noise temperature of the receiver front end, including all successive stages at the front end input.

For radio-relay receivers and where the waveguide loss of a receiving earth station is not known, a value of $\ell_{tl} = 1.0$ is used.

In case of determination of the coordination contours between two earth stations operating in the opposite direction of transmission, the following earth station receiving system noise temperatures should be used if the value is not provided in Table 3. This assumption is necessary because the receiving earth station takes the place of a receiving terrestrial station in the calculations.

Frequency range (GHz)	T_e (K)
$f < 10$	75
$10 < f < 17$	150
$f > 17$	300

2.2 Determination of the factor N_L

The factor N_L is the noise contribution to the link. In the case of a satellite transponder, it includes the up-link noise, intermodulation, etc. In the absence of table entries, it is assumed:

$$N_L = 1 \text{ dB for fixed-satellite links}$$

$$N_L = 0 \text{ dB for terrestrial links.}$$

2.3 Determination of the factor M_s

The factor M_s is the factor by which the link noise under clear-sky conditions would have to be raised to equal the permissible interference power.

2.4 Determination of the factor *W*

The factor *W* (dB) is the level of the radio-frequency thermal noise power relative to the received power of an interfering emission which, in the place of the former and contained in the same (reference) bandwidth, would produce the same interference (e.g., an increase in the voice or video channel noise power, or in the bit error ratio). The factor *W* generally depends on the characteristics of both the wanted and the interfering signals.

When the wanted signal is digital, *W* is usually equal to or less than 0 dB, regardless of the characteristics of the interfering signal.

3 Horizon antenna gain for a receiving earth station with respect to a transmitting earth station

For the determination of the coordination area of a transmitting earth station with respect to a receiving earth station in a bidirectionally allocated band, it is necessary to calculate the horizon antenna gain of the unknown earth station. In cases where the unknown receiving earth stations operate to geostationary satellites, Table 3 provides the necessary receiving earth station parameters for the calculation procedure, which is described in § 1.1 of Annex V.

In the case where the unknown receiving earth station operates to non-geostationary satellites, the horizon antenna gain to be used for all azimuths is provided in Table 3. The tabulated values were determined by using the method described in § 2.2 of the main body of the Appendix, which uses the maximum and minimum values of antenna horizon gain. For this purpose the maximum antenna horizon gain is the gain of the antenna for an off-axis angle equal to the minimum operating elevation angle. The minimum horizon gain is the gain at large off-axis angles, usually more than 36 or 48 degrees.

In determining the Non-GSO horizon gain entries in Table 3, the difference between the maximum and minimum horizon gain did not exceed 30 dB. Consequently, the Non-GSO horizon gain was taken as the lesser of the maximum horizon gain or 20 dB more than the minimum horizon gain. For the purpose of determining the Non-GSO horizon gain, the reference antenna pattern of § 3 of Annex III was used, except in cases noted in the Tables where a different pattern was deemed to be more appropriate.

TABLE 1a

Parameters required for the determination of coordination distance for a transmitting earth station

Transmitting space radiocommunication service designation		Mobile-satellite		Mobile-satellite, Space operation	Earth exploration-satellite, Meteorological satellite		Space operation	Space research, Space operation	Mobile-satellite	Space operation		Mobile-satellite, Radiodetermination satellite	Mobile-satellite		Mobile -satellite		Space operation, Space research		Mobile-satellite		Space research, Space operation, Earth exploration-satellite
Frequency bands (MHz)		121.45-121.55		148.0-149.9	401-403		433.75-434.25	449.75-450.25	806-840	1 427-1 429		1 610-1 626.5	1 675-1 700		1 675-1 710		1 750-1 850		1 980-2 025		2 025-2 110 2 110-2 120 (Deep space)
Receiving terrestrial service designations		Aeronautical Mobile		Fixed, Mobile	Fixed, Mobile, Meteorological Aids		Amateur, Radiolocation Fixed, Mobile	Fixed, Mobile, Radiolocation	Fixed, Mobile Broadcasting, Aeronautical Radionavigation	Fixed, Mobile		Aeronautical, Radionavigation, Radio Astronomy	Meteorological Aids		Fixed, Mobile		Fixed, Mobile		Fixed, Mobile		Fixed, Mobile
Method to be used		§ 1.4.7		§ 2.1, § 2.2	§ 2.1, § 2.2		§ 2.1, § 2.2	§ 2.1, § 2.2	§ 1.4.6	§ 2.1, § 2.2		§ 1.4.6	§ 1.4.6		§ 1.4.6		§ 2.1, § 2.2		§ 1.4.6		§ 2.1, § 2.2
Modulation at terrestrial station [1]		A	N	A	A	N		A&N	A&N	A	N		A	N	A	N	A	N	A	N	A
Terrestrial station interference parameters and criteria	p_0(%)			1.0				0.01	0.01	0.01	0.01				0.01	0.01	0.01	0.01	0.01		0.01
	n			1				2	2	2	2				2	2	2	2	2		2
	p(%)			1.0				0.005	0.005	0.005	0.005				0.005	0.005	0.005	0.005	0.005		0.005
	N_L (dB)			-				0	0	0	0				0	0	0	0	0		0
	M_s (dB)			-				20	20	33	33				33	33	33	33	26[2]		26[2]
	W (dB)			-				0	0	0	0				0	0	0	0	0		0
Terrestrial station parameters	Gx (dBi) [3]			8				16	16	33	33				35	35	35	35	49[2]		49[2]
	T_r (K)			-				750	750	750	750				750	750	750	750	500[2]		500[2]
Reference bandwidth	B (Hz)			14×10^3				12.5×10^3	12.5×10^3	4×10^3	10^6				4×10^3	10^6	4×10^3	10^6	4×10^3		4×10^3
Permissible interference power	P_r (p) (dBW) in B			–153				–139	–139	–131	–107				–131	–107	–131	–107	–140		–140

NOTES to Table 1a:

(1) A: analogue modulation; N: digital modulation.

(2) The parameters for the terrestrial station associated with transhorizon systems have been used. Line-of-sight radio-relay parameters associated with the frequency band 1 675-1 710 MHz may also be used to determine a supplementary contour.

(3) Feeder losses are not included.

TABLE 1b

Parameters required for the determination of coordination distance for a transmitting earth station

Transmitting space radiocommunication service designation		Fixed-satellite, Mobile-satellite	Fixed-satellite	Fixed-satellite	Fixed-satellite		Space operation, Space research		Fixed-satellite, Mobile-satellite, Meteorological-satellite		Fixed-satellite		Fixed-satellite		Fixed-satellite	Fixed-satellite (3)	Fixed-satellite	Fixed-satellite (3)
Frequency bands (GHz)		2.655-2.690	5.091-5.150	5.725-5.850	5.850-7.075		7.100-7.235 (5)		7.900-8.400		10.7-11.7		12.5-13.25		13.75-14.8	15.43-15.65	17.7-18.4	19.3-19.7
Receiving terrestrial service designations		Fixed, Mobile	Aeronautical radio-navigation	Radio-location	Fixed, Mobile		Fixed, Mobile		Fixed, Mobile		Fixed, Mobile		Fixed, Mobile		Radiolocation radio-navigation	Aeronautical radio-navigation	Fixed, Mobile	Fixed, Mobile
Method to be used		§ 2.1		§ 2.1	§ 2.1		§ 2.1, § 2.2		§ 2.1		§ 2.1		§ 2.1, § 2.2				§ 2.1, § 2.2	§ 2.2
Modulation at terrestrial station (1)		A			A	N	A	N	A	N	A	N	A	N			N	N
Terrestrial station interference	p_0(%)	0.01			0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005	0.01	0.005			0.005	0.005
	n	2			2	2	2	2	2	2	2	2	2	2			2	2
	p(%)	0.005			0.005	0.0025	0.005	0.0025	0.005	0.0025	0.005	0.0025	0.005	0.0025			0.0025	0.0025
parameters and criteria	N_L (dB)	0			0	0	0	0	0	0	0	0	0	0			0	0
	M_s (dB)	26 (2)			33	37	33	37	33	37	33	40	33	40			25	25
	W (dB)	0			0	0	0	0	0	0	0	0	0	0			0	0
Terrestrial station Parameters	G_x (dBi) (4)	49 (2)	6		46	46	46	46	46	46	50	50	52	52			48	48
	T_r (K)	500 (2)			750	750	750	750	750	750	1 500	1 100	1 500	1 100			1 100	1 100
Reference bandwidth	B (Hz)	4×10^3	150×10^3		4×10^3	10^6	4×10^3	10^6	4×10^3	10^6	4×10^3	10^6	4×10^3	10^6			10^6	10^6
Permissible interference power	$P_r(p)$ (dBW) in B	–140	–160		–131	–103	–131	–103	–131	–103	–128	–98	–128	–98			–113	–113

NOTES to Table 1b:

(1) A: analogue modulation; N: digital modulation.

(2) The parameters for the terrestrial station associated with transhorizon systems have been used. Line-of-sight radio-relay parameters associated with the frequency band 5 725-7 075 MHz may also be used to determine a supplementary contour with the exception that G_x = 37 dBi.

(3) Feeder links of non-geostationary satellite systems in the mobile-satellite service.

(4) Feeder losses are not included.

(5) Actual frequency bands are 7 100-7 155 MHz and 7 190-7 235 MHz for space operation service and 7 145-7 235 MHz for the space research service.

TABLE 1c

Parameters required for the determination of coordination distance for a transmitting earth station

Transmitting space radiocommunication service designation		Fixed-satellite	Fixed-satellite (2)	Fixed-satellite (3)	Space research	Earth exploration-satellite, Space research	Fixed-satellite, Mobile-satellite, Radionavigation satellite	Fixed-satellite	Fixed-satellite, Mobile-satellite	Fixed-satellite	Fixed-satellite
Frequency bands (GHz)		24.75-25.25 27.0-29.5	28.6-29.1	29.1-29.5	34.2-34.7	40.0-40.5	42.5-51.4	47.2-50.2	71.0-75.5	92.0-94.0	94.1-95.0
Receiving terrestrial service designations		Fixed, Mobile	Fixed, Mobile	Fixed, Mobile	Fixed, Mobile, Radio-location	Fixed, Mobile	Fixed, Mobile, Radionavigation, Radio Astronomy	Fixed, Mobile	Fixed, Mobile	Fixed, Mobile, Radiolocation	Fixed, Mobile, Radiolocation
Method to be used		§ 2.1	§ 2.2	§ 2.2		§ 2.1, § 2.2	§ 2.1	§ 2.1, § 2.2	§ 2.1, § 2.2	§ 2.1, § 2.2	§ 2.1, § 2.2
Modulation at terrestrial station (1)		N	N	N		N	N	N	N	N	N
Terrestrial station interference parameters and criteria	p_0(%)	0.005	0.005	0.005		0.005	0.005	0.001	0.002	0.002	0.002
	n	1	2	1		1	1	1	2	2	2
	p(%)	0.005	0.0025	0.005		0.005	0.005	0.001	0.001	0.001	0.001
	N_L (dB)	0	0	0		0	0	0	0	0	0
	M_s (dB)	25	25	25		25	25	25	25	25	25
	W (dB)	0	0	0		0	0	0	0	0	0
Terrestrial station parameters	G_x (dBi)	50	50	50		42	42	46	45	45	45
	T_r (K)	2 000	2 000	2 000		2 600	2 600	2 000	2 000	2 000	2 000
Reference bandwidth	B (Hz)	10^6	10^6	10^6		10^6	10^6	10^6	10^6	10^6	10^6
Permissible interference power	$P_r(p)$ (dBW) in B	–111	–111	–111		–110	–110	–111	–111	–111	–111

NOTES to Table 1c:

(1) A: analogue modulation; N: digital modulation.

(2) Non-GSO FSS.

(3) Feeder links to non-GSO MSS.

(4) Feeder losses are not included.

TABLE 2a

Parameters required for the determination of coordination distance for a receiving earth station

Receiving space radiocommunication service designation			Space operation, Space research	Meteoro-logical satellite, Mobile satellite	Space research	Space research, Space operation	Space operation	Mobile satellite	Meteoro-logical satellite	Mobile-satellite	Space research Space operation	Space operation	Meteor-ological satellite Earth exploration-satellite	Space operation	Broad-casting satellite	Mobile satellite	Broad-casting satellite (DAB)	Mobile satellite, Land-mobile satellite, Maritime mobile satellite
Frequency band (MHz)			137-138	137-138	143.6-143.65	174-184	163-167 272-273(5)	335.4-399.9	400.15-401	400.15-401	400.15-401	401-402	460-470	549.75-550.25	620-790	856-890	1 452-1 492	1 492-1 530 1 555-1 559 2 160-2 200 (1)
Transmitting Terrestrial Service designations			Fixed, Mobile	Fixed, Mobile	Fixed, Mobile, Radio-location	Fixed, Mobile, Broad-casting	Fixed, Mobile	Fixed, Mobile	Meteor-logical Aids	Meteor-logical Aids	Meteor-logical Aids	Meteor-logical Aids, Fixed, Mobile	Fixed, Mobile	Fixed, Mobile, Broad-casting	Fixed, Mobile, Broad-casting	Fixed, Mobile, Broad-casting	Fixed, Mobile, Broad-casting	Fixed, Mobile
Method to be used			§ 2.1	§ 2.1	§ 2.1	§ 2.1	§ 2.1	§ 1.4.6	§ 1.4.6	§ 1.4.6	-	§ 2.1	§ 2.1	§ 2.1	§ 1.4.5	§ 1.4.6	§ 1.4.5	§ 1.4.6
Modulation at earth station (2)			N		N		N				N	N					N	N
Earth station interference parameters and criteria	p_0 (%)		0.1		0.1		1.0		0.012		0.1	0.1	0.012					10
	n		2		2		1		1		2	2	1					1
	p (%)		0.05		0.05		1.0		0.012		0.05	0.05	0.012					10
	N_L (dB)		0		0		0		0		0	0						0
	M_s (dB)		1		1		1		4.3		1	1						1
	W (dB)		0		0		0		0		0	0						0
Terrestrial station parameters	E (dBW) in B (3)	A	-		-		15				-	-	5				38	37(4)
		N	-		-		15				-	-	5				38	37
	P_t (dBW) in B	A	-		-		–1				-	-	–11				3	0
		N	-		-		–1				-	-	–11				3	0
	Gx (dBi)		-		-		16				-	-	16				35	37
Reference bandwidth	B (Hz)		1		1		10^3		177.5×10^3		1	1	85				25×10^3	4×10^3
Permissible interference power	P_r (p) (dBW) in B		–199		–199		–173		–148		–208	–208	–178					–176

NOTES to Table 2a:

(1) In these bands the terrestrial station parameters of line-of-sight radio-relay systems have been used. If an administration believes that, in the bands 2 160-2 200 MHz and 24 835-25 200 MHz, transhorizon systems need to be considered, the parameters associated with the frequency band 2 500-2 690 MHz may be used to determine the coordination area.

(2) A: analogue modulation; N: digital modulation.

(3) *E* is defined as the equivalent isotropically radiated power of the interfering terrestrial station in the reference bandwidth.

(4) This value is reduced from the nominal value of 50 dBW for the purposes of determination of coordination area, recognizing the low probability of high power emissions falling fully within the relatively narrow bandwidth of the earth station.

(5) The fixed service parameters provided in the column for 163-167 MHz and 272-273 MHz are only applicable to the band 163-167 MHz.

TABLE 2b

Parameters required for the determination of coordination distance for a receiving earth station

Receiving space radiocommunication service designation			Space operation (GSO and Non-GSO)	Radio-navigation satellite	Meteor-ological satellite (Non-GSO)	Meteor-ological satellite (GSO)	Space research Near Earth (Non-GSO & GSO)		Space research Deep Space (Non-GSO)	Space operation (Non-GSO & GSO)	Earth exploration-satellite (GSO)	Broadcasting satellite	Mobile satellite, Radio-determination satellite	Fixed satellite, Broadcasting satellite		Fixed satellite	
							Un-manned	Manned									
Frequency band (GHz)			1525-1535	1.559-1.610	1.670-1.710	1.670-1.710	1.700-1.710 2.200-2.290		2.290-2.300	2.200-2.290	2.200-2.290	2.310-2.360	2.4835-2.500	2.500-2.690		3.400-4.200	
Transmitting terrestrial service designations			Fixed	Fixed	Fixed, Mobile, Meteor-ological Aids	Fixed, Mobile, Meteor-ological Aids	Fixed, Mobile		Fixed, Mobile	Fixed, Mobile	Fixed, Mobile	Fixed, Mobile, Radiolocation	Fixed, Mobile, Radiolocation	Fixed, Mobile Radiolocation		Fixed, Mobile	
Method to be used			§ 2.1, § 2.2	§ 2.1	§ 2.2 and (1)	§ 2.1 and (1)	§ 2.1, § 2.2		§ 2.2	§ 2.1, § 2.2	§ 2.1	§ 1.4.5	§ 1.4.6	§ 1.4.5 and § 2.1		§ 2.1	
Modulation at earth station (2)			N		N	N	N		N	N	N		N	A	N	A	N
Earth station Interference Parameters and criteria	p_0 (%)		1.0		0.006	0.011	0.1	0.001	0.001	1.0	1.0		10	0.03	0.003	0.03	0.005
	n		1		3	2	2	1	1	2	2		1	3	3	3	3
	p (%)		1.0		0.002	0.0055	0.05	0.001	0.001	0.5	0.5		10	0.01	0.001	0.01	0.0017
	N_L (dB)		0		0	0	0		0	0			0	1	1	1	1
	M_s (dB)		1		2.8	0.9	1		0.5	1			1	7	2	7	2
	W (dB)		0		0	0	0		0	0			0	4	0	4	0
Terrestrial Station Parameters	E (dBW) in B (3)	A	50		92(4)	92(4)	–27(4,5)		–27(5)	72()	72(4)		37	72(4)	72(4)	55	55
		N	37		-	-	–27		–27	76	76		37	76	76	42	42
	P_t (dBW) in B	A	13		40(4)	40(4)	–71(4,5)		–71(5)	28()	28(4)		0	28(4)	28(4)	13	13
		N	0		-	-	–71		–71	32	32		0	32	32	0	0
	Gx (dBi)		37		52	52	44		44	44	44		37	44	44	42	42
Reference bandwidth	B (Hz)		10^3		10^6	4×10^3	1		1	10^6	10^6		4×10^3	10^6	10^6	10^6	10^6
Permissible interference power	$P_r(p)$ (dBW) in B		–184		–142	–177	–216		–222	–154	–154		–176				

NOTES to Table 2b:

(1) In the band 1 670-1 700 MHz an additional contour for coordination with the meteorological aids service is required:

The coordination distance, *d* (km), for fixed earth stations in the meteorological-satellite service *vis-à-vis* stations in the meteorological aids service assumes a radiosonde altitude of 20 km and is determined as a function of the physical horizon elevation angle θ (degrees) for each azimuth, as follows:

$$d = 582 \left(\sqrt{1 + (0.254\,\theta)^2} - 0.254\,\theta \right) \qquad \text{for } \theta > 0$$

$$d = 582 \qquad \text{for } \theta > 0$$

The minimum and maximum coordination distances are (100 - f(GHz)/2) km and 582 km, and occur at physical horizon angles greater than 11° and less than 0°.

(2) A: analogue modulation; N: digital modulation.

(3) *E* is defined as the equivalent isotropically radiated power of the interfering terrestrial station in the reference bandwidth.

(4) In this band, the parameters for the terrestrial stations associated with transhorizon systems have been used. If an administration believes that transhorizon systems do not need to be considered, the line-of-sight radio-relay parameters associated with the frequency band 3.4-4.2 GHz may be used to determine the coordination area, with the exception that $E = 50$ dBW for analogue terrestrial stations; and $G_x = 37$ dBi. However, for the space research service only, noting footnote(5) when transhorizon systems are not considered, $E = 20$ dBW and $P_t = -17$ dBW for analogue terrestrial stations, $E = -23$ dBW and $P_t = -60$ dBW for digital terrestrial stations; and $G_x = 37$ dBi.

(5) These values are estimated for 1 Hz bandwidth and are 30 dB below the total power assumed for emission.

TABLE 2c

Parameters required for the determination of coordination distance for a receiving earth station

Receiving space radiocommunication service designation			Fixed satellite		Fixed satellite Radio-determination satellite	Fixed satellite	Fixed satellite		Meteoro-logical satellite (7,8)	Meteoro-logical satellite (9)	Earth exploration-satellite (7)	Earth exploration-satellite (9)	Space research (10)		Fixed satellite		Broadcasting-satellite		Fixed satellite (9)	Broad-casting satellite	Fixed satellite (7)
													Deep Space								
Frequency band (GHz)			4.500-4.800		5.150-5.216	6.700-7.075	7.250-7.750		7.450-7.550	7.750-7.850	8.025-8.400	8.025-8.400	8.400-8.450	8.450-8.500	10.7-12.75		12.5-12.75 (12)		15.4-15.7	17.7-17.8	17.7-18.8 19.3-19.7
Transmitting terrestrial service designations			Fixed, Mobile		Aeronautical radio-navigation	Fixed, Mobile	Fixed, Mobile		Fixed, Mobile	Fixed, Mobile	Fixed, Mobile	Fixed, Mobile	Fixed, Mobile		Fixed, Mobile		Fixed, Mobile		Aeronautical radio-navigation	Fixed	Fixed, Mobile
Method to be used			§ 2.1		§ 2.1	§ 2.2	§ 2.1		§ 2.1, § 2.2	§ 2.2	§ 2.1	§ 2.2	§ 2.2		§ 2.1, § 2.2		§ 1.4.5			§ 1.4.5	§ 2.1
Modulation at earth station [1]			A	N		N	A	N	N	N	N	N	N	N	A	N	A	N	-		N
Earth station interference parameters and criteria	p_0 (%)		0.03	0.005		0.005	0.03	0.005	0.002	0.001	0.083	0.011	0.001	0.1	0.03	0.003	0.03	0.003	0.003		0.003
	n		3	3		3	3	3	2	2	2	2	1	2	2	2	1	1	2		2
	p (%)		0.01	0.0017		0.0017	0.01	0.0017	0.001	0.0005	0.0415	0.0055	0.001	0.05	0.015	0.0015	0.03	0.003	0.0015		0.0015
	N_L (dB)		1	1		1	1	1	-	-	1	0	0	0	1	1	1	1	1		1
	M_s (dB)		7	2		2	7	2	-	-	2	4.7	0.5	1	7	4	7	4	4		6
	W (dB)		4	0		0	4	0	-	-	0	0	0	0	4	0	4	0	0		0
Terrestrial station parameters	E (dBW) in B [2]	A	92[3]	92[3]		55	55	55	55	55	55	55	25[5]	25[5]	40	40	55	55			35
		N	42[4]	42[4]		42	42	42	42	42	42	42	–18	–18	[43]	[43]	42	42		40	40
	P_t (dBW) in B	A	40[3]	40[3]		13	13	13	13	13	13	13	–17[5]	–17[5]	–5	–5	10	10			–10
		N	0	0		0	0	0	0	0	0	0	–60	–60	–2	–2	–3	–3		–7	–5
	Gx (dBi)		52[3,4]	52[3,4]		42	42	42	42	42	42	42	42	42	45	45	45	45		47	45
Reference band-width[6]	B (Hz)		10^6	10^6		10^6	10^6	10^6	10^7	10^7	10^6	10^6	1	1	10^6	10^6	27 10^6	27 10^6			10^6
Permissible interference power	P_r (p) (dBW) in B					–151.2			–125	–125	–154 (11)	–142	–220	–216			–131	–131			

NOTES to Table 2c:

(1) A: analogue modulation; N: digital modulation.

(2) *E* is defined as the equivalent isotropically radiated power of the interfering terrestrial station in the reference bandwidth.

(3) In this band, the parameters for the terrestrial stations associated with transhorizon systems have been used. If an administration believes that transhorizon systems do not need to be considered, the line-of-sight radio-relay parameters associated with the frequency band 3.4-4.2 GHz may be used to determine the coordination area.

(4) Digital systems assumed to be non-transhorizon. Therefore G_x = 42.0 dBi. For digital transhorizon systems, parameters for analogue transhorizon systems above have been used.

(5) These values are estimated for 1 Hz bandwidth and are 30 dB below the total power assumed for emission.

(6) In certain systems in the fixed-satellite service it may be desirable to choose a greater reference bandwidth B. However, a greater bandwidth will result in smaller coordination distances and a later decision to reduce the reference bandwidth may require recoordination of the earth station.

(7) GSO satellite systems.

(8) Non-GSO meteorological satellites notified in accordance with Radio Regulations **S5.461A** may use the same coordination parameters.

(9) Non-GSO satellite systems.

(10) Space research earth stations in the band 8.4-8.5 GHz operate with non-GSO satellites.

(11) For large earth stations: Pr(p) = (G – 180) dBW

For small earth stations: Pr(20%) = 2 (G – 26) – 140 dBW for 26 < G ≤ 29 dBi

Pr(20%) = G – 163 dBW for G > 29 dBi

Pr(p)% = G – 163 dBW for G ≤ 26 dBi

(12) Applies to the broadcasting-satellite service in unplanned bands in Region 3.

TABLE 2d

Parameters required for the determination of coordination distance for a receiving earth station

Receiving Space radiocommunication service designation		Meteoro-logical satellite	Fixed satellite	Fixed satellite (3)	Broad-casting satellite	Earth exploration-satellite (4)	Earth exploration-satellite (5)	Space research (Deep Space)	Space research		Fixed satellite (6)	Fixed satellite (5)	Mobile satellite	Broadcasting satellite, Fixed satellite	Mobile satellite	Radio-navigation	Broadcasting satellite
									Un-manned	Manned							
Frequency band (GHz)		18.1-18.3	18.8-19.3	19.3-19.7	21.4-22.0	25.5-27.0	25.5-27.0	31.8-32.3	37.0-38.0		37.5-40.5	37.5-40.5	39.5-40.5	40.5-42.5	43.5-47.0	43.5-47.0	84-86
Transmitting terrestrial service designations		Fixed, Mobile	Fixed, Mobile	Fixed, Mobile	Fixed, Mobile	Fixed, Mobile	Fixed, Mobile	Fixed, Radio-navigation	Fixed, Mobile		Fixed, Mobile	Fixed, Mobile	Fixed, Mobile	Broadcasting, Fixed	Mobile	Mobile	Fixed, Mobile, Broadcasting
Method to be used		§ 2.1, § 2.2	§ 2.1, § 2.2	§ 2.2	§ 1.4.5	§ 2.2	§ 2.1	§ 2.1, § 2.2	§ 2.1, § 2.2		§ 2.2	§ 2.1	§ 1.4.6	§ 1.4.5 and § 2.1	§ 1.4.6	-	§ 1.4.5
Modulation at earth station (1)		N	N	N		N	N	N	N		N	N	N	-	N		
Earth station interference parameters and criteria	p_0 (%)		0.003	0.01		0.25	0.25	0.001	0.1	0.001	0.02	0.003					
	n		2	1		2	2	1	1	1		2					
	p (%)		0.0015	0.01		0.125	0.125	0.001	0.1	0.001		0.0015					
	N_L (dB)		0	0		0	0	0	0		1	1					
	M_s (dB)		5	5		11.4	14	1	1		6.8	6					
	W (dB)		0	0		0	0	0	0		0	0					
Terrestrial station parameters	E (dBW) in B (2) A		-	-		-	-	-	-		-	-	-	-			
	E (dBW) in B (2) N	40	40	40	40	42	42	–28	–28		35	35	35	44	40	40	
	P_t (dBW) in B A		-	-		-	-	-	-		-	-	-	-			
	P_t (dBW) in B N	–7	–7	–7	–7	–3	–3	–81	–73		–10	–10	–10	–1	–7	–7	
	Gx (dBi)	47	47	47	47	45	45	53	45		45	45	45	45	47	47	
Reference bandwidth	B (Hz)		10^6	10^6		10^7	10^7	1	1		10^6	10^6	10^6	10^6			
Permissible interference power	P_r (p) (dBW) in B		–140 (7)	–137 (7)		–120	–116	–216	–217		–140						

NOTES to Table 2d:

(1) A: analogue modulation; N: digital modulation.

(2) *E* is defined as the equivalent isotropically radiated power of the interfering terrestrial station in the reference bandwidth.

(3) Non-GSO MSS feeder links.

(4) Non-GSO satellite systems.

(5) GSO satellite systems.

(6) Non-GSO FSS systems.

TABLE 3a

Parameters required for the determination of coordination distance for a transmitting earth station in bands shared bidirectionally with receiving earth stations

Space service designation in which the transmitting earth station operates		Land mobile-satellite	Mobile-satellite	Land mobile-satellite	Earth exploration-satellite, Meteoro-logical satellite	Mobile-satellite (2)	Mobile-satellite (3)	Mobile-satellite		Fixed satellite, Mobile satellite	Fixed satellite (5)		Fixed satellite	Fixed satellite, Meteorological satellite	Fixed satellite
Frequency bands (GHz)		0.1499-0.15005	0.272-0.273	0.3999-0.40005	0.401-0.402	1.675-1.710	1.675-1.710	1.700-1.710		2.655-2.690	5.150-5.216		6.700-7.075	8.025-8.400	8.025-8.400
Space service designation in which the *receiving* earth station operates		Radio-navigation satellite	Space operation	Radio-navigation satellite	Space operation	Meteoro-logical satellite	Meteoro-logical satellite	Space research Near Earth		Fixed satellite, Broadcasting satellite	Fixed satellite	Radio deter-minat-ion satellite	Fixed satellite	Earth exploration-satellite	Earth exploration-satellite
								Un-Manned (12)	Manned						
Orbit(8)			Non-GSO		Non-GSO	Non-GSO	GSO	Non-GSO			Non-GSO		Non-GSO	Non-GSO	GSO
Modulation at receiving earth station (1)			N		N	N	N	N	N				N	N	N
Receiving earth station interference parameters and criteria	P_0(%)		1.0		0.1	0.006	0.011	0.1	0.001				0.005	0.011	0.083
	n		1		2	3	2	2	1				3	2	2
	P(%)		1.0		0.05	0.002	0.0055	0.05	0.001				0.0017	0.0055	0.0415
	N_L (dB)	0	0	0	0	0	0	0	0				1	0	1
	M_s (dB)	*2*	1	2	1	2.8	0.9	1	1	2	2	2	2	4.7	2
	W (dB)	0	0	0	0	0	0	0	0				0	0	0
Receiving earth station parameters	G_m(dBi) (4)	0	20	0	20	30	45				48.5		50.7		
	G_e (dBi) (6)	0	19	0	19	19(11)	See note (10)	A	10		10		10	10	See note (10)
	θ_{min} (7)	3°	10°	3°	10°	5°	3°	5°	5°	3°	3°	3°	3°	5°	3°
	T_e (K) (9)	200	500	200	500	370	118			75	75	75	75		
Reference bandwidth	B (Hz)	4×10^3	10^3	4×10^3	1	10^6	4×10^3	1	1				10^6	10^6	10^6
Permissible interference power	P_r (p) (dBW) in B	–172	–177	–172	–208	–145	–178	–216	–216				–151	–142	–154

NOTES to Table 3a:

(1) A: analogue modulation; N: digital modulation.

(2) Non-GSO.

(3) GSO.

(4) On-axis gain of the receive earth station antenna.

(5) Feeder links of non-geostationary satellite systems in the mobile-satellite service.

(6) Horizon antenna gain for the receive earth station (refer to § 3 of the main body of the Appendix).

(7) Minimum elevation angle of operation in degrees (non-GSO or GSO).

(8) Orbit of the space service in which the receiving earth station operates (non-GSO or GSO).

(9) The thermal noise temperature of the receiving system at the terminal of the receiving antenna (under clear-sky conditions). Refer to § 1.1 of this Annex for missing values.

(10) Horizon gain is calculated using the procedure of Annex III

(11) Non-GSO horizon gain, $G_e = G_{min} + 20$ dB (see § 2.2.1), with $G_{min} = 10 - 10 \log(D/\lambda)$, $D/\lambda = 13$ (refer to Annex III for definition of symbols)

(12) Unmanned space research is not a separate radiocommunication service and the system parameters are only to be used for the generation of supplementary contours.

TABLE 3b

Parameters required for the determination of coordination distance for a transmitting earth station in bands shared bidirectionally with receiving earth stations

Space service designation in which the transmitting earth station operates		Fixed satellite			Fixed satellite			Fixed satellite (3)	Fixed satellite	Fixed satellite	Fixed satellite (3)	Fixed satellite (3)	Earth exploration-satellite, Space research			
Frequency bands (GHz)		10.7-11.7			12.5-12.75			15.43-15.65	17.3-17.8	17.7-18.4	19.3-19.6	19.3-19.6	40.0-40.5			
Space service designation in which the *receiving* earth station operates		Fixed satellite			Fixed satellite,			Fixed satellite (3)	Broad-casting satellite	Fixed satellite, Meteor-ological satellite	Fixed satellite (3)	Fixed satellite (4)	Fixed satellite, Mobile satellite			
Orbit(7)		GSO		Non-GSO	GSO		Non-GSO	Non-GSO		GSO	Non-GSO	GSO	GSO	Non-GSO		
Modulation at receiving earth station (1)		A	N	N	A	N				N	N					
Receiving earth station interference parameters and criteria	p_0(%)	0.03	0.003		0.03	0.003		0.003		0.003	0.01	0.003	0.003			
	N	2	2		2	2		2		2	1	2	2			
	p(%)	0.015	0.0015		0.015	0.0015		0.0015		0.0015	0.01	0.0015	0.0015			
	N_L (dB)	1	1		1	1		1		1	0	1	1			
	M_s (dB)	7	4		7	4		4		6	5	6	6			
	W (dB)	4	0		4	0		0		0	0	0	0			
Receiving earth station parameters	G_m (dBi) (2)			51.9			31.2	48.4		58.6	53.2	49.5	50.8	54.4		
	G_e (5)	See note (9)	See note (9)	10	See note (9)	See note (9)	11(11)	10		See note (9)	10	See note (10)	See note (9)	7(12)		
	θ_{min} (6)	5°	5°	6°	5°	5°	10°	5°		5°	5°	10°	10°	10°		
	T_e (K) (8)	150	150		150	150		150		300	300	300	300			
Reference bandwidth	B (Hz)	10^6	10^6		10^6	10^6		2×10^6		10^6	10^6					
Permissible interference power	P_r (p) (dBW) in B	–144	–144	–144	–144	–144	–144	–141		–138	–141					

NOTES to Table 3b:

(1) A: analogue modulation; N: digital modulation.

(2) On-axis gain of the receive earth station antenna.

(3) Feeder links of non-geostationary satellite systems in the mobile-satellite service.

(4) GSO satellite systems.

(5) Horizon antenna gain for the receive earth station (refer to § 3 of the main body of the Appendix).

(6) Minimum elevation angle of operation in degrees (non-GSO or GSO).

(7) Orbit of the space service in which the receiving earth station operates (GSO or non-GSO).

(8) The thermal noise temperature of the receiving system at the terminal of the receiving antenna (under clear-sky conditions). Refer to § 1.1 of this Annex for missing values.

(9) Horizon antenna gain is calculated using the procedure of Annex III.

(10) Horizon gain is calculated using the procedure of Annex III , except that the following antenna pattern may be used in place of that given in § 3 of that Annex: $G = 32 - 25 \log \phi$ for $1 \leq \phi < 48$; and $G = -10$ for $48 \leq \phi < 180$ (refer to Annex III for definition of symbols).

(11) Non-GSO horizon gain, $G_e = G_{max}$ (see § 2.2.1) for $G = 36 - 25 \log (\phi) > -6$ (refer to Annex III for definition of symbols).

(12) Non-GSO horizon gain, $G_e = G_{max}$ (see § 2.2.1) for $G = 32 - 25 \log (\phi) > -10$ (refer to Annex III for definition of symbols).

4 Predetermined coordination distances

The predetermined coordination distances specified in Tables 4 and 5 are used for transmitting and receiving earth stations, respectively, in cases defined by the corresponding frequency sharing situation.

TABLE 4

Frequency sharing situation		**Coordination distance (in sharing situations involving services allocated with equal rights) (km)**	***Source of information and comments*** *This column is for clarification purpose only and is not to be kept in the final text that may be included in Appendix **S7***
Earth station for which coordination area is determined	**Station in terrestrial service**		
Ground-based	Mobile (aircraft)	500	*Tables 1 and 2 (Section 3 of Annex 1 of Appendix **S5**) for frequencies below 3 GHz No coordination distance is provided for frequencies above 3 GHz (e.g. in the band 5 725-7 075 MHz)*
Aircraft (mobile)	Ground-based	500	*Tables 1 and 2 (Section 3 of Annex 1 of Appendix **S5**) for frequencies below 3 GHz Table S5-1 of Appendix **S5** (under the No. **S9.17**) for frequencies above 1 GHz*
Aircraft (mobile)	Mobile (aircraft)	1 000	
Ground-based in the bands: 400.15-401 MHz 1 675-1 700 MHz	Station in the meteorological aids service (radiosonde)	580	*Tables 1 and 2 (Section 3 of Annex 1 of Appendix **S5**)*
Aircraft (mobile) in the bands: 400.15-401 MHz 1 675-1 700 MHz	Station in the meteorological aids service (radiosonde)	1 080	
~~Ground based in the bands:~~ ~~454 – 456 MHz~~ ~~459 – 460 MHz~~	~~Ground based~~	~~500~~	*Table 1 (Section 3 of Annex 1 of Appendix **S5**)* *This case can be deleted since under **S5.286B** MSS earth stations shall not cause harmful interference to, or claim protection from, stations of the fixed or mobile services*

Ground-based in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz 2 483.5-2 500 MHz 2 500-2 516.5 MHz	Ground-based	100	*Table S5-1 of Appendix **S5** (under the No. **S9.17**)*
Airborne earth station in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz 2 483.5-2 500 MHz 2 500-2 516.5 MHz	Ground-based	400	
Receiving earth stations in the meteorological-satellite service	Station in the meteorological aids service	The coordination distance is considered to be the visibility distance as a function of the earth station horizon elevation angle for a radiosonde at an altitude of 20 km above mean sea level, assuming 4/3 Earth radius (see NOTE 1)	*Table S5-1 of Appendix **S5** (under the No. **S9.17**)* *Note 3 of Recommendation ITU-R IS.850*

NOTE 1 - The coordination distance, *d* (km), for fixed earth stations in the meteorological-satellite service vis-à-vis stations in the meteorological aids service assumes a radiosonde altitude of 20 km and is determined as a function of the physical horizon elevation angle θ (degrees) for each azimuth, as follows:

$$d = 100 \qquad \textit{for } \theta \geq 11$$

$$d = 582\left(\sqrt{1+(0.254\theta)^2} - 0.254\theta\right) \qquad \textit{for } 0 < \theta < 11,$$

$$d = 582 \qquad \textit{for } \theta \leq 0$$

The minimum and maximum coordination distances are 100 km and 582 km, and correspond with physical horizon angles greater than 11° and less than 0°.

TABLE 5

Non-GSO MSS feeder-link earth stations

Frequency sharing situation		Coordination distance (in sharing situations involving services allocated with equal rights) (km)	*Source of information and comments*
Earth station for which coordination area is determined	**Other service or station (station in terrestrial service or earth station)**		*This column is for clarification purpose only and is not to be kept in the final text that may be included in Appendix **S7***
Earth station operating in opposite direction in bands in which the FSS is already allocated	Ground-based stations in terrestrial services or Earth station operating in opposite direction of transmission	– 170 (in the band 19.3-19.7 GHz) – 300 (in the band 6 700-7 075 MHz)	*Table 3 (Section 3 of Annex 1 of Appendix **S5**)* *These distances would be in conflict with the ones calculated by using the method provided in the TG 1/6 DNR that may be used for revising Appendix **S7***
Transmit non-GSO MSS feeder-link earth station in the band 15.4-15.7 GHz	Aeronautical radionavigation	"the coordination distances required to protect the aeronautical radionavigation stations from harmful interference from feeder-link earth station emissions are: – 515 km from the aircraft landing surface for aircraft landing systems (ALS) – 600 km from aircraft using general purpose radars (MPR) – 270 km from the aircraft landing for radar sensing and measurement systems"	***S5.511C*** *Recommendation ITU-R S.1340 (recommends 7)* *If these distances have to be counted from the location of the earth station (as defined in **S1.173**) only the worst distance of 600 km is proposed to be retained in order to cover all cases of sharing (e.g. all systems used in aeronautical radionavigation stations). If these distances have to be counted from the terrestrial station, they are not "coordination distances" in the sense of the Radio Regulations and they might not be included in this table but only be referred in Article **S5** as another coordination method*

Receive non-GSO MSS feeder-link earth station in the band 15.4-15.7 GHz	Aeronautical radionavigation	"the threshold distance for the coordination of emissions from stations in the aeronautical radionavigation service with respect to feeder-link earth stations for the MSS based on an earth station antenna gain in the local horizontal plane of 11.5 dBi are: – 150 km from the ground segment for aircraft landing system (ALS) – 600 km from aircraft using general purpose radars – 60 km from the aircraft landing surface for radar sensing and measurement systems"	***S5.511A*** *Recommendation ITU-R S.1341 (recommends 5)* *If these distances have to be counted from the location of the earth station (as defined in* ***S1.173****) only the worst distance of 600 km is proposed to be retained in order to cover all cases of sharing (e.g. all systems used in aeronautical radionavigation stations). If these distances have to be counted from the terrestrial station, they are not "coordination distances" in the sense of the Radio Regulations and they might not be included in this table but only be referred in Article* ***S5*** *as another coordination method*
All bands and earth stations	Terrestrial mobile (aircraft)	500	*Table 3 (Section 3 of Annex 1 of Appendix* ***S5****)*

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 7 to
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PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

PART 7

Appendices S3 and S7, Resolutions 28 (WRC-95) and 95 (WRC-97), PP-98 resolutions

CONTENTS

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Portugal, Slovakia, Czech Rep., United Kingdom, Slovenia, Sweden, Switzerland, Ukraine

PART 7A

Agenda item 1.1 - Deletion of country names in footnotes to Article S5

1 Introduction

WRC-2000 agenda item 1.1 requests administrations to review the footnotes to the Table of Frequency Allocations with the view to delete their country footnotes or to have their country's name deleted from footnotes, if no longer required.

2 Background

In preparation of WARC-87 Europe developed several proposals in favour of new allocations for the mobile service.

At that point in time the aeronautical community through ICAO planned to have the instrument landing system (ILS) phased out by the end of this century and that the microwave landing system (MLS) would be the replacement system. Therefore WARC-87 added footnotes S5.181 (around 75 MHz used for ILS-marker beacons), S5.197 (around 108 MHz used for ILS-localizer and VOR) and S5.259 (around 330 MHz used for ILS-glide path transmitters) with an additional allocation for several European countries to the mobile service on a secondary basis and further restrictions to protect the ILS as long as required.

This decision was taken in order to indicate that the mobile service should use this spectrum after the aeronautical-radionavigation service would have ceased operation in these parts of the spectrum.

Meanwhile ICAO reviewed its concepts and extended the lifetime of the ILS far beyond the year 2000, the transition to MLS may not take place on a global basis and concluded, that the global navigation satellite system (GNSS Phase 2) is the most appropriate system which will meet all future requirements of the aeronautical radionavigation service.

3 Proposals

Considering the above described development and due to the fact that the three mentioned footnotes lost their duty, the concerned administrations which entered the footnotes collectively, propose the deletion of their names in footnotes S5.181, S5.197 and S5.259:

MOD EUR/13/255

S5.181 *Additional allocation:* in~~ Germany, Austria, Cyprus, Denmark,~~ Egypt~~, France, Greece,~~ Israel~~, Italy,~~ Japan, Jordan, Lebanon~~, Malta,~~ Morocco~~, Monaco, Norway,~~ and Syria~~, Sweden and Switzerland,~~ the band 74.8-75.2 MHz is also allocated to the mobile service on a secondary basis, subject to agreement obtained under No. **S9.21**. In order to ensure that harmful interference is not caused to stations of the aeronautical radionavigation service, stations of the mobile service shall not be introduced in the band until it is no longer required for the aeronautical radionavigation service by any administration which may be identified in the application of the procedure invoked under No. **S9.21**.

MOD EUR/13/256

S5.197 *Additional allocation:* in~~ Germany, Austria, Cyprus, Denmark,~~ Egypt~~, France, Italy,~~ Japan, Jordan, Lebanon~~, Malta,~~ Morocco~~, Monaco, Norway,~~ Pakistan, and Syria~~, and Sweden~~, the band 108-111.975 MHz is also allocated to the mobile service on a secondary basis, subject to agreement obtained under No. **S9.21**. In order to ensure that harmful interference is not caused to stations of the aeronautical radionavigation service, stations of the mobile service shall not be introduced in the band until it is no longer required for the aeronautical radionavigation service by any administration which may be identified in the application of the procedures invoked under No. **S9.21**.

MOD EUR/13/257

S5.259 *Additional allocation:* in ~~Germany, Austria, Cyprus, ~~the Republic of Korea~~, Denmark,~~ Egypt~~, Spain, France, Greece,~~ Israel~~, Italy,~~ Japan, Jordan~~, Malta,~~ Morocco~~, Monaco, Norway, the Netherlands,~~ and Syria~~ and Sweden~~, the band 328.6-335.4 MHz is also allocated to the mobile service on a secondary basis, subject to agreement obtained under No. **S9.21**. In order to ensure that harmful interference is not caused to stations of the aeronautical radionavigation service, stations of the mobile service shall not be introduced in the band until it is no longer required for the aeronautical radionavigation service by any administration which may be identified in the application of the procedure invoked under No. **S9.21**.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 7B

Agenda item 1.2 - Review of Appendix S3 with respect to spurious emissions for space services

Introduction

This agenda item covers finalizing the outstanding issues on spurious emissions limits for space services in the review of the generic spurious emission limits of Appendix S3 that was largely completed by WRC-97.

Appendix S3, as revised by WRC-97, contains two tables of maximum permitted spurious emission power levels. Table I contains levels currently in force, while Table II contains levels applicable to transmitters installed after 1 January 2003 and to all transmitters after 1 January 2012. Note 14 of Table II identifies the spurious emissions limits for space services as “design objectives” until after WRC-2000.

Following study and in accordance with Recommendation 66 (Rev.WRC-97), in particular *recommends* 1, 2 and 6, the CPM Report identifies several issues that require modification of Appendix S3:

i) Space services spurious emission limits.

The “design objective” qualification for space service limits (existing footnote 14 in Table II of Section II) should be suppressed and that, at this time, no changes to the attenuation values or the reference bandwidth for space services are appropriate.

ii) The limiting case of a very narrow-band or unmodulated signal in a wideband amplifier operating particularly in the space services.

A new self-explanatory paragraph 11*bis* should be added to Section II to cover this case.

iii) The special case of spurious emission limits applying in adjacent transponders within the same transmitting system.

A new self-explanatory paragraph 11*ter* should be added to Section II to cover this case.

The European proposal for paragraph 11*ter* is intended to cover the case of two transponders spaced far apart (see explanatory Note 1 below).

iv) Amateur earth stations operating below 30 MHz.

A new footnote 15 in Table II of Section II should applied to “Space services (earth stations)” to clear up any ambiguity for amateur earth stations.

To suppress the reference, in Table II of Section II, against “Amateur services operating below 30 MHz (including with SSB)”, to existing footnote 12 since it may add ambiguity; this particular service category includes all amateur stations.

v) Spurious emission limits for deep-space satellites.

Since there is no reason for spurious emission limits to be specified for *Deep Space* spacecraft, as defined by the ITU Radio Regulations, a new footnote 16 to Table II of Section II should be applied to “space services (space stations)” to indicate this exemption.

The CPM Report also identifies a further item requiring modifications to Appendix S3 which, although not directly related to agenda item 1.2, may be considered in order to bring attention to one particular WRC-97 decision that may be misunderstood. The modifications address:

vi) Radiodetermination (radar) spurious emission limits.

Section I of Appendix S3 adopted by WRC-97 includes paragraph 6 addressing measurement methods for radar systems. This may be taken to imply that the current spurious emission limits apply to radar systems. Radar systems were to have been exempted from the limits in Section I because the required measurement methods had not yet been determined. The measurement methods provided in Recommendation ITU-R M.1177 (referred to in paragraph 6) pertain to the spurious emission limits in Section II. Therefore, a new paragraph 6*bis* should be added to Section II to clarify any misunderstanding.

It is also preferable that spurious emission levels for radar systems should be based on radiated emissions, and not measured at the transmission line as called for in existing paragraph 1 of Appendix S3. This will ensure that the measured spurious emission levels account for the inherent selectivity of certain radar antennas that are integral to the transmitting system. To clarify this issue, existing paragraph 6 of Section I should be suppressed and a new footnote 17, applied to “Radiodetermination”, should be included in the Table II of Section II.

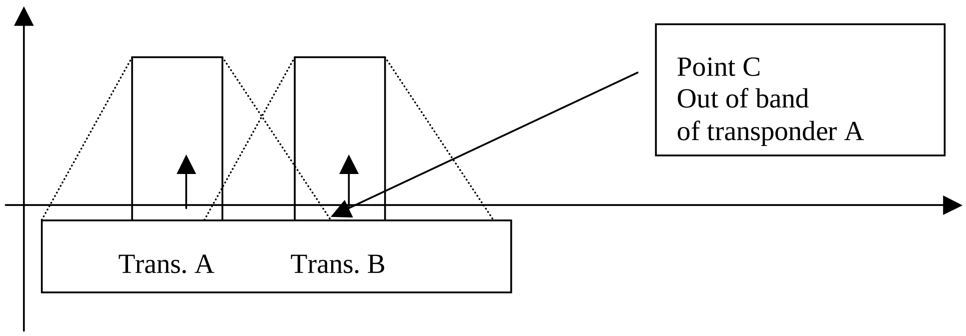
If the change indicated above is made, permitting the use of these measurement methods, the existing paragraph 8 of Section II should be modified to add the words “or appropriate” after the phrase “when it is not possible”.

Taking into account the conclusions of the CPM Report, Europe has developed proposals to revise Appendix S3 of the Radio Regulations at WRC-2000 to:

- include the relevant modifications highlighted in the six items discussed above;
- further split the space services categories of space stations and earth stations. This will allow different types of stations and their requirements to be clearly distinguished and also permit the application of different limits, if deemed appropriate at a later date. As a result of this split, a number of new categories are shown in Table II of Section II, however identical values for spurious emission levels to those currently indicated in Appendix S3 should be maintained. ITU-R Working Parties 4A, 8D and JWP 10-11S have indicated to TG 1/5 that such a split, based on definitions of RR Article S1, is appropriate.

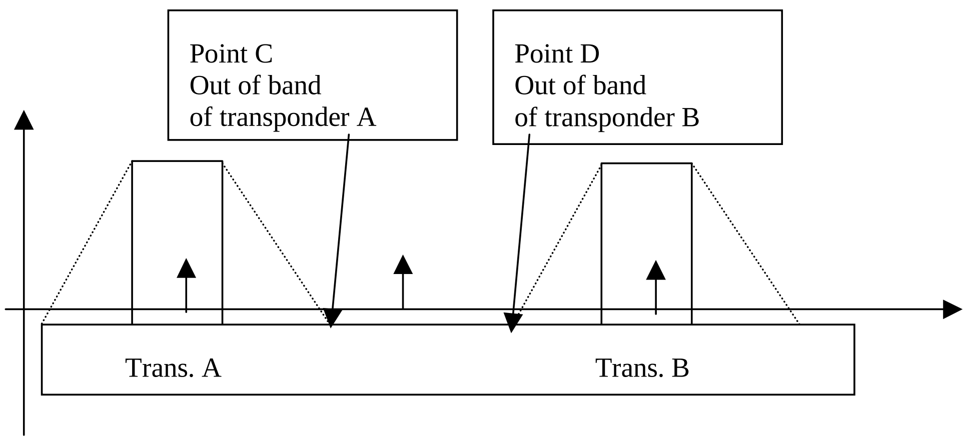
NOTE 1 - Explanation of the European proposal regarding adjacent satellite transponders.

Scheme with two closely spaced transponders



In this case the spurious emissions of the transponder A are covered by the out-of-band emissions of transponder B. The diagram shows that the CPM text is correct when you have two transponders near but if the two transponders are far, it is not the same situation.

Scheme with two transponders far apart



In this case the CPM text is not clear because the spurious emissions are not hidden by the out-of band emissions from the second transponder.

APPENDIX S3

Table of maximum permitted spurious emission power levels

(See Article **S3**)

NOC

1 to 5

Section I – Spurious emission limits for transmitters installed on or before 1 January 2003 (valid until 1 January 2012)

MOD EUR/13/258

6 ~~The measurement methods for radar systems should be guided by Recommendation ITU-R M.1177. For those radar systems for which acceptable methods of measurement do not exist, the lowest practicable power of spurious emission should be achieved.~~Radar systems are exempt from spurious emission limits under this section. The lowest practicable power of spurious emission should be achieved.

NOC

TABLE 1

Attenuation values and absolute mean power levels used to calculate maximum permitted spurious emission power levels for use with radio equipment

Section II – Spurious emission limits for transmitters installed after 1 January 2003 and for all transmitters after 1 January 2012

Application of these limits

NOC

7

MOD EUR/13/259

8 Guidance regarding the methods of measuring spurious emissions is given in the most recent version of Recommendation ITU-R SM.329. The e.i.r.p. method specified in that Recommendation should be used when it is not possible to measure the power supplied to the antenna transmission line, or for specific applications, such as radar, where the antenna is designed to provide significant attenuation at the spurious frequencies. Additionally, the e.i.r.p. method may need some modification for special cases, e.g. beam-forming radars.

NOC

9 to 11

ADD EUR/13/260

11*bis* As an emitted signal becomes more and more narrow (to the limiting case of an unmodulated carrier with theoretical necessary bandwidth of zero), the application of the term “necessary bandwidth” as used in determining the region where spurious emission limits apply to space services, becomes more and more difficult. In the limit, ±250% of necessary bandwidth (generally recognized as establishing the region beyond which spurious emissions are defined), approaches zero. Beacon and other unmodulated signals, such as those used in uplink and downlink circuits in control and tracking of satellites, are examples of a case where it is difficult to practically apply the term “necessary bandwidth” in determining where out-of-band emissions end, and spurious emissions begin. Pending further studies and definitive action by a future world radiocommunication conference, in calculating the region where spurious emission limits apply for transmitters using amplifiers to pass essentially an unmodulated signal (or a signal with very small bandwidth), the amplifier bandwidth is taken to be the necessary bandwidth (in calculating the regions where spurious emissions apply).

ADD EUR/13/261

11*ter* For satellites employing more than one transponder, and when considering the limits for spurious emission as indicated by Headnote 11 to Appendix **S3**, spurious emissions from one transponder may fall on a frequency at which a companion, second transponder is transmitting or in the guardband between two transponders. In these situations, if it can be shown that the level of spurious emission from the first transponder is below the fundamental emissions of the second transponder or below its out-of-band emissions, then the limits of Appendix **S3** should not apply to those spurious emissions.

NOC

12

MOD EUR/13/262

TABLE II

Attenuation values used to calculate maximum permitted spurious emission power levels for use with radio equipment

Service category in accordance with Article S1, or equipment type ~~15~~14	**Attenuation (dB) below the power supplied to the antenna transmission line**
All services except those services quoted below:	43 + 10 log (*P*), or 70 dBc, whichever is less stringent
~~Space services (earth stations) 10, 14~~	~~43 + 10 log (*P*), or 60 dBc, whichever is less stringent~~
Mobile earth stations [10, 15]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Fixed earth stations [10, 15]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
~~Space services (space stations) 10, 14~~	~~43 + 10 log (*P*), or 60 dBc, whichever is less stringent~~
FSS space stations [10]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
MSS space stations [10]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
RNSS, ARNSS, RDSS and RLSS space stations [10]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Space stations of the space research service [10, 16]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Space stations (other than those in services mentioned above) [10]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Radiodetermination [17]	43 + 10 log (*PEP*), or 60 dB, whichever is less stringent
Broadcast television [11]	46 + 10 log (*P*), or 60 dBc, whichever is less stringent, without exceeding the absolute mean power level of 1 mW for VHF stations or 12 mW for UHF stations. However, greater attenuation may be necessary on a case by case basis.
Broadcast FM	46 + 10 log (*P*), or 70 dBc, whichever is less stringent; the absolute mean power level of 1 mW should not be exceeded
Broadcasting at MF/HF	50 dBc; the absolute mean power level of 50 mW should not be exceeded
SSB from mobile stations [12]	43 dB below *PEP*
Amateur services operating below 30 MHz (including with SSB) ~~12~~15	43 + 10 log (*PEP*), or 50 dB, whichever is less stringent
Services operating below 30 MHz, except space, radiodetermination, broadcast, those using SSB from mobile stations, and amateur [12]	43 + 10 log (*X*), or 60 dBc, whichever is less stringent, where *X* = *PEP* for SSB modulation, and *X* = *P* for other modulation

TABLE II *(end)*

Service category in accordance with Article S1, or equipment type ~~15~~14	**Attenuation (dB) below the power supplied to the antenna transmission line**
Low-power device radio equipment [13]	56 + 10 log (*P*), or 40 dBc, whichever is less stringent
Emergency position-indicating radio beacon Emergency locator transmitter Personal location beacon Search and rescue transponder Ship emergency, lifeboat and survival craft transmitters Land, aeronautical or maritime transmitters when used in emergency	No limit

NOC

Definitions of P, PEP and dBc.

NOC

Notes 10 to 13.

SUP EUR/13/263

14

(MOD) EUR/13/264

~~15~~14 In some cases of digital modulation (including digital broadcasting), broadband systems, pulsed modulation and narrow-band high-power transmitters for all categories of services, there may be difficulties in meeting limits close to ±250% of the necessary bandwidth.

ADD EUR/13/265

15 Amateur earth stations operating below 30 MHz are in the service category “Amateur services operating below 30 MHz (including with SSB)”.

ADD EUR/13/266

16 Space stations in the space research service intended for operation in deep space as defined by No. **S1.177**, are exempt from spurious emission limits.

ADD EUR/13/267

17 Radiodetermination (radar) system spurious emission dB attenuation shall be determined for radiated emission levels, not at the antenna transmission line. The measurement methods for determining the radiated spurious emission levels from the radar systems should be guided by Recommendation ITU-R M.1177.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 7C

Agenda item 1.3 - Review of Appendix S7

1 Introduction

In response to agenda item 1.3, a set of proposals is presented hereafter that fulfils the following objectives:

- replacement of the current text of Appendix S7 by the essential regulatory material within Recommendation ITU-R SM.[Doc. 1/1004], covering the frequency range 100 MHz - 105 GHz;
- relocation of the material relating to predetermined coordination distances from Appendix S5 to the revised Appendix S7;
- provisions for a procedure for updating the tables of system parameters within the revised Appendix S7 (Tables 1, 2 and 3);
- the completion of consequential changes elsewhere within the Radio Regulations.

2 Background

The revision of Appendix S7 was originally on the agenda of WRC-97. However, as the necessary technical studies could not be completed in time for that Conference, ITU-R Task Group 1/6 was set up to complete the work and to produce a draft new recommendation relating to methods for determining the coordination area around earth stations.

The ITU-R has now completed this work. The resulting recommendation exists as Recommendation ITU-R SM.[Doc. 1/1004]. This text is therefore available as a technical basis for a revision of Appendix S7 at WRC-2000. The ITU-R has indicated that the text can be used either as the basis of a revision of the Appendix S7 text or as a recommendation for incorporation by reference.

Chapter 7.2 of the CPM Report indicates the principal improvements that the material within the new recommendation will bring to Appendix S7. Section 7.2.3 of the Report offers five different methods for satisfying the agenda item:

- Method 1 proposes a complete replacement of the current text of Appendix S7 by the essential regulatory material from the new recommendation. However, the ITU-R agreed that there would be considerable advantage in being able to update the tables of system parameters between full revisions of Appendix S7, given that additional and modified allocations are made at each WRC, and given that systems and applications using the Article S5 frequency allocations nowadays change more often. Europe also agrees that this flexibility is desirable, and thus Method 1 is not supported.

- Method 5 proposes that the full recommendation be incorporated by reference. Europe believes that, whilst acknowledging the particular case of the parameter tables, the fundamental role of Appendix S7 determines that a stable and fully managed text should be located within the Radio Regulations, and not be incorporated by reference. Incorporation by reference could lead to almost constant change and this is neither necessary nor desirable in the case of Appendix S7. The experience of the ITU-R was that considerable attention had to be paid to the testing and validation of all changes in terms of their impact on coordination distances and the integrity of the procedures. This extensive effort could not be justified for frequent revisions.

  The CPM Report notes that there would be value in moving the information on predetermined coordination distances from Appendix S5 to Appendix S7 and that this cannot be achieved by incorporation by reference.

  Furthermore, the Special Committee concluded that there was only limited support for the approach using incorporation by reference. Method 5 is not therefore supported.

The three remaining methods (Methods 2-4) are based on the principal of a replacement text. Each offers a different method of achieving a procedure to allow the updating of the parameters in Tables 1, 2 and 3 of the revised Appendix S7.

- Method 4 suggests the replacement of the main text, but the incorporation by reference of Tables 1, 2 and 3 from the recommendation. This would result in a significant duplication of a large amount of material as the recommendation itself would need to be located in Volume 4 of the Radio Regulations under the provisions of Resolution 27. Method 4 is not therefore supported.
- Method 2 suggests the replacement of the main text with a permanent agenda item to allow the updating of the tables at each conference, based on allocation changes made at the previous conference. Europe believes that such a permanent agenda item might promote numerous small changes for consideration, where these may or may not be urgent. Method 2, whilst viable, is not therefore the preferred option. However, if it is anticipated that significant change to Tables 1, 2 or 3 would be needed at nearly every future conference, then the practical difference between Methods 2 and 3 becomes very small indeed, and the procedural overhead of Method 3 (see below) may no longer be justifiable.
- Method 3 calls for the establishment of a new WRC-2000 resolution that would provide a framework for a future conference to consider urgent changes to the tables of system parameters (Tables 1, 2 and 3 of ITU-R Recommendation ITU-R SM.[Doc. 1/1004]) when such a need arises.

The new resolution would create the mechanism that would permit the ITU-R to provide conclusions on the updating of the system parameters in a timely manner, so that a proposal can be made by the Director of the Radiocommunications Bureau to the Secretary General that Council place on the agenda of the next WRC an appropriate extraordinary agenda item to consider the ITU-R conclusions. Within the framework of this WRC Resolution a further resolution would need to be approved by the Radiocommunications Assembly to provide the practical implementation of this process.

On balance, of the five options proposed within the CPM Report, Method 3, as presented above, is the solution preferred by Europe. The proposals set out in section 3 below are structured on this basis. The method provides for stability and control of the main text, flexibility to update the tables, and offers a managed approach to the placing of changes to those tables before future conferences.

The ITU-R also proposed that the material relating to predetermined coordination distances, currently in Appendix S5, should be relocated within the revised Appendix S7, with appropriate references being inserted in Appendix S5 to indicate where the material is to be found. This proposal is supported within the Report of the Conference Preparatory Meeting. This advice is accepted and supported by Europe and the relevant proposals are set out in section 3 below.

3 Proposals

Modification to Appendix S7

MOD EUR/13/268

APPENDIX S7

Method<u>s</u> for the determination of the coordination area around an earth station in frequency bands between ~~1 GHz and 40 GHz shared between space and terrestrial radiocommunication services~~ <u>100 MHz and 105 GHz</u>

Reasons: The title is modified to reflect the changes introduced by the new Recommendation ITU-R SM.[Doc. 1/1004] where the frequency range has been extended to 100 MHz - 105 GHz and methods added for determining the coordination area of earth stations operating in bidirectionally allocated frequency bands.

MOD EUR/13/269

Replace the entire text of Appendix S7 by the text attached in Annex 1, that contains the essential regulatory text derived from Recommendation ITU-R SM.[Doc. 1/1004], together with the modified material from Appendix S5 relating to predetermined coordination distances, as included in Annex 1 of Chapter 7 of the CPM Report.

Reasons: The ITU-R has completed its studies and has developed a new Recommendation ITU-R SM.[Doc. 1/1004] on Methods for the determination of the coordination area around an earth station in frequency bands between 100 MHz and 105 GHz. This new recommendation is identified in the CPM text as the appropriate text to be used as the basis of a revision of Appendix S7.

Replacement of the existing text allows just the essential regulatory content of the new recommendation to be included, resulting in a considerably smaller text than would be the case if the whole recommendation were to be incorporated by reference into the Radio Regulations. It also permits the information on predetermined coordination distances to be moved into Appendix S7, allowing the benefits identified in the CPM Report, and the rationalization of the procedures on earth station coordination to be achieved. This approach also avoids inconsistencies between the existing regulatory provisions and the more generalized text within the recommendation.

Modification to Article S1

MOD EUR/13/270

S1.171 *coordination area:* When determining the need for coordination, t~~T~~he area ~~associated with~~surrounding an *earth station* ~~outside of which a *terrestrial station* sharing the same frequency band neither causes nor is subject to interfering *emissions* greater than a permissible level~~sharing the same frequency band with terrestrial stations, or surrounding a transmitting earth station sharing the same bidirectionally allocated frequency band with receiving earth stations, beyond which the permissible level of interference will not be exceeded.

NOC

S1.172

MOD EUR/13/271

S1.173 *coordination distance:* ~~Distance on a given azimuth from an *earth station* beyond which a *terrestrial station* sharing the same frequency band neither causes nor is subject to interfering *emissions* greater than a permissible level.~~When determining the need for coordination, the distance on a given azimuth from an *earth station* sharing the same frequency with terrestrial stations, or from a transmitting earth station sharing the same bidirectionally allocated frequency band with receiving earth stations, beyond which the permissible level of interference will not be exceeded.

Reasons: Consequential change identified by ITU-R.

Modifications to Article S9

MOD EUR/13/272

S9.17 *f)*[13] for any specific earth station or typical mobile earth station in frequency bands above ~~1 GHz~~100 MHz allocated with equal rights to space and terrestrial services, in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**;

Reasons: The frequency range of Appendix S7 has been extended.

MOD EUR/13/273

S9.53 Thereafter, the requesting and responding administrations shall make every possible mutual effort to overcome the difficulties, in a manner acceptable to the parties concerned[1].

ADD EUR/13/274

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1 **S9.53.1** In the process of coordination among earth stations and terrestrial stations, administrations are requested to use the methods for determining supplementary and auxiliary contours described in Recommendation ITU-R SM.[Doc. 1/1004], and, particularly for earth stations operating with non-GSO space stations, the TVG (Time Variant Gain) method described in the above recommendation and in Recommendations ITU-R SF.[XX] and ITU-R S.[XX].

Reasons: Article S9 subsection IIC refers to the “Action upon receiving a request for coordination”. Recognizing the requirements placed on administrations by the provision of S9.53 (“Thereafter, the requesting and responding administrations shall make every possible mutual effort

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1 Footnote **S9.53.1** added to **S9.53**.

to overcome the difficulties, in a manner acceptable to the parties concerned.”), Recommendation ITU-R SM.[Doc. 1/1004] and Recommendations ITU-R SF.[XX] and ITU-R S.[XX] provide information to assist administrations in meeting the requirements of this regulatory provision.

Modifications to Annex 2A of Appendix S4

A.7 Earth station site characteristics

For a specific earth station:

a) The horizon elevation angle in degrees and, in the case of a station submitted in accordance with Appendix **S30A**, the antenna gain in the direction of the horizon for each azimuth around the earth station.

ADD EUR/13/275

b) The distance in kilometres from the earth station to the horizon for each azimuth around the earth station.

SUP EUR/13/276

b)

SUP EUR/13/277

c)

ADD EUR/13/278

c) That is operating to an associated geostationary space station and having due regard to possible inclined-orbit operation of the associated space station:

i) the planned minimum angle of elevation of the antenna in the direction of maximum radiation in degrees from the horizontal plane;

ii) the planned range of operating azimuthal angles for the direction of maximum radiation in degrees, clockwise from True North.

ADD EUR/13/279

d) That is operating to associated non-geostationary space stations, the minimum angle of elevation of the antenna in the direction of maximum radiation in degrees from the horizontal plane for each azimuth around the earth station.

(MOD) EUR/13/280

~~d~~e) The altitude (metres) of the antenna above mean sea level.

Reasons: Additional provisions are needed in Appendix S4 to cover all data elements required to determine the coordination area of a particular earth station using the revised Appendix S7.

Modifications to Table S5-1 and section 3 of Annex 1 to Appendix S5

(NOTE - Only entries relating to earth station coordination are shown.)

TABLE S5-1

Technical conditions for coordination
(see Article **S9**)

MOD EUR/13/281

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.15** Non-GSO/ terrestrial	A specific earth station or a typical earth station in respect of terrestrial stations in frequency bands for which a footnote refers to No. **S9.11A** allocated with equal rights to space and terrestrial services, where the coordination area of the earth station includes the territory of another country	See Table S5-2	The coordination area of the earth station covers the territory of another administration	~~See § 2 of Annex 1 of this Appendix~~Appendix **S7**	

Reasons: There is no calculation method in § 2 of Annex 1. The applicable calculation method is Appendix S7 as § 3 of Annex 1 can be deleted following the revision of Appendix S7. Also see proposal EUR/13/287.

MOD EUR/13/282

No. **S9.16** Terrestrial/ non-GSO	A transmitting station in a terrestrial service within the coordination area of an earth station in a non-GSO network in frequency bands for which a footnote refers to No. **S9.11A**	See Table S5-2	Transmitting terrestrial station is situated within the coordination area of a receiving earth station	~~See § 2 of Annex 1 of this Appendix~~	The coordination area of the affected earth station has already been determined using the calculation method of ~~No. **S9.15**~~Appendix **S7**

Reasons: There is no calculation method in § 2 of Annex 1. The reference to a calculation method is not appropriate since, as mentioned in the right hand column, the method of Appendix S7 has already been used under S9.15. Also see proposal EUR/13/287.

MOD EUR/13/283

No. **S9.17** GSO, non-GSO/ terrestrial	A specific earth station or a typical mobile earth station in frequency bands above ~~1 GHz~~100 MHz allocated with equal rights to space and terrestrial services in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**	Any frequency band allocated to a space service, except those mentioned in the Plans in Appendix **S30A**	The coordination area of the earth station covers the territory of another administration	Appendix **S7** ~~(for earth stations in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz, 2 483.5-2 500 MHz and 2 500-2 516.5 MHz, see Remarks column)~~ ~~1)The coordination area of aircraft earth stations is determined by increasing the service area by 1 000 km with respect to the aeronautical mobile service (terrestrial) or 500 km with respect to terrestrial services other than the aeronautical mobile service~~	~~NOTE – For RDSS earth stations, a uniform coordination distance of 400 km corresponding to an airborne earth station shall be used. In cases where the earth stations are all ground-based, a coordination distance of 100 km shall be used~~	

Reasons: The frequency range has been extended down to 100 MHz following the revision of Appendix S7. The predetermined coordination distances will now be in Appendix S7 and hence do not need to be included here.

MOD EUR/13/284

No. **S9.17** GSO, non-GSO/ terrestrial (*cont.*)				2)~~For receiving earth stations in the meteo-rological-satellite service in frequency bands shared with the meteorological aids service, the coordina-tion distance is consi-dered to be the visibility distance as a function of the earth station horizon elevation angle for a radiosonde at an altitude of 20 km above mean sea level, assuming 4/3 Earth radius~~	Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices	

Reasons: The predetermined coordination distances will now be in Appendix S7 and hence do not need to be included here.

MOD EUR/13/285

No. **S9.17A** GSO, non-GSO/ GSO, non-GSO	A specific earth station in respect of other earth stations operating in the opposite direction of transmission in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission, where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of a coordinated earth station, with the exception of the frequency bands subject to the Plans in Appendix **S30A**	Any frequency band allocated to a space service	The coordination area of the earth station covers the territory of another administration or the earth station is located within the coordination area of an earth station	~~i) For bands in Table S5-2, see § 2 of Annex 1 of this Appendix~~ ~~ii) See Recommendations ITU-R IS.847, ITU-R IS.848 and ITU-R IS.849~~ Appendix **S7**		

Reasons: Consequential change owing to revision of Appendix S7 to cover earth stations within both GSO and non-GSO systems.

NOC EUR/13/286

No. **S9.21** Terrestrial, GSO, non-GSO/ terrestrial, GSO, non-GSO	A station of a service for which the requirement to obtain the agreement of other administrations is included in a footnote to the Table of Frequency Allocations, referring to No. **S9.21**	Band(s) indicated in the relevant footnote	Condition: Incompatibility established by the use of Appendices **S7**, **S8**, technical annexes of Appendices **S30**, **S30A** and **S30B**, pdf values specified in some of the footnotes, other technical provisions of the Radio Regulations or ITU-R Recommendations as appropriate	Methods specified in, or adapted from, Appendices **S7**, **S8**, **S30**, **S30A**, **S30B**, other technical provisions of the Radio Regulations or ITU-R Recommendations	

Modification of Table S5-1A of Appendix S5

MOD EUR/13/287

TABLE S5-~~1A~~2

Reasons: Editorial error made by WRC-95, not corrected at WRC-97.

Modification of the table text of Table S5-1A of Appendix S5

MOD EUR/13/288

Applicability of No. S9.11A for space services

NOTE - Annex 1 contains the relevant coordination thresholds for sharing between the mobile-satellite service (MSS) (space-to-Earth) and terrestrial services~~ as well as the relevant coordination areas for mobile earth stations operating below 3 GHz~~. It also contains the relevant coordination thresholds for sharing between non-GSO MSS feeder links (space-to-Earth) and terrestrial services~~ as well as the relevant coordination areas for earth stations providing feeder links for non-GSO satellites operating in the MSS and for non-GSO FSS earth stations~~.

Reasons: Consequential to the inclusion of the predetermined coordination distances in Appendix S7.

Modification of Table S5-2 of Annex 1 to Appendix S5

MOD EUR/13/289

TABLE AS5-2

Reasons: This table needs to be renumbered in order to avoid the current confusion with the references to Table S5-2 contained in Table S5-1. The real Table S5-2 is the current Table S5-1A (see EUR/13/287).

Suppression of section 2 of Annex 1 to Appendix S5

SUP EUR/13/290

2 Hard limits

Reasons: This section contains hard limits, hence not coordination thresholds. These limits should therefore not appear in Appendix S5. They already appear in Article S21, which is the proper place for such limits. They can therefore be suppressed from Appendix S5 without any consequence.

Suppression of section 3 of Annex 1 to Appendix S5

SUP EUR/13/291

3 Coordination areas for mobile earth stations operating below 3 GHz and earth stations providing feeder links for non-GSO satellites operating in the MSS and for non-GSO FSS earth stations

Reasons: The relevant material with appropriate modifications will now be available in Appendix S7. Relocating the material in a central location in Appendix S7 avoids the present duplication of text in Appendix S5.

Suppression of Resolution 60

SUP EUR/13/292

RESOLUTION 60

Relating to information on the propagation of radio waves used in the determination of the coordination area

Reasons:

1 Resolution 60 provided a mechanism for the updating of the propagation material in Appendix S7 independently from full updates of the Appendix S7 text. Recommendation ITU-R SM.[Doc. 1/1004] contains new calculation methodologies that have a greater degree of integration with the propagation models, and it is now less straightforward to adopt new propagation material without checking for consequential changes that might be necessary elsewhere in the text.

2 New arrangement will need to be made for the ongoing maintenance of Recommendation ITU-R SM.[Doc. 1/1004]. The relevant lead group might prefer to request changes to the propagation material and/or be notified of improvements made by SG 3 via the now effective liaison statement process.

MOD EUR/13/293

ANNEX 4 TO RESOLUTION 27 (Rev.WRC-97)

List of ITU-R Recommendations referred to in the Radio Regulations[1]

Recommendation	Title	Status[2]	Document	RR provision[3]
~~ITU-R SF.356-4~~	~~Maximum allowable values of interference from line-of-sight radio-relay systems in a telephone channel of a system in the fixed-satellite service employing frequency modulation, when the same frequency bands are shared by both systems~~	~~NOC~~	~~1997 SF Series~~	~~AP S7, § 2.3.1, Note 2~~
~~ITU-R SF.357-4~~	~~Maximum allowable values of interference in a telephone channel of an analogue angle-modulated radio-relay system sharing the same frequency bands as systems in the fixed-satellite service~~	~~MOD~~	~~1997 SF Series~~	~~AP S7, § 2.3.1, Note 2~~
~~**ITU-R IS.847-1**~~	~~Determination of the coordination area of an earth station operating with a geostationary space station and using the same frequency band as a system in a terrestrial service~~	~~NOC~~	~~1997 IS Series~~	~~**AP S5**, **Table S5-1**~~ ~~**AP S5**, **Annex 2**,~~ ~~**Tables 2** and **3**~~
~~**ITU-R IS.848-1**~~	~~Determination of the coordination area of a transmitting earth station using the same frequency band as receiving earth stations in bidirectionally allocated frequency bands~~	~~NOC~~	~~1997 IS Series~~	~~**AP S5**, **Table S5-1**~~
~~**ITU-R IS.849-1**~~	~~Determination of the coordination area for earth stations operating with non-geostationary spacecraft in bands shared with terrestrial services~~	~~NOC~~	~~1997 IS Series~~	~~**AP S5**, **Table S5-1**~~ ~~**AP S5**, **Annex 2**,~~ ~~**Tables 2** and **3**~~
~~**ITU-R M.1185-1**~~	~~Method for determining coordination distance between ground based mobile earth stations and terrestrial stations operating in the 148.0-149.9 MHz band~~	~~MOD~~	~~1997 M Series, Part 5~~	~~**AP S5**, **Annex 1**, **§ 3.2**, **Table 1**~~ ~~Resolution 46 (Rev.WRC-97), Annex 2, Table 1~~

Reasons: The proposed revision of Appendix S7 is based upon the essential regulatory text of Recommendation ITU-R SM.[Doc. 1/1004]. This new recommendation has drawn upon, and in some cases updated, the material of the recommendations identified for suppression in Annex 4 of Resolution 27. As the material in these recommendations is either obsolete or represents duplication, they should no longer be incorporated by reference within the Radio Regulations and the reference to them can be suppressed.

NOTE **-** It is assumed that this action and the modifications to Appendix S5 will also result in the deletion of these recommendations from Volume 4 of the Radio Regulations.

Suppression of Recommendation 105 (WRC-95)

SUP EUR/13/294

RECOMMENDATION 105 (WRC-95)

Further work by ITU-R on determination of the coordination area around earth stations operating with geostationary-satellite networks in the fixed-satellite service and earth stations providing feeder links to non-geostationary-satellite networks in the mobile-satellite service operating in opposite directions of transmission

Reasons: Consequential change. While the procedures called for in this recommendation have been provided by Recommendation ITU-R SM.[Doc. 1/1004], it is recognized that not all the technical coordination parameters have yet been identified. However, new Resolution [AAA] will provide the mechanism by which these parameters can be updated, and hence Recommendation 105 should be suppressed.

Suppression of Recommendation 711

SUP EUR/13/295

RECOMMENDATION 711

Relating to the coordination of earth stations

Reasons: Consequential change. While the procedures called for in this recommendation have been provided by Recommendation ITU-R SM.[Doc. 1/1004], it is recognized that not all the technical coordination parameters have yet been identified. However, new Resolution [AAA] will provide the mechanism by which these parameters can be updated, and hence Recommendation 711 should be suppressed.

Modification to Resolution 712

MOD EUR/13/296

RESOLUTION 712 (Rev.WRC-~~95~~2000)

Consideration by a future competent World Radiocommunication Conference of issues dealing with allocations to space services

The World Radiocommunication Conference (~~Geneva, 1995~~Istanbul, 2000),

considering

a) that the agenda of WARC-92 called for the development of new Recommendations and Resolutions relating to allocations to space services which were not placed on the agenda of that Conference;

b) that Recommendation ITU-R SA.363-5 recommends that frequencies below 1 GHz are technically suitable for telecommand of satellites operating below an altitude of 2 000 km;

c) that the United Nations Conference on Environment and Development (UNCED) (Rio de Janeiro, 1992) identified an urgent need for systematic observations of forest cover, and that such observations can best be performed using frequencies in the range 420-470 MHz;

d) that Resolution 35 of the Plenipotentiary Conference (Kyoto, 1994) considered that application of the latest telecommunication and information technologies, especially those associated with space systems, can be extremely useful in implementing and conducting environment protection activities such as monitoring air, river, harbour and sea pollution, remote sensing, wildlife studies, forestry development, and others;

e) that the status of existing allocations available for use by active space-based sensors between 1 and 25 GHz, in frequency bands shared with radiolocation or radionavigation systems, needs to be reviewed in order to facilitate worldwide usage by active space-based sensors;

f) that the allocations to the Earth exploration-satellite service in the frequency bands 8.025-8.4 GHz and 18.6-18.8 GHz are complex and not uniform worldwide, and that the band 18.6-18.8 GHz is vital for passive sensing of ecologically important data;

g) that the allocation of the frequency band 13.75-14 GHz to the fixed-satellite service by WARC-92 reduced the total bandwidth available for active space-based sensors in the frequency range 13-14 GHz, which is important for wideband sensor instruments, e.g. radar altimeters, scatterometers;

h) that future active Earth sensing requirements for monitoring environmental data in the 35 GHz and 95 GHz ranges have been identified;

i) that ITU-R has agreed to certain important technical parameters required for coordination of the space services under Appendix **S7**,

resolves

that, based on proposals from administrations and taking into account the results of studies in the Radiocommunication Study Groups and the 1997 Conference Preparatory Meeting (CPM-97), WRC-97 should consider the following matters:

1 provision of up to 3 MHz of frequency spectrum for the implementation of telecommand links in the space research and space operation services in the frequency range between 100 MHz and 1 GHz;

2 provision of up to 3.5 MHz of frequency spectrum to the Earth exploration-satellite service (active sensors) in the frequency range 420-470 MHz;

3 use of existing allocations by space-based active sensors operating in the Earth exploration-satellite and space research services in frequency bands shared with the radiolocation or radionavigation services, between 1 GHz and 25 GHz, with a view to the possibility of establishing common worldwide primary allocations;

4 use of existing allocations in the frequency range from 7 GHz to 20 GHz to the Earth exploration-satellite, meteorological-satellite, space research and space operation services, with a view to the possibility of establishing common worldwide primary allocations to these services in appropriate bands, taking into account Recommendation **706**;

5 provision of up to 500 MHz of frequency spectrum around 35 GHz and up to 1 GHz of frequency spectrum around 95 GHz for use by space-based active Earth sensors;

6 inclusion of ITU-R approved technical coordination parameters in Appendix **S7**, ~~taking into account Resolution **60** and Recommendation **711**,~~taking into account Resolution [EUR/13/9],

invites the Radiocommunication Study Groups

to carry out the necessary studies, taking into account the present uses of allocated bands, with a view to presenting, at the appropriate time, the technical information likely to be required as a basis for the work of the Conference,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

Reasons: Proposals EUR/13/292 and EUR/13/295 call for the suppression of Resolution 60 and Recommendation 711. Resolution 60 is recommended for suppression following the ITU-R work in revising Appendix S7 (EUR/13/269). Recommendation 711 can also be suppressed if Resolution [EUR/13/9] is approved.

Draft Resolution EUR/13/9

ADD EUR/13/297

RESOLUTION [EUR/13/9] (WRC-2000)

Consideration by a future competent World Radiocommunication Conference of revisions to technical coordination parameter tables contained in Annex VII of Appendix S7

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that Appendix **S7** to the Radio Regulations provides a method for the determination of the coordination area which requires assumed technical coordination parameters for the unknown terrestrial station or earth station;

b) that these technical coordination parameters are contained in Tables 1, 2 and 3 of Annex VII of Appendix **S7** (WRC-2000);

c) that the technical coordination parameter tables contained in Appendix **S7** are based directly on texts of the ITU-R;

d) that ITU-R studies on radiocommunication systems are continuing, and therefore the conclusions of these studies are subject to change and may in future show the need to revise those sections of Appendix **S7** which incorporate the technical coordination parameter tables;

e) that the technical coordination parameter tables may require to be updated when new frequency allocations are made at WRCs;

f) that the technical coordination parameter tables do not show numerical values for all the necessary parameters of certain space radiocommunication services and terrestrial radiocommunications services sharing frequency bands with equal rights,

recognizing

a) that Recommendation ITU-R SM.[Doc. 1/1004] was developed by the ITU-R as a basis for revision to Appendix **S7**;

b) that there is a need for future conferences to consider the revision of the tables of technical coordination parameters on an irregular basis,

invites

the ITU-R to continue to study technical parameters concerned with the determination of the coordination area, and to maintain the relevant ITU-R texts in a format which would permit direct insertion into Appendix **S7** in place of the existing Annex VII,

resolves

that when the ITU-R has come to the conclusion that a revision of Annex VII of Appendix **S7** is warranted, based on the latest available information on technical coordination parameter values, the Director of the Radiocommunication Bureau shall so inform the Secretary-General of ITU and send him the proposed amendments to Appendix **S7**, given in Annex 2 of the most recent version of Recommendation ITU-R SM.[Doc. 1/1004],

requests

that the Council then place, as an extraordinary item, on the agenda of the next world radiocommunication conference, the consideration of the conclusion of the ITU-R.

Reasons: This proposed Resolution provides the framework for updating the technical coordination parameter tables in support of Method 3 for fulfilling the agenda item as set out in Chapter 7.2.3 of the CPM Report.

Resolution 712 and Recommendations 105 and 711 require the updating of the technical coordination parameter in Appendix S7. This Resolution provides the mechanism by which this requirement can be achieved. In addition, the work performed by the ITU-R in revising Appendix S7 and the approval of this Resolution will permit Resolution 60 and Recommendations 105 and 711 to be suppressed (see proposals EUR/13/292, EUR/13/294 and EUR/13/295).

ANNEX 1 TO PART 7C OF THE EUROPEAN COMMON PROPOSALS

APPENDIX S7

(Will be provided as Addendum 1 to Addendum 7 of Document CMR2000/13)

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey

PART 7D

Agenda item 7.1 - Report of the Director, BR - Rules of Procedure

ARTICLE S13

Instructions to the Bureau

Introduction

The present structure of Article S13 dealing with the Rules of Procedure of the Radio Regulations Board has resulted in some misunderstanding as to what was intended by the WRC-97. The RRB have, on a provisional basis, developed some rules to clarify the application of these provisions. The purpose of these proposals is to modify Article S13 to clarify the sequence of these various provisions. In these proposals there is no major change in substance (except as mentioned in the following paragraph), mainly a rearrangement of the provisions.

In addition, there are situations when administrations may wish to react to decisions of the RRB and submit documents to the next meeting. Under the present situation and in accordance with the current No. S13.18, the minutes of the RRB meetings are not available until after the subsequent Board meeting starts - about three months later. It should be possible for the RRB to approve and make its minutes available before the start of the subsequent meeting, therefore a modification to No. S13.18 is proposed.

Section III – Maintenance of the Rules of Procedure by the Bureau

(MOD) EUR/13/298

S13.13 The Rules of Procedure shall include, inter alia, calculation methods and other data required for the application of these Regulations. These shall be based upon the decisions of world radiocommunication conferences and the Recommendations of the Radiocommunication Sector. Where requirements arise for new data for which there are no such decisions or Recommendations the Bureau shall develop such data in accordance with No. ~~**S13.14**~~**S13.15**, and shall revise them when appropriate decisions or Recommendations are available.

MOD EUR/13/299

S13.14 ~~The Bureau shall submit to the Board the final drafts of all proposed changes to the Rules of Procedure. The Rules of Procedure approved by the Board shall be published and shall be open for comment by administrations. In case of continuing disagreement, the matter shall be submitted by the Director in his report, with the agreement of the concerned administration, to the next world radiocommunication conference. The Director of the Bureau shall also inform the appropriate study groups of this matter. Pending resolution of the matter, the Board and the Bureau shall continue to use the particular Rule of Procedure in dispute but, following resolution of the matter by a decision of a world radiocommunication conference, the Board shall promptly review and revise as necessary the Rules of Procedure and the Bureau shall review all relevant findings.~~ Any administration may request a review or a study of the Rules of Procedure or may submit proposals for either changes to the existing Rules of Procedure or for new Rules of Procedure. Any such proposals for changes to existing Rules or new Rules shall be submitted to the Bureau as soon as possible so that the Bureau may make these proposals available to other administrations for comment before submitting the proposal to the Board.

ADD EUR/13/300

S13.14A The Board may also request the Bureau to undertake studies with respect to the Rules of Procedure and such reviews shall be treated in accordance with **S13.15**.

MOD EUR/13/301

S13.15 ~~If an administration, or the Board or the Bureau identifies a need for a special study, in relation to the Rules of Procedure, of any provisions of these Regulations or of a regional agreement with an associated frequency allotment or assignment plan, the case shall be handled under No. **S13.14**.~~The Bureau shall, where appropriate, prepare draft modifications or additions to the Rules of Procedure which shall be made available for comment before being submitted to the Board. The Director of the Bureau shall submit to the Board the final drafts of all proposed changes to the Rules of Procedure. The same shall apply if as a consequence of the review of a finding or other action by the Board it is necessary to re-examine the Rules of Procedure.

MOD EUR/13/302

S13.16 The Rules of Procedure shall be maintained and published in a form that will facilitate easy modification and maximize their value to administrations and other users. The Rules of Procedure approved by the Board shall be published and shall be open for comment by administrations. In case of continuing disagreement, the matter shall be submitted by the Director in his report, with the agreement of the concerned administration, to the next world radiocommunication conference. The Director of the Bureau shall also, where appropriate, inform the relevant study groups of this matter. Pending resolution of the matter, the Board and the Bureau shall continue to use the particular Rule of Procedure in dispute but, following resolution of the matter by a decision of a world radiocommunication conference, the Board shall promptly review and revise as necessary the Rules of Procedure and the Bureau shall review all relevant findings.

Section IV – Board documents

MOD EUR/13/303

S13.17 ~~The Bureau shall, where appropriate, prepare draft modifications or additions to the Rules of Procedure which shall be made available for comment before being submitted to the Board.~~ One week beforehand, the draft agenda of each Board meeting shall be sent by facsimile, or mailed, to all administrations and shall also be made available in electronic form. At the same time, all documents which are both referred to in that draft agenda and available at that time shall be sent by facsimile, or mailed, to those administrations requesting them as well as simultaneously being made accessible in electronic form.

MOD EUR/13/304

S13.18 Within one week after a meeting of the Board, a summary of all decisions taken in that meeting~~, as well as the~~. No later than six weeks after each Board meeting the approved minutes of ~~the preceding~~that meeting, shall be~~ published. These shall be~~ circulated to administrations by means of a circular-letter from the Bureau and~~ then~~ made available in electronic form.

MOD EUR/13/305

S13.19 A copy of all documents considered at the Board's meetings, including the minutes, shall be available for public inspection by administrations in the offices of the Bureau and shall be available in electronic form as soon as possible.

PART 7E

PP-98 resolutions

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Ireland, Iceland, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey

PART 7E1

PP-98 RESOLUTION 86

Date of bringing into use of satellite network frequencies

1 Introduction

During the past year there has been a situation in which the bringing into use of frequencies to a satellite network has resulted in some problems. This arose as a result of a satellite being tested for a few days at one orbital position and then moved to another orbital position. The testing at the first position was then used to indicate compliance with the date limits of the RR for the bringing into use of frequencies and thus avoid the consequential loss of protection for frequencies and the network concerned. While the term “date of bringing into use” is not defined in the RR, the closest phrase that exists in the RR is in No. S13.6 which relates to a review by the BR and this provision uses the term “regular operation in accordance with the notified required characteristics” is used. The term “regular use” is also used in No. S9.49 which deal with the bringing back into use after a period of suspension. Moreover, in at least one administration, the testing for a short period of time does not comply with the national requirements to bring the frequencies into service by a certain date limit.

One question that has been raised is whether there should be some flexibility in the application of this type of provision. However, it is to be noted that the Radio Regulations (1998 version) clearly indicate that the procedures for the API, coordination and notification of satellite networks should not start before five years in advance of the planned "in-service date" (No. S9.1). In addition, these Regulations provide for the extension of this “in-service date” by up to two years under certain circumstances such as launch problems and satellite design problems (Nos. S11.44C to S11.44I). The Radio Regulations seem to provide sufficient flexibility to deal with problems that may arise in the implementation of satellite networks so that a planned satellite can be brought into use within either the original five year period or the seven year extended period as provided for in the RR. If too much flexibility were provided in the Regulations, then the intent of these changes would be lost.

The discussion of this issues at the CPM and the conclusions of the CPM in section 7.5.2.1 have been taken into consideration.

2 Proposals

It is proposed to modify Appendix S4 Annex 2A, item A.2 (the explanation of the date of bringing into use) as follows as well as similar changes to Annexes of Appendices S30, S30A and S30B:

MOD EUR/13/306

a) The date (actual or foreseen, as appropriate) of bringing the frequency assignment (new or modified) into use. The date of bringing into use denotes the date at which the frequency is brought into regular operation to provide the published Radiocommunication service with the technical parameters within the technical characteristics notified to the Bureau. Whenever the assignment is changed in any of its basic characteristics (except in the case of a change in § A.1 *a)*, the date to be given shall be that of the latest change (actual or foreseen, as appropriate).

1) Pending further studies by ITU-R on the applicability of the term "regular operation" to non-GSO networks, the condition of regular operation shall be limited to GSO networks.

EUR/13/307

Similar changes to Annex 2 of Appendix S30 (item 4), Annex 2 of Appendix S30A (item 1.4) and Annex 2 of Appendix S30B (item 1.4).

Proposals submitted by the following administrations

Germany, Austria, Belgium, Croatia, Denmark, Spain, Estonia, Finland, France, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey

PART 7E2

PP-98 RESOLUTION 86

Satellite coordination procedures

1 Background

The PP-98 adopted Resolution 86 on the coordination and notification procedures for satellite networks. The objective of this Resolution is to permit WRC-2000 and subsequent WRCs to review and update the various coordination and notification procedures for satellite networks to achieve additional simplification of the procedures and cost savings for the BR and for administrations. During the past few years, the complexity of satellite networks has increased with the resulting increase in the complexity in the ITU notifications. This increased complexity together with the increased volume of notices to the ITU has resulted in very large backlogs in the processing of notices. Another important aspect is that the operational use of many satellite networks changes over time and it is probably not practical to expect operators and administrations to keep the ITU database current. One of the other purposes of Resolution 86 is to correct any problems that arise in the application of the procedures.

Another important change during the past few years has been the increasing role of satellite operators. An example of this is the coordination arrangements that have been made in the MSS in the L band, in which there are general intergovernmental agreements and then the operators meet on an annual basis to modify the operational requirements for the following year. This particular process may not work for other bands/services, but it does reflect the need to use new approaches to coordination.

The increasing complexity and volume of notices has increased the complexity and amount of work for BR and administrations, and thus the backlogs. It is not realistic to expect that BR will be provided with the necessary resources to be able to process the notices within the time period specified in the RR based on the present procedures. On the other hand, the time to build and launch satellites is decreasing significantly and the long processing delays by BR, are not consistent with these shorter times. As an example, the delay for the processing of a coordination request by BR is longer than some of the contracted satellite construction and launch times. Consequently, the most logical approach would seem to be to try to find some considerable simplification to the ITU procedures without sacrificing the major objective of the procedures. The present proposals address some of the issues related to the backlog, but further improvements would be necessary to have a significant impact on the backlogs.

2 Coordination procedures

There are a number of related changes to the coordination procedures that would result in considerable simplicity and cost savings for both BR and administrations.

2.1 Separation of uplink and downlink data

At the present time, the data requirements are complicated by the need to provide strapping tables to cover all of the possible combinations of the up and downlink frequencies, however, in the end it is necessary to identify separate coordination requirements for the two directions of transmissions. With the simplified coordination triggers it would be possible to treat the up and downlinks completely separate by looking only at the orbital separation where there is a frequency band overlap and considering the two directions separately. For identifying possible coordination needs outside the coordination arc, there would be considerable simplification in the exchange of data between administrations, if the strapping information is not a part of the data.

If there is no change to use coordination arcs, there would be considerable simplification under the present process for both the coordination and notification phases if the two directions were treated separately. However, if there is a change to use the coordination arcs, then the benefits would only be available at the notification and recording phase of the procedures. This proposal will facilitate the work of the Bureau and administrations.

SUP EUR/13/308

Section D of Appendix S4 with some consequential modifications to Appendix S8.

2.2 Identification of networks subject to coordination

Under the present procedures, Appendix S8 (formerly Appendix 29) is used to identify the networks, with which coordination is required, but the procedures require the identification of the administrations affected and this results in some problems. Under the existing provisions in the application of No. S9.7 plus others, the BR is required to identify the administrations with which coordination is required. The trigger requirements under Appendix S8 are based on individual networks. The present practice of the BR is to stop the examination for networks of a particular administration, once one network is identified. This identified network may be an insignificant or very significant problem in the coordination process. In the publications of the BR including the Special Sections and the MR, BR only identifies the administration with no identification of the networks involved. The reasons for including an administration in the coordination requirements are not public, as the networks are not listed. When an administration receives the publication indicating that it is included in the coordination requirements for the network being published, it does not know which of its networks triggered the coordination requirement. It is then necessary for the administrations to agree on which networks will be included. Once the coordination is completed and communicated to the BR, there is no record with BR as to whether a particular network was included in the agreement or not. There are also provisions in Appendix S5 which state that no coordination is required for a modification if the interference is not increased, but BR has no record as to whether the networks were in fact coordinated in the first place.

This new approach would be equally applicable if a coordination angle is used for the trigger.

MOD EUR/13/309

S9.36 *b)* identify in accordance with No. **S9.27** any administration[13A] with which coordination may need to be effected[14];

NOTE - The subsequent footnotes in Article S9 will need to be renumbered.

ADD EUR/13/310

13A **S9.36.2** In the case of coordination under Nos. **S9.7, S9.8, S9.9, S9.12** and **S9.13**, the Bureau shall also identify the specific satellite networks that may be affected and inform administrations in the most appropriate manner.

MOD EUR/13/311

S9.41 Following receipt of the Weekly Circular referring to requests for coordination under Nos. **S9.7** to **S9.9**, an administration believing that it should have been included in the request shall, within four months of the date of publication of the relevant Weekly Circular, inform the initiating administration and the Bureau, giving its technical reasons for doing so and identifying the specific satellite networks and frequencies, and shall request that its name be included.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey

PART 7E3

PP-98 RESOLUTION 87

Role of the notifying administration

1 Background

1.1 The Plenipotentiary Conference 1998 adopted Resolution 87 dealing with the role of the Notifying Administration when acting on behalf of a group of named administrations. Under this Resolution, the Director BR is requested to prepare a report to the next WRC on this issue. During the past couple years there has been a situation in which the role and responsibility of the notifying administration when it is acting on behalf of a group of named administrations is not clear. The BR and RRB see the notifying administration as being responsible for the submission, whereas, some notifying administrations see their responsibility as that of a “post office“ and only to forward to the BR the information that they receive from the intergovernmental organization that is responsible for the satellite network. It is to be noted that under the Radio Regulations only administrations may submit notices and data to the BR for processing and also there are certain rights and obligations that flow from the application of the Radio Regulations and that these rights and obligations relate to the notifying administration. Intergovernmental satellite organizations that operate satellite networks are not recognized within the coordination and notification procedures of the Radio Regulations.

1.2 Some of the main provisions of the Radio Regulations that relate to the roles and responsibilities of the notifying administration are the following:

- S4.4 - assignment of frequencies not in conformity with the RR by an administration on the condition of no interference;
- S8.4 - recording of assignments with a reference to No. S4.4 only when the administration makes a commitment;
- S9.3 - no comments within a time period equals no objection by the administration, and administrations shall endeavour to cooperate to resolve any difficulties;
- S9.4 - the administration shall explore all possible means, etc.;
- S9.43 - an administration not responding shall be considered as not affected;
- S9.47-49 - an administration undertakes to not make a claim about harmful interference and to not cause harmful interference;
- S9.51 - an administration shall act within a specified period;

- S11.36 - undertaking by the notifying administration to not cause harmful interference;
- S11.39B - as per No. S11.36;
- Article S18 – licences.

This is only a partial listing. During the discussion at the SC, there were a number of questions raised as to which administration is responsible under the various provisions listed above. This proposal also takes note of the report of the CPM in section 7.5.3.

1.3 As for the question of licensing under Article S18, this issue is not applicable to the application of Chapter SIII of the Radio Regulations, as there is no mention of licensed stations in this chapter. Article S18 is a parallel set of obligations under the Radio Regulations and not related to the provisions of Chapter SIII. In addition some administrations do not license or are not authorized by national legislation to license the space stations for which they are the notifying administration and in the case of space stations operated by intergovernmental organizations, they are not licensed by any administration. Also the application of Article S18 is limited to private networks.

1.4 Except for Article S18 the other provisions listed in paragraph 1.2 fall into one of two categories:

- Those provisions relating to the coordination of specific earth stations with terrestrial stations or between earth stations and the provisions relating to the notification and operation of specific earth stations, it is the administration on whose territory the earth station is situated that is responsible.
- Those provisions relating to the API, coordination, notification and operations of the space station (with typical earth stations as appropriate) and in this case (for non-intergovernmental operating entities) it is the notifying administration of the space station that is responsible. In the case on intergovernmental operating entities, this is the aspect that is not clear and is being addressed in this document.

1.5 This situation of notifying on behalf of a group of administrations only applies to satellite networks and Nos. S9.1.1, No. S9.6.1 and S11.15.1 are the relevant provisions. There are no similar specific provisions in Appendices S30 and S30A, but the Rules of Procedure of the RRB (paragraph 1 under No. 4.3.5 of Appendix S30 and paragraph 1 under No. 4.2.5 of Appendix S30A) provide for such a process.

1.6 These provisions of Articles S9 and S11 clearly indicate that each administration when notifying on behalf of a group of administrations still has the right to act independently with respect to its networks. There have been cases in which the notifying administration submits notices on behalf of a group of named administration and also raises concerns about the submitted notices on the basis of its own networks. Under the provisions of the Radio Regulations it is not necessary that the same administration to be the notifying administration for all satellite networks operated by an intergovernmental organization. However, in many cases, the agreement between the intergovernmental operating organization and the host administration limits the notifying administration to the host administration.

1.7 Appendix S30B in No. 6.38 already recognizes the principle of having one of the listed administrations to be identified to act as the notifying administration.

1.8 In these cases the notifying administration normally has the responsibility to submit to the BR whatever it receives from the intergovernmental organization. Under the Radio Regulations, on the other hand, there must be a single administration that is accountable as it is impracticable for the BR or other administrations with whom coordination is required to deal with all administrations that are members of the organization or all members on whose behalf the publication is made. Normally, the present situation does not result in any problems, but in some cases, e.g. when there are questions raised or allegations of interference, etc. one administration should be responsible for investigating the case, taking the necessary action and reporting to the BR/RRB.

2 Proposals

As a consequence of the above considerations it is proposed to add to Article S7 a new provision as follows:

ADD EUR/13/312

S7.9 When an administration acts as the notifying administration of a satellite network on behalf of a group of named administrations in accordance with Nos. **S9.1.1, S9.6.1** and **S11.15.1** and Appendix **30/30A**, that administration shall act on behalf of all members of the group of administrations in the application of the various provisions of Chapter SIII of the Radio Regulations with respect to that network. In these cases it is desirable that the notifying administration be one of the members of the group on whose behalf the notification is being made.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey,

PART 7E4

PP-98 RESOLUTION 88

Processing charge for satellite networks

1 Background

The Plenipotentiary Conference 1998 adopted Resolution 88 dealing with the processing charges for satellite network filings. That Resolution included the following:

"*instructs WRC-2000*

to consider whether, in the light of the Council decisions, any relevant amendments to the Radio Regulations with respect to the procedures covered by *resolves* 2 above may be necessary,"

Council at its 1999 session adopted Decision 482 and in that decision there is the following invites WRC-2000:

"to consider, in accordance with Resolution 88 (Minneapolis, 1998), required modifications to the Radio Regulations to take account of the content of this decision,[2]

[2] The implementation of Resolution 88 (Minneapolis, 1998) implies that WRC-2000 may also consider any consequence of non-payment taking account of unforeseen circumstances, and take, in this respect, any action within its competence. In developing the required procedures, due account shall be taken of the principles contained in the Constitution and Convention, in particular those relating to the sovereign right of Member States in gaining access to spectrum and orbit resources."

One of the major concerns of many administrations is that there should be some consequences for the non-payment of the required charge within the prescribed period. For many administrations, in accordance with the decision of Council, the invoices and payments will be handled directly between the ITU and satellite network operator and therefore any consequences of non-payment should be directed towards the operator. It is recognized that there are provisions in the CS/CV, which deal with the situation of non-payments, and these are directed to the administration and deal with the non-payment of the annual contribution. There are no provisions in the CS/CV that would apply in the case of non-payment of these processing charges. As a consequence there would be no consequences resulting from non-payment unless the WRC would take such action. As the treatment of notices received by the Bureau is specified in the Radio Regulations, only a WRC can change the treatment under the Radio Regulations.

This matter was raised at the SCRPM and the CPM meeting and is treated in paragraph 7.5.4 of the CPM Report. One of the questions raised was that such a proposal could impinge on the rights of administrations. In signing the Final Acts of a WRC administrations have certain rights as well as obligations and there are many cases in which administrations rights are effected in similar manner in that the right to keep specific satellite filings/frequencies active with the ITU are subject to certain conditions such as:

- No. S9.5D in which the API publication is cancelled by the Bureau if the coordination request is not received within 24 months of the date of receipt of the API request;
- No. S11.44 in which the assignments are cancelled by the Bureau if they are not brought into use within the time period provided for by the Regulations;
- Resolution 49 (WRC-97) *resolves* 6 in which the publications are cancelled if certain specified data is not provided to the ITU within the time period specified.

In addition the Council Decision 482 in *decides* 3 specifically addresses the question of the rights of administrations in that each administration is permitted to have one satellite filing per year at no charge.

2 Proposals

As a result of the above considerations it is proposed that the following modifications be made to the Radio Regulations.

MOD EUR/13/313

S9.2B On receipt of the complete information sent under Nos. **S9.1** and **S9.2**, the Bureau shall publish[6A] it in a Special Section of its Weekly Circular within three months. When the Bureau is not in a position to comply with the time limit referred to above, it shall periodically so inform the administrations, giving the reasons therefore.

ADD EUR/13/314

[6A] **S9.2B1** If the payments are not received in accordance with the provisions of Council Decision 482 as amended on the implementation of cost recovery for satellite network filings, the Bureau shall cancel the publication and inform all administrations of such action and that the network specified in this publication no longer has to be taken into consideration by the Bureau and other administrations.

MOD EUR/13/315

S9.38 *d)* publish[14A], as appropriate, the complete information in the Weekly Circular within four months. When the Bureau is not in a position to comply with the time limit referred to above, it shall periodically so inform the administrations, giving the reasons therefore.

ADD EUR/13/316

[14A] **S9.38.1** If the payments are not received in accordance with the provisions of Council Decision 482 as amended on the implementation of cost recovery for satellite network filing, the Bureau shall cancel the publication and inform all administrations of such action and that the network specified in this publication no longer has to be taken into consideration by the Bureau and other administrations.

Modification to Appendix S30

MOD EUR/13/317

4.3.6 The Bureau shall determine on the basis of Annex 1 the administrations whose frequency assignments are considered to be affected within the meaning of § 4.3.1 or § 4.3.3. The Bureau shall include the names of those administrations with the information received under § 4.3.5.2 and shall publish[3A] the complete information in a special section of its Weekly Circular. The Bureau shall immediately send the results of its calculations to the administration proposing the modification to the appropriate Regional Plan.

ADD EUR/13/318

[3A] If the payments are not received in accordance with the provisions of Council Decision 482 as amended on the implementation of cost recovery for satellite network filing, the Bureau shall cancel the publication and inform all administrations of such action and that the network specified in this publication no longer has to be taken into consideration by the Bureau and other administrations.

Modification to Appendix S30A

MOD EUR/13/319

4.2.7 The Bureau shall determine on the basis of Annex 1 the administrations whose frequency assignments are considered to be affected within the meaning of § 4.2.1 and 4.2.3. The Bureau shall include the names of those administrations with the information received under § 4.2.6.2 and shall publish[3A] the complete information in a special section of its Weekly Circular. The Bureau shall immediately send the results of its calculations to the administration proposing the modification to the Plan.

ADD EUR/13/320

[3A] If the payments are not received in accordance with the provisions of Council Decision 482 as amended on the implementation of cost recovery for satellite network filing, the Bureau shall cancel the publication and inform all administrations of such action and that the network specified in this publication no longer has to be taken into consideration by the Bureau and other administrations.

Modification to Appendix S30B

MOD EUR/13/321

ARTICLE 6

Procedures for implementation of the Plan and regulation of the fixed-satellite service in the planned bands[1A]

ADD EUR/13/322

1A If the payments are not received in accordance with the provisions of Council Decision 482 as amended on the implementation of cost recovery for satellite network filing, the Bureau shall cancel the publication specified in Nos. 6.26, 6.33, 6.49 or cancel the entry in the list under No. 6.44 as appropriate and inform all administrations of such action and that the network specified in this publication no longer has to be taken into consideration by the Bureau and other administrations.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 1 to Addendum 6 to Document 13-E
25 March 2000
Original: French English Spanish

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

Proposals submitted by the following administrations

[Albania, Germany, Andorra, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Cyprus, Vatican, Croatia, Denmark, Spain, Estonia, Finland, France, Greece, Hungary, Ireland, Iceland, Italy, Latvia, The Former Yugoslav Republic of Macedonia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Monaco, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, San Marino, Slovenia, Sweden, Switzerland, Turkey, Ukraine]

PART 6E

Agenda item 1.12 - Non-GSO MSS and GSO FSS at 19.3-19.7 GHz and 29.1-29.5 GHz

Introduction

Resolution 121 (WRC-97) *invites ITU-R*:

1 to undertake, as a matter of urgency, the continued development of appropriate permissible interference criteria for both non-GSO MSS feeder links and GSO FSS networks operating in the bands 19.3-19.7 GHz and 29.1-29.5 GHz;

2 to undertake, as a matter of urgency, studies of interference mitigation techniques (including those techniques listed in *considering d)*) which could facilitate coordination between non-GSO MSS feeder links and GSO FSS networks;

3 to undertake, as a matter of urgency, studies to develop coordination methodologies for GSO FSS networks and non-GSO MSS feeder links operating in the bands 19.3-19.7 GHz and 29.1-29.5 GHz on an equal basis.

The CPM Report concludes (section 6.4.2) that the requirements of Resolution 121 (Rev.WRC-97) have been satisfied and suggests that Resolution 121 (Rev.WRC-97) could now be suppressed.

This however does not take into account that no action had been taken at the time of the CPM in reponse to point 3 above. At its February 2000 meeting, WP 4A considered this issue and undertook the development of methodologies to be used under coordination involving non-GSO FSS systems, hence in particular non-GSO MSS feeder links in the 19/29 GHz bands. Although these methodologies have not at this time been fully developed, they are now expected to become part of an ITU-R recommendation within the next study period and will be used in detailed coordinations relating to this sharing situation.

ITU-R has also developed methodologies which are now included in Recommendation [Doc. 1/1004], relating to the coordination area of non-GSO FSS earth stations.

The existence of such recommendations will help in resolving a long-standing lack of harmonization in the provisions of Article S11, which results in a situation where the coexistence between GSO and non-GSO systems and between non-GSO earth stations and terrestrial stations may lead to arbitrary blockage of the recording process by a previous user of the frequency band. For this purpose, CEPT proposes that Nos. S11.32A and S11.33 also cover the possibility for the Bureau to examine notifications received from the point of view of the probability of harmful interference, using the above-mentioned methodologies.

Should WRC-2000 decide to postpone a decision on this proposal until all recommendations on this issue have been adopted by ITU-R, then Resolution 121 should be maintained. However, CEPT considers it unnecessary to delay the Conference decision on this issue and that this Resolution could therefore be suppressed.

As highlighted in section 7.5.2.7 of the CPM Report, in the cases where the coordination of an assignment under S9.7, S9.17, S9.17A and S9.18 could not be concluded successfully, Article S11 foresees a two step approach to record this assignment in the Master Register:

- In the first step, the Bureau conducts an examination of the probability of harmful interference (S11.32A for S9.7 and S11.33 for S9.17, S9.17A and S9.18). If this examination is favourable, the assignment is recorded;
- in the second step, should the examination under the first step be unfavourable, the assignment may be resubmitted and recorded if the Bureau is informed that it has been in use, together with the assignment which was the basis for the unfavourable finding, for at least four months without any complaint of harmful interference being made (S11.41). After this second step, the assignment remains under the Damocles of S11.42, i.e. any harmful interference has to be ceased if it occurs into the assignments which was the basis of the unfavourable finding.

This approach, which follows the pattern previously used under Articles 11 and 13 since 1971, ensures that an administration cannot block the recording process, hence the establishment of the rights of other administrations, for undue reasons.

This two step approach does not exist in the case where coordination under the other entry points in Article S9 could not be successfully concluded. In particular, the entry points corresponding to Resolution 46 (S9.12 to S9.16) are not covered by these provisions. This means that in case of disagreement in the coordination process under any S9.12 to S9.16, recording in the Master Register is not possible.

This is of particular concern in the case of S9.12 and S9.13 (coordination between non-GSO and GSO satellite systems) because the coordination is triggered by bandwidth overlap only, and no coordination threshold or method currently exists in these cases. This means that disagreeing to a coordination request, without any technical reason, is sufficient to prevent the access to frequencies of subsequent satellite systems (GSO or non-GSO), even if in practice no interference would occur.

Given that recommendations also exist on coordination methods relating to S9.14 (e.g. the application of the system specific methodology described in Recommendation ITU-R IS.1143 (see Annex 1 to Appendix S5) and are under development in relation to S9.11, the proposed modifications to S11 should also include a reference to these provisions.

2 Proposals

It is therefore proposed to recognize that the work undertaken by ITU-R in response to Resolution 121 (Rev.WRC-97) has been satisfactorily undertaken, hence to suppress this Resolution, and to reflect this result by harmonizing the ways in which recording is conducted under Article S11.

SUP EUR/13/371

RESOLUTION 121 (Rev.WRC-97)

Continued development of interference criteria and methodologies for fixed-satellite service coordination between feeder links of non-geostationary satellite networks in the mobile-satellite service and geostationary-satellite networks in the fixed-satellite service in the bands 19.3-19.7 GHz and 29.1-29.5 GHz

NOTE - Should WRC-2000 decide to postpone a decision on the proposals made hereafter until all Recommendations on this issue have been adopted by ITU-R, then Resolution 121 should be maintained. However, Europe considers it unnecessary to delay the Conference decision on this issue and this Resolution could therefore be suppressed.

PROPOSED MODIFICATIONS TO ARTICLE S11

MOD EUR/13/372

S11.32A *c)* with respect to the probability of harmful interference that may be caused to or by assignments recorded with a favourable finding under Nos. **S11.36** and **S11.37** or **S11.38**, or recorded in application of No. **S11.41**, or published under Nos. **S9.38** or **S9.58** but not yet notified, as appropriate, for those cases for which the notifying administration states that the procedure for coordination under Nos. **S9.7**, **S9.7A, S9.7B, S9.11, S9.12, S9.13** or **S9.14** could not be successfully completed (see also No. **S9.65**);[10] or

MOD EUR/13/373

S11.33 *d)* with respect to the probability of harmful interference that may be caused to or by other assignments recorded with a favourable finding in application of Nos. **S11.36** and **S11.37** or **S11.38** or in application of No. **S11.41**, as appropriate, for those cases for which the notifying administration states that the procedure for coordination or prior agreement under Nos. **S9.15**[11], **S9.16**[11], **S9.17**[11], **S9.17A** or **S9.18**[11] could not be successfully completed (see also No. **S9.65**);[12] or

MOD EUR/13/374

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10 **S11.32A.1** The examination of such notices with respect to any other frequency assignment for which a request for coordination under Nos. **S9.7**, **S9.7A, S9.7B, S9.12** or **S9.13**, as appropriate, has been published under No. **S9.38** but not yet notified shall be effected by the Bureau in the order of their publication under the same number using the most recent information available.

MOD EUR/13/375

S11.35 ~~Not used.~~In cases where the Bureau is not in a position to conduct the examination under No. **S11.32A** (**S11.33**), the Bureau shall immediately inform the notifying administration, which may then resubmit its notice under No. **S11.41**, under the assumption that the finding under No. **S11.32A** (**S11.33**) is unfavourable.

NOTE - These proposals also reflect proposals EUR/13/129 and 130.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 6 to
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PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

PART 6

Fixed and fixed-satellite services

CONTENTS

PART 6A

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Part 6A3	Resolutions 128, 129 and 134 (WRC-97) - HDFS in the 40.5-42.5 GHz band

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Norway, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 6A1

Agenda item 1.4 - Resolution 133 (WRC-97)

HDFS in the 37-39.5 GHz band

Introduction

The 37-39.5 GHz band is presently allocated to the fixed service, the mobile service, the fixed-satellite service (downlink), and the space research service (downlink) and is already used for high-density fixed services in European countries. Therefore, the continued development of the fixed service in this band must be safeguarded.

The band is broad enough to satisfy low, medium and high-capacity fixed service needs. Recommendation ITU-R F.749-1, which provides a raster supporting all capacities, has been developed. Standardized equipment is available and is being implemented in Europe in large numbers, mainly supporting the mobile infrastructure. This HDFS use will increase with the introduction of new terrestrial mobile systems and progressive telecommunications liberalization.

These European common proposals ensure the long-term security of high-density fixed service use in the 37-39.5 GHz band by supporting:

– the use of HDFS in the 37-39.5 GHz band, and its addition in S5.547. Moreover, Europe supports the use of the band 39.5-40.5 GHz for FSS in European countries, so that both FS and FSS have the opportunity to use the 38 GHz range;

– the pfd limits defined in Option A of section 6.1.2.3.2 of the CPM Report in order to adequately protect the fixed service from FSS satellite systems;

– that the pfd limits proposed for FSS in Option A be also applied to the space research service (SRS) in the band 37.5-38 GHz and to GSO SRS in the band 37-37.5 GHz. For non-GSO SRS in the band 37-37.5 GHz, Europe proposes to keep the existing pfd mask.

ARTICLE S5

MOD EUR/13/230

34.2-40.5 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
37-37.5	FIXED MOBILE SPACE RESEARCH (space-to-Earth) MOD S5.547	
37.5-38	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE SPACE RESEARCH (space-to-Earth) Earth exploration-satellite (space-to-Earth) MOD S5.547	
38-39.5	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Earth exploration-satellite (space-to-Earth) MOD S5.547	
39.5-40	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) Earth exploration-satellite (space-to-Earth)	

Reasons: The fixed service is already heavily deployed in the band 37-39.5 GHz, and its use is expected to grow in the future. Insertion of footnote MOD S5.547 in this band ensures the development of HDFS, without precluding the use by other services.

MOD EUR/13/231

S5.547 The bands 31.8-33.4 GHz, 37-39.5 GHz, 40.5-42.5 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are available for high-density applications in the fixed service ~~(see Resolution **726 (WRC-97)**)~~. Administrations should take this into account, when considering regulatory provisions in relation to these bands.

Reasons: The fixed service is already heavily deployed in the band 37-39.5 GHz, and its use is expected to grow in the future. Resolution 726 (WRC-97) is no longer needed, because the studies leading to the identification of system characteristics of high-density systems in the fixed service in the bands listed in this Resolution have been completed. The *resolves* of Resolution 726 is also proposed to be transferred to footnote MOD S5.547.

MOD EUR/13/232

TABLE **S21-4** *(end)*

Frequency band	Service*	Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
31.0-31.3 GHz 31.8-32.3 GHz 34.7-35.2 GHz (space-to-Earth transmissions referred to in No. **S5.550** on the territories of countries listed in No. **S5.549**) ~~37.0~~39.5-40.5 GHz	~~Fixed-satellite~~ Mobile-satellite Space research	-115 [10]	$-115 + 0.5(\delta - 5)$ [10]	-105 [10]	1 MHz
37-37.5 GHz	Space research non-geostationary-satellite orbit	-115	$-115 + 0.5(\delta - 5)$	-105	1 MHz
37-40 GHz	Space research geostationary-satellite orbit Fixed-satellite geostationary-satellite orbit	-125	$-125 + (\delta - 5)$	-105	1 MHz
37.5-40 GHz	Space research non-geostationary-satellite orbit Fixed-satellite non-geostationary-satellite orbit	-120	$-120 + 0.75(\delta - 5)$	-105	1 MHz
40-40.5 GHz	Fixed-satellite	-115	$-115 + 0.5(\delta - 5)$	-105	1 MHz

Reasons: The pfd masks proposed in EUR/13/232 are needed to protect the fixed service from FSS, MSS and SRS in the band 37-40 GHz, and the FS from the SRS in the band 31.8-32.3 GHz (see EUR/13/235 to 238 for the band 31.8-33.4 GHz).

SUP EUR/13/233

RESOLUTION 133 (WRC-97)

Sharing between the fixed service and other services in the band 37-40 GHz

Reasons: Resolution 133 (WRC-97) is no longer needed, because the studies to determine pfd limits to adequately protect terrestrial services from fixed-satellite service networks have been completed, as well as the other studies leading to technical and operational recommendations to facilitate sharing between terrestrial and space services.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Croatia, Denmark, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 6A2

Agenda item 1.4 - Resolutions 126 and 726 (WRC-97)

HDFS in the 31.8-33.4 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz bands

Introduction

Resolution 726 (WRC-97) and footnote S5.547 identify the bands 31.8-33.4 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz for high-density applications in the fixed service (HDFS).

HDFS meets the demand of fast growing and new applications. The recent introduction of competition in many countries has created an additional demand for narrow-band or broadband fixed wireless access to the end-user. Fixed wireless access technologies allow new operators to quickly deploy an alternative network at low cost and in a flexible way, provided that coordination and regulatory requirements are kept to a minimum. The fast growing mobile sector also increases the need for new mobile network infrastructures for GSM, GSM1800 and soon IMT-2000 operators.

The band 31.8-33.4 GHz is presently allocated to the fixed service, the radionavigation service, the space research and the inter-satellite service. However, footnote S5.547A places some constraints on these applications via Resolution 126 (WRC-97). The CPM Report concluded that the sharing between FS and the other services is feasible with some constraints. Therefore, this ECP proposes to confirm the FS allocation and to introduce the necessary pfd limits in this band.

In the band 55.78-59 GHz, sharing studies conducted in ITU-R have shown that the sharing between FS and EESS is feasible. However, in the sub-band 55.78-56.26 GHz, some limitations on the FS are necessary to ensure the sharing with the EESS. This ECP proposes to confirm the FS allocation and implement the necessary limitations in this sub-band.

In the other bands (51.4-52.6 GHz and 64-66 GHz) compatibility studies conducted within the ITU-R have shown that the sharing between HDFS and the other services is feasible.

MOD EUR/13/234

29.9-34~~,~~.2 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
31.8-32	FIXED ~~S5.547A~~ RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) MOD S5.547 S5.547B S5.548	
32-32.3	FIXED ~~S5.547A~~ INTER-SATELLITE RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) MOD S5.547 S5.547C S5.548	
32.3-33	FIXED ~~S5.547A~~ INTER-SATELLITE RADIONAVIGATION MOD S5.547 S5.547D S5.548	
33-33.4	FIXED ~~S5.547A~~ RADIONAVIGATION MOD S5.547 S5.547E	

Reasons: Ensure the long-term security of high-density fixed service in the bands 31.8-33.4 GHz. Sharing studies have shown that sharing between FS and other services in these bands is feasible with appropriate mitigation techniques. See also EUR/13/231 for MOD S5.547.

MOD EUR/13/235

TABLE **S21-4** *(end)*

Frequency band	**Service***	**Limit in dB(W/m^2) for angle of arrival (δ) above the horizontal plane**			**Reference bandwidth**
		0°-5°	**5°-25°**	**25°-90°**	
32-33 GHz	Inter-satellite	–135	–135 + (δ – 5)	–115	1 MHz

Reasons: The pfd mask proposed in EUR/13/235 is needed to protect the fixed service from ISS in the band 31.8-33 GHz. For the protection of FS from SRS in the band 31.8-32.3 GHz, see EUR/13/232.

SUP EUR/13/236

S5.547A

SUP EUR/13/237

RESOLUTION 126 (WRC-97)

Use of the frequency band 31.8-33.4 GHz for high-density systems in the fixed service

Reasons: Sharing between the space research, radionavigation and inter-satellite services is feasible as detailed in the CPM Report. Appropriate studies to determine what criteria would be necessary for sharing between stations in the fixed service and stations in the other services in this band have been conducted. The results show that the sharing is feasible with appropriate mitigation techniques. The date 1 January 2001 for the provisional application of the allocation to the fixed service in this band can be withdrawn. Reference to Resolution 126 (WRC-97) via footnote S5.547A is then no longer needed.

MOD EUR/13/238

40.5-55.78 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
51.4-52.6	FIXED MOBILE MOD S5.547 S5.556	

Reasons: Compatibility studies have shown that HDFS can share with the other services in this band as detailed in the CPM Report. No change is needed to the allocations in this band. See also EUR/13/231 for MOD S5.547.

MOD EUR/13/239

55.78-66 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
55.78-56.9	EARTH EXPLORATION-SATELLITE (passive) FIXED ADD S5.XXX INTER-SATELLITE S5.556A MOBILE S5.558 SPACE RESEARCH (passive) MOD S5.547 S5.557	
56.9-57	EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE S5.558A MOBILE S5.558 SPACE RESEARCH (passive) MOD S5.547 S5.557	

57-58.2	EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE S5.556A MOBILE S5.558 SPACE RESEARCH (passive) MOD S5.547 S5.557
58.2-59	EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) MOD S5.547 S5.556

ADD EUR/13/240

S5.XXX In the band 55.78-56.26 GHz, the output power density of stations in the fixed service shall be limited to –21.5 dBW/MHz and the e.i.r.p. density in the zenith direction shall be limited to –31.5 dBW/MHz.

Reasons: Compatibility studies have shown that HDFS can share with the other services in this band as detailed in the CPM Report. No change is needed to the allocations in this band. For the sub-band 55.78-56.26 GHz, a footnote in compliance with study assumptions in Recommendation ITU-R SA.1259 is required in order to ensure protection of EESS (passive). See also EUR/13/231 for MOD S5.547

MOD EUR/13/241

55.78-66 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
64-65	FIXED INTER-SATELLITE MOBILE except aeronautical mobile MOD S5.547 S5.556	
65-66	EARTH EXPLORATION-SATELLITE FIXED INTER-SATELLITE MOBILE except aeronautical mobile SPACE RESEARCH MOD S5.547	

Reasons: Compatibility studies have shown that HDFS can share with the other services in this band as detailed in the CPM Report. No change is needed to the allocations in this band. See also EUR/13/231 for MOD S5.547.

SUP EUR/13/242

RESOLUTION 726 (WRC-97)

Frequency bands above 30 GHz available for high-density applications in the fixed service

Reasons: Resolution 726 (WRC-97) is no longer needed, because the studies leading to the identification of system characteristics of high-density systems in the fixed service in the bands listed in this Resolution have been completed. Other parts of this Resolution have been transferred to footnote MOD S5.547.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Croatia, Denmark, Estonia, Finland, Hungary, Ireland, Iceland, Italy, Lithuania, Luxembourg, Norway, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Turkey, Ukraine

PART 6A3

Agenda item 1.4 - Resolutions 128, 129 and 134 (WRC-97)

HDFS in the 40.5-42.5 GHz band

Introduction

WRC-97 added a primary allocation to the fixed-satellite (space-to-Earth) service in Regions 2 and 3, and in certain non-European countries in Region 1. This allocation is subject to discussions at the next WRC, according to the resolutions mentioned above. WRC-97 also upgraded the fixed service to primary.

The band will be used in many countries including Europe to provide fixed wireless access directly to the end user for multimedia services, and such use is expected to grow in the future. Terrestrial multimedia wireless systems (MWS) have priority in Europe. The band 42.5-43.5 GHz is used by the radio astronomy service in many countries.

Europe is concerned about coexistence between MWS terminals and uncoordinated FSS and BSS earth stations in the band 40.5-42.5 GHz. Therefore, the introduction of FSS in Region 1 is opposed and the BSS allocation is proposed for deletion in Region 1. It is also proposed to introduce adequate pfd limits to protect terrestrial services from space services allocated in Regions 2 and 3, and in many countries in Region 1.

MOD EUR/13/243

40.5-55.78 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
40.5-42.5 FIXED BROADCASTING ~~BROADCASTING-SATELLITE~~ Mobile MOD S5.547~~S5.551B~~ S5.551D ADD S5.551XX	**40.5-42.5** FIXED FIXED-SATELLITE (space-to-Earth) S5.551B S5.551E BROADCASTING BROADCASTING-SATELLITE Mobile S5.551C S5.551F	

SUP EUR/13/244

S5.551B

Reasons: In line with the European position to oppose the introduction of the FSS and to delete the BSS allocation.

ADD EUR/13/245

S5.551XX Broadcasting-satellite service systems for which complete information for advance publication has been received by the Bureau by 2 June 2000 may operate in the band 40.5-42.5 GHz in the space-to-Earth direction.

Reasons: To take the requirements of current and planned BSS systems into account.

MOD EUR/13/246

TABLE **S21-4** *(end)*

Frequency band	Service*	Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
40.5-42.5 GHz	Fixed-satellite (non-geostationary-satellite orbit) Broadcasting-satellite (non-geostationary-orbit)	–115	–115 + 0.5(δ – 5)	–105	1 MHz

MOD EUR/13/247

TABLE **S21-4** *(end)*

Frequency band	Service*	Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane				Reference bandwidth
		0°-5°	5°-**15**°	**15**°-25°	25°-90°	
40.5-42.5 GHz	Fixed-satellite (geostationary-satellite orbit) Broadcasting-satellite (geostationary-orbit)	–120	–120 + (δ – 5)	–110 + 0.5 (δ – 5)	–105	1 MHz

Reasons: The pfd mask proposed in EUR/13/246 and EUR/13/247 are needed to protect the terrestrial services from FSS and BSS in the band 40.5-42.5 GHz.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 6B

Agenda item 1.5 - High altitude platforms (HAPS)

1 Introduction

This proposal deals with the issues involved in the consideration of the use of HAPS in the fixed service in the 47.2-47.5 GHz and 47.9-48.2 GHz bands and in other bands in the 18-32 GHz range. Proposals concerning the use of HAPS in the IMT-2000 context are dealt with under WRC-2000 agenda item 1.6.

Since WRC-97 studies have been undertaken within ITU-R for the type of HAPS-based fixed service system described in ITU-R Recommendation [9B/TEMP/112]. For such systems the general conclusion is that co-frequency sharing in the same geographical area between HAPS-based and conventional fixed service systems could be difficult unless appropriate interference mitigation techniques are developed and implemented. The studies were based on scenarios using worst-case conditions and it has been recognized that further studies are required. As regards sharing with FSS earth stations, there are indications that small separation distances will be appropriate in some conditions but further study is required to fully assess the implications of the scenarios. It has also been concluded that it is technically feasible to protect the radio astronomy service in nearby bands through appropriate protection measures.

Consideration has been given to the use of other specific bands by HAPS-based systems in the fixed service and the CPM has noted that studies are required in respect of the use of HAPS in the fixed service within the frequency range 18-32 GHz. However, studies so far have not established a suitable basis for the sharing of use between HAPS systems in the fixed service and other services in this frequency range, in view of the current heavy usage of the spectrum. It is therefore considered premature to make any additional allocations/designations/provisions for the use of HAPS in the fixed service, or for other services (noting the comment above regarding use of HAPS in the IMT-2000 context) and further studies should be undertaken.

2 Proposal

Thus it is proposed that there should be no change in the Radio Regulations in relation to the use of HAPS in the fixed service, and that the time frame of Resolution 122 should be extended to the next WRC so that more detailed studies may be completed and that trial systems may be implemented.

3 Proposed changes to Resolution 122 (WRC-97)

Resolution 122 should be modified based on the following changes, in line with the draft text contained in the CPM Report prepared for WRC-2000.

MOD EUR/13/248

RESOLUTION 122 (Rev.WRC-~~97~~2000)

Use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz by high altitude platform stations in the fixed service and by other services and the potential use of bands below 47 GHz by HAPS in the fixed service

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that the band 47.2-50.2 GHz is allocated to the fixed, mobile and fixed-satellite services on a co-primary basis;

b) that ~~this Conference has~~WRC-97 made provision for operation of high altitude platform stations, also known as stratospheric repeaters, within the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz;

c) that ITU has among its purposes "to promote the extension of the benefit of the new telecommunication technologies to all the world's inhabitants" (No. 6 of the Constitution of the ITU (Geneva, 1992));

d) that systems based on new technologies using high altitude platforms will be able to provide high-capacity, competitive services to urban and rural areas;

e) that the development of any service requires major investment and that manufacturers and operators should be given the confidence to make the necessary investment;

~~e~~f) that high altitude platform systems are in an advanced stage of development and some countries have notified such systems to ITU;

~~f~~g) that the Radio Regulations Board issued a provisional rule of procedure concerning notification periods in No. **S11.24/1228** in February 1997;

~~g~~h) that in spite of the urgency attached to the development of such systems, technical, sharing and regulatory issues should be further studied in order to achieve the most efficient use of the spectrum available for these systems;

~~h~~i) that technical studies ~~are required in order to ascertain the extent to which sharing of the~~have been undertaken on the characteristics of a HAPS system in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz ~~is feasible between systems using high altitude platforms in the fixed service and systems in the fixed, fixed-satellite and mobile services, and to ascertain the requirements to protect radio astronomy services in adjacent bands from spurious emissions~~and on the coordination and sharing requirements between HAPS systems and systems in the conventional fixed service and in other services, but that further studies are still in progress on the potential for interference between such systems;

~~i~~j) that the radio astronomy service has primary allocations in the bands 42.5-43.5 GHz and 48.94-49.04 GHz;

~~*j)* that ITU-R studies are already under way on the preferred characteristics of systems using high altitude platforms and the feasibility of sharing between these systems and systems of other services and between these systems and other systems in the fixed service (Questions ITU-R 212/9, ITU-R 218/9 and ITU-R 251/4);~~

k) that ITU-R study results have been presented which indicate that in WRC-97 designated bands at 47.2-47.5/47.9-48.2 GHz, sharing between fixed service systems using HAPS and other conventional fixed service systems in the same area will require appropriate interference mitigation techniques to be developed and implemented;

~~k~~l) that No. **S5.552** urges administrations to reserve fixed-satellite service use of the band 47.2-49.2 GHz for feeder links for the broadcasting-satellite service, and that~~ preliminary~~ ITU-R studies indicate that high altitude platform stations in the fixed service may share with broadcasting-satellite feeder links;

~~*l)* that the development of services using high altitude platform stations in these bands requires major investment and that manufacturers and operators should be given the confidence to make the necessary investment in these applications,~~

m) that ITU-R studies in the bands 47.2-47.5 GHz and 47.9-48.2 GHz indicate that sharing between fixed service systems using HAPS and FSS could be feasible under certain limitations, such as geographical separation between HAPS-based systems and FSS earth stations;

n) that since 47 GHz bands are more susceptible to the rain attenuation in certain areas of Region 3, the range 18-32 GHz has been proposed for possible identification of additional spectrum in ITU-R and preliminary studies are in progress for these bands;

o) that the 18-32 GHz range is already heavily used by a number of different services,

resolves

1 to urge administrations to facilitate coordination between high altitude platform stations in the fixed service operating in the bands 47.2-47.5 GHz and 47.9-48.2 GHz and other co-primary services in their territory and adjacent territories;

2 that, on a provisional basis, the procedures of Article **S9** shall be used for coordination between satellite systems and high altitude platform systems;

3 to request ITU-R to continue to carry out urgently studies on the appropriate technical sharing criteria for the situations referred to in *considering ~~h~~i)*~~, with priority given to the sharing with other systems in the fixed and fixed-satellite services, in particular the determination of the appropriate geographical separation from feeder links in the broadcasting-satellite service~~;

4 to request ITU-R, taking into account the requirements of other fixed service systems and other services, to urgently conduct studies on the feasibility of identifying additional frequencies for the use of HAPS in the fixed service in the range 18-32 GHz;

~~4~~5 that WRC-~~99~~02 should review the results of these studies and consider refinement of the regulatory provisions that might facilitate a broader application of these high altitude platform technologies,

instructs the Director of the Radiocommunication Bureau

1 that notices concerning high altitude platform stations that were received by the Bureau prior to 22 November 1997, and provisionally recorded in the Master International Frequency Register in accordance with the provisional rule of procedure issued by the Board, shall be maintained;

2 that from 22 November 1997, and pending review of the sharing studies in *considering ~~h~~i)* and review of the notification process by WRC-~~99~~02, the Bureau shall accept notices in the bands 47.2-47.5 GHz and 47.9-48.2 GHz only for high altitude platform stations in the fixed service and for feeder links for the broadcasting-satellite service, shall continue to process notices for fixed-satellite service networks (except for feeder links for the broadcasting-satellite service) for which complete information for advance publication has been received prior to 27 October 1997, and shall inform the notifying administrations accordingly.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 6C

Agenda item 1.8 - Earth stations on board vessels in the FSS at 3 700-4 200 MHz and 5 925-6 425 MHz

Introduction

Agenda item 1.8 requests to consider regulatory and technical provisions to enable earth stations located on board vessels (ESV) to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands.

Both bands are heavily used by the fixed service throughout Europe and significant growth is expected in the future, in order to satisfy the fixed service spectrum requirements for long-haul high capacity systems which could not be accommodated in other bands.

The ESV operation bears a great potential of interference to the fixed service applications in the 5 925-6 425 MHz and could constraint the fixed service development in the 3 700-4 200 MHz if protection from the FS were to be requested. Therefore, a change to the Radio Regulations which would permit use of ESVs could not be supported if it had the potential to allow harmful interference to the fixed service, or if it introduced additional constraints on the development of the fixed service.

Considering that the studies of the technical and regulatory environment of the use of the ESV have not been completed within ITU-R, Europe proposes to make no change to the existing Radio Regulations and that further studies be conducted to resolve the technical, regulatory and legal uncertainties before a future possible recognition of the ESV in the Radio Regulations.

<u>NOC</u> EUR/13/249

2 700-4 800 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="2">3 600-4 200
FIXED
FIXED-SATELLITE (space-to-Earth)
Mobile</td><td colspan="2"></td></tr>
<tr><td colspan="2">3 700-4 200
FIXED
FIXED-SATELLITE (space-to-Earth)
MOBILE except aeronautical mobile</td></tr>
</table>

Reasons: The technical, regulatory and legal uncertainties concerning the use of ESV do not allow modification to Article S5 regarding the bands 3 700-4 200 MHz and 5 925-6 425 MHz.

NOC EUR/13/250

5 830-7 550 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 925-6 700	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.149 S5.440 S5.458	

Reasons: The technical, regulatory and legal uncertainties concerning the use of ESV do not allow modification to Article S5 regarding the bands 3 700-4 200 MHz and 5 925-6 425 MHz.

ADD EUR/13/251

RESOLUTION [EUR/13/8] (WRC-2000)

Feasibility studies into the operations of earth stations located on board vessels using fixed-satellite service networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that there is a demand for global wideband satellite communication services on vessels;

b) that the technology exists that would permit the use of fixed-satellite services (FSS) networks by earth stations on board vessels (ESV) operating in the 3 700-4 200 MHz and 5 925-6 425 MHz bands;

c) that ESV have the potential to cause unacceptable interference to the fixed service (FS) systems in the band 5 925-6 425 MHz;

d) that in order to ensure the protection and future growth of the FS, the ESV would have to operate with certain technical and operational constraints;

e) that ESV shall not claim protection from fixed service station transmissions;

f) that administrations may authorize radiocommunication stations on off-shore structures and platforms for which they are responsible,

noting

a) that operation within the territorial sea is at the discretion of the administration with territorial authority, in which case the relevant procedures of that administration will apply;

b) that operation of earth stations on board vessels from specified fixed points at locations outside the territorial sea but for which an administration has territorial jurisdiction would be fully within the FSS,

recognizing

that studies within ITU-R have not been completed,

resolves

1 to request ITU-R to continue to study, as a matter of urgency, the regulatory, technical and operational constraints to be applied to ESV operations and, in particular, to determine the appropriate value for the operational minimum distance from the territory of an administration beyond which ESV are assumed not to have the potential to cause unacceptable interference to the fixed service stations of that administration;

2 that WRC-03 should review the results of these studies to consider whether earth stations located on board vessels could operate in fixed-satellite service networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz,

requests the Secretary-General

to send this Resolution to the Secretary-General of the International Maritime Organization (IMO).

Reasons: To request ITU-R to further study the technical, regulatory and legal issues regarding ESV operations before a future possible recognition of the ESV in the Radio Regulations.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 6D

Agenda item 1.14 - Non-GSO MSS feeder links in the 15.43-15.63 GHz band

Introduction

WRC-95 and WRC-97 allocated the frequency band 15.43-15.63 GHz to the fixed-satellite service (space-to-Earth) on a primary basis, limited to non-GSO MSS feeder links. RR No. S5.511A specifies that "... in the space-to-Earth direction, harmful interference shall not be caused to stations of the radio astronomy service using the band 15.35-15.4 GHz." Furthermore the frequency band 15.35-15.4 GHz is allocated on a primary basis to the Earth exploration-satellite (passive) and space research (passive) services.

Based on Resolution 123 (WRC-97) the World Radiocommunication Conference 2000 (WRC-2000) has to discuss issues related to the allocation to the fixed-satellite service (FSS) (space-to-Earth) to provide feeder links to non-geostationary-satellite orbit (non-GSO) mobile-satellite service (MSS) systems in the band 15.43-15.63 GHz.

ITU-R studies have shown that there is no need to modify the current allocation to the fixed-satellite service (FSS) (space-to-Earth) as presented in RR Article 5. However No. S5.511A should be modified to state that operation of FSS in the band 15.43-15.63 GHz (space-to-Earth) should be limited to non-GSO MSS feeder links for which advanced publication information has been received by the Bureau prior to the end of WRC-2000.

There is also a need to clarify the provisions of S5.511A so that the limits that need to be met to ensure protection of the radio astronomy service are clearly indicated and that compliance with these limits can be the subject of a finding by the Radiocommunication Bureau. The use of incorporation by reference in this situation is not considered appropriate.

On these bases, it is also proposed that Resolution 123 (WRC-97) be suppressed.

Proposed modifications to Article S5

MOD EUR/13/252

14.25-15.63 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
15.43-15.63	FIXED-SATELLITE (space-to-Earth) (Earth-to-space) MOD S5.511A AERONAUTICAL RADIONAVIGATION S5.511C	

MOD EUR/13/253

S5.511A Use of the band 15.43-15.63 GHz by the fixed-satellite service (space-to-Earth ~~(see Resolution **123 (WRC-97)**)~~ and Earth-to-space) is limited to feeder links of non-geostationary systems in the mobile-satellite service, subject to coordination under No. **S9.11A**. The use of the frequency band 15.43-15.63 GHz by the fixed-satellite service (space-to-Earth) is limited to non-GSO MSS feeder-link systems for which advanced publication information has been received by the Bureau prior to the end of WRC-2000. In the space-to-Earth direction, the minimum earth station elevation angle above and gain towards the local horizontal plane and the minimum coordination distances to protect an earth station from harmful interference shall be in accordance with Recommendation ITU-R S.1341. ~~Also in the space-to-Earth direction, harmful interference shall not be caused to stations of the radio astronomy service using the band 15.35-15.4 GHz. The threshold levels of interference and associated power flux-density limits which are detrimental to the radio astronomy service are given in Recommendation ITU-R RA.769-1. Special measures will need to be employed~~In order to protect the radio astronomy service in the band 15.35-15.4 GHz, the aggregate power flux-density radiated in the 15.35-15.4 GHz band by all the space stations within any non-GSO MSS feeder link (space-to-Earth) system operating in the 15.43-15.63 GHz band shall not exceed the level of –156 dB(W/m^2) in a 50 MHz bandwidth into any radio astronomy observatory site for more than 2% of the time.

Reasons: The ITU-R studies in requirements for allocating the frequency band 15.43-15.63 GHz (space-to-Earth) to non-GSO MSS feeder links confirmed the importance and demand in the frequency spectrum resource of an allocation in the band 15.43-15.63 GHz (space-to-Earth).

Studies on the feasibility of providing protection from interference to the radio astronomy, Earth exploration-satellite (passive) and space research (passive) services operating in the band 15.35-15.4 GHz showed that non-GSO MSS feeder-link systems for which advance publication has already been received by the Bureau in the frequency band 15.43-15.63 GHz (space-to-Earth) could provide sufficient protection to the radio astronomy, Earth exploration-satellite (passive) and space research (passive) services.

The level of protection considered sufficient for radio astronomy and that can be met by these non-GSO MSS feeder-link systems corresponds to not exceeding for more than 2% of the time the level of detrimental interference set forth in Recommendation ITU-R RA.769-1, i.e. a level of –156 dB(W/m^2) in any 50 MHz bandwidth for the aggregate pfd radiated by all the space stations in the non-GSO MSS feeder link system at the radio astronomy observatory site.

However, future non-GSO MSS systems using the 15.43-15.63 GHz space-to-Earth allocation would have to use substantial mitigation techniques to adequately protect the radio astronomy service operating in the band 15.35-15.4 GHz from harmful interference.

SUP EUR/13/254

RESOLUTION 123 (WRC-97)

Feasibility of implementing feeder links of non-geostationary satellite networks in the mobile-satellite service in the band 15.43-15.63 GHz (space-to-Earth) while taking into account the protection of the radio astronomy service, the Earth exploration-satellite (passive) service and the space research (passive) service in the band 15.35-15.4 GHz

Reasons: In the case WRC-2000 decides to implement the above-mentioned proposals, there would be no need for further studies to protect the radio astronomy in this band.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 5 to
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21 January 2000
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PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

PART 5

Appendices S30 and S30A

Page

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 5A

Agenda item 1.19*bis* - Scope of the ROP on S23.13

Introduction

In response to Resolution 531 (WRC-95), the RRB established a Rule of Procedure on S23.13 in 1996 which was later modified in 1998. If the service area of a BSS system exceeds the territory of the notifying administration, the Rule of Procedure requires that a separate agreement from the one required under Article 4 of Appendix S30 or Resolution 33 (Rev.WRC-97) be sought either directly from the administrations concerned or through the publication required under Resolution 33 (Rev.WRC-97) or the plan modification procedure.

The above-mentioned administrations consider that this Rule of Procedure should not be applied retroactively to systems received by the BR for the application of Article 4 of Appendix S30 before 18 November 1995.

EUR/13/196

Consequently, it is proposed that no specific action be taken by WRC-2000 on this agenda item.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 5B

PART 5B1

Agenda item 1.20 - Procedures for the use of the guardbands of Appendices S30 and S30A Plans to perform space operations functions, also taking into account Resolution 86 (Minneapolis, 1998)

Introduction

The lack of a coordination procedure and criteria relating to the use of the guardbands of the BSS and associated feeder-link Plans to perform space operation functions was pointed out during WRC-95.

CPM99-2 noted that ITU-R had developed criteria that could be used in applying the procedures of Article S9 or Appendices S30 and S30A in this context and concluded that a possible way to apply these procedures in this context would be to coordinate such use using the same procedures as those applicable to non-planned services in the bands covered by these Appendices, specifically:

- to coordinate this use with the assignments subject to the Plan using Article 7 of Appendix S30 or No. S9.8 and Article 7 of Appendix S30A or No. S9.9, as appropriate;
- to coordinate this use with the assignments in non-planned services, and vice versa, using the provisions of Articles S9/S11;
- to coordinate modifications to the Plans with such use using paragraph 4.3.1.5 or 4.3.3.5, as appropriate, of Article 4 of Appendix S30, and using paragraph 4.2.3.x of Article 4 of Appendix S30A (see section 5.2.3 for details on this possible additional provision).

Europe supports the approach proposed by the CPM on this issue and, in line with the CPM conclusions, proposes that this approach be implemented as follows. In line with Part 2, the following proposals are based on Approach B described in Chapter 5 of the CPM Report (i.e. the current Articles 6 and 7 of Appendices S30 and S30A are suppressed and replaced by S9.8, S9.9, S9.19 and the associated provisions in Appendix S5 and Article S11).

It is proposed to include the following two additional footnotes in the title of Article S9.

MOD EUR/13/197

ARTICLE S9

Procedure for effecting coordination with or obtaining agreement of other administrations[1, 2, 3, 4, 5, 6, 7]

ADD EUR/13/198

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[6] **A.S9.6** The use of the guardbands of the Plans in Appendix **S30**, as defined in section 3.9 of Annex 5 to this Appendix, to provide space operations functions in accordance with No. **S1.23** shall be coordinated with the assignments subject to these Plans using the provisions of No. **S9.8**. Coordination among assignments intended to provide these functions and services not subject to a Plan shall be effected using the provisions of No. **S9.7** and the associated provisions of Articles **S9** and **S11**. Coordination of modifications to the Plans with assignments intended to provide these functions shall be effected using paragraph 4.3.1.5 or 4.3.3.5, as appropriate, of Article 4 of Appendix **S30**, considering, for this purpose, that space operations functions are operating in the fixed-satellite service.

ADD EUR/13/199

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[7] **A.S9.7** The use of the guardbands of the Plans in Appendix **S30A**, as defined in sections 3.1 and 4.1 of Annex 3 to this Appendix, to provide space operations functions in accordance with No. **S1.23** shall be coordinated with the assignments subject to these Plans using the provisions of No. **S9.9**. Coordination among assignments intended to provide these functions and services not subject to a Plan shall be effected using the provisions of No. **S9.7** and the associated provisions of Articles **S9** and **S11**. Coordination of modifications to the Plans with assignments intended to provide these functions shall be effected using paragraph 4.2.1.2A of Article 4 of Appendix **S30A**.

The coordination criteria applicable in the above procedures would be equally applicable to the situations involving space operations functions in the guardbands of the Plans.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 5B2

Agenda item 1.20 - Proposed revisions relating to the suppression of Articles 6 and 7 of Appendices S30 and S30A, also taking into account Resolution 86 (Minneapolis, 1998)

1 Introduction

Europe supports the conclusions reported in Chapter 5 of the CPM Report taking into account Resolution 86 (Minneapolis, 1998) and considers of primary importance, for the conservation of the Appendices S30 and S30A Plans and the protection of other non-planned services and systems in the frequency bands covered by these Plans, that the deficiencies identified by the CPM regarding the existing provisions relating to the coordination between planned and non-planned services be corrected as a matter of urgency.

Concerning the approach to be selected in response to agenda item 1.20, the CPM identified three possible approaches. Europe considers that Approach B, under which Articles 6 and 7 of Appendices S30 and S30A are suppressed and replaced by the equivalent procedures under Articles S9 and S11 and Appendix S5, is clearly preferable to the other approaches identified in the CPM Report to satisfy the agenda item, for the following reasons:

a) It is the only approach consistent with the decisions taken by WRC-95 and WRC-97 on the simplification of the Radio Regulations and with the intent of Resolution 86 (Minneapolis, 1998), "to achieve additional simplification and cost savings for the Radiocommunication Bureau and administrations".

b) As highlighted by the examples of possible modifications given in Annex 1 to Chapter 5 of the CPM Report, Approach A would lead to a number of extensive changes in the current procedures of Appendices S30 and S30A, and to unduly complicated modifications to the current procedures in Article S9 and associated Appendix S5, with the only result of a duplication of extensive regulatory text.

c) Under Approach A, many sections remained to be reviewed in order to be aligned with the current practice as contained in S11.49, which is not necessary under Approach B.

d) Although Approach C has the potential for even greater simplicity, additional study would be required on this Approach prior to its possible consideration by WRC-2000.

2 Description of the proposed approach

The proposed Approach (Approach B in Chapter 5 of the CPM Report) consists in suppressing Articles 6 and 7 of Appendices S30 and S30A and replacing them by currently existing or suspended provisions under Articles S9 and S11 and under Appendix S5. In order to correct the deficiencies identified by the CPM, modifications to these provisions and to some provisions under Appendix S30 are also proposed.

In summary, the proposed Approach consists in the following:

- Article 6 of Appendix S30 is suppressed and replaced by S9.19. In this context, there would be a need to update Annex 3 of Appendix S30, which contains the associated method for the determination of the need for coordination, to include the case of interference caused by transmit FSS earth stations, and to take into account the results of the studies recently carried out in ITU-R on this type of interference in the framework of the revision of Appendix S7.
- Article 7 of Appendix S30 is suppressed and replaced by S9.8. Annex 4 of Appendix S30, which contains the associated method for the determination of the need for coordination, is moved to Appendix S5, where it is already referred to.
- Article 6 of Appendix S30A is suppressed. Consequential to the use of S9.17 and S9.17A proposed in section 3 below instead of Article 4 of Appendix S30A for the coordination of feeder-link earth stations with terrestrial stations or with earth stations operating in the opposite direction of transmission, this provision is no longer necessary.
- Article 7 of Appendix S30A is suppressed. Section 7.1 of this Article is replaced by S9.9. Section 1 of Annex 4 of Appendix S30A, which contains the associated method for the determination of the need for coordination, is moved to Appendix S5, where it already appears. Section 7.2 of this Article is replaced by S9.17A. Section 3 of Annex 4 of Appendix S30A, which contains the associated method for the determination of the need for coordination, is moved to Appendix S7, as proposed by the CPM.

3 Proposed modifications to the Radio Regulations to correct the deficiencies identified by the CPM in respect of the provisions of Appendices S30 and S30A

In the framework of Resolution 86 of the Plenipotentiary Conference (Minneapolis, 1998), the current situation of the relevant procedures of Article S9 and Articles 4, 6 and 7 of Appendices S30 and S30A was analysed by the CPM with regard to the two following principles:

1) all possible cases of interference that may arise in practice between planned BSS and non-planned services (e.g. FSS or FS) should be covered by a procedure;

2) the coordination between earth stations and terrestrial stations, and between earth stations operating in opposite directions of transmission should be undertaken by and between the administrations on the territory of which these stations are located.

Europe supports the conclusions reached by the CPM under this agenda item and considers of primary importance, for the conservation of the Appendices S30 and S30A Plans and the protection of other non-planned services and systems in the frequency bands covered by these Plans, that the deficiencies identified by the CPM regarding the existing provisions relating to the coordination between planned and non-planned services be corrected as a matter of urgency.

In the framework of the proposed Approach outlined in the previous section, the following proposals are made to correct these deficiencies:

3.1 To avoid the inclusion in the Plans in the Master Register of mutually incompatible assignments, it is proposed to modify section 1 of Appendix S5 in order to allow the inclusion in the coordination process under S9.8 and S9.9 of assignments for which a modification to one of the BSS Plans in Appendices S30 and S30A has been initiated, but not yet completed.

3.2 To enable receive BSS earth stations to be protected from FSS transmit earth stations operating in opposite directions of transmission (e.g. in the frequency band 12.5-12.7 GHz which is allocated to planned BSS in Region 2 and to FSS Earth-to-space in Region 1), it is proposed, as in the example provided by the CPM under Annex 2 of Chapter 5, to extend the scope of S9.19 to cover this case.

3.3 The use of S9.17A and S9.19 (as modified under 3.2 above) allows the coordination between earth stations and terrestrial stations, and between earth stations operating in opposite directions of transmission to be handled between the administrations on the territory of which these stations are located, and is therefore in line with Resolution 1 (Rev.WRC-97). No further change is therefore required to correct the current deficiency in Appendices S30 and S30A. This corresponds to Option C in subsection e) of section 5.2.3.2.1 of the CPM Report.

3.4 In order to enable the coordination of planned feeder-link earth stations with terrestrial stations while conforming to Resolution 1 (Rev.WRC-97), the solution proposed in section 5.2.3.2.3 of the CPM Report is proposed, which consists in replacing paragraphs 4.2.1.3 and 4.2.3.3 of Article 4 of Appendix S30A by No. S9.17.

3.5 Similarly, in order to enable the coordination of planned feeder-link earth stations with earth stations operating in the opposite direction of transmission while conforming to Resolution 1 (Rev.WRC-97), the solution proposed in section 5.2.3.2.4 of the CPM Report is proposed, which consists in replacing paragraphs 4.2.1.2/4.2.3.2 of Article 4 of Appendix S30A by No. S9.17A.

3.6 As outlined in section 5.2.3.3.1 of the CPM Report and to enable the coordination of non-planned BSS with planned BSS in the frequency band 12.5-12.7 GHz, where BSS is planned in Region 2 and non-planned in Region 3, it is proposed to replace the terms "fixed-satellite service" by "fixed-satellite service or broadcasting-satellite service where these services are not subject to a Plan" in No. S9.8 and Appendix S5. The Criteria of Annex 4 of Appendix S30 are proposed to be used to determine if the coordination is required.

3.7 As outlined in section 5.2.3.3.2 of the CPM Report and to enable the coordination between non-planned and Planned BSS feeder links in the 17.8-18.1 GHz band, it is proposed to:

a) under Article 4 of Appendix S30A, the inclusion of an additional paragraph in order to protect Region 2 non-planned FSS (Earth-to-space) from modifications to the Regions 1 and 3 feeder-link Plan;

b) in No. S9.9, the suppression of the term "space", in "transmitting space station in the FSS", in such a way that the procedure would cover the interference caused by either an FSS space station or an FSS earth station.

In both cases, it is proposed that the criteria to determine if the coordination is required be aligned with those of Annexes 1 and 4 of Appendix S30A, i.e. a delta T/T criterion. Noting that a value of 4% appears for this criterion in Annex 4 of Appendix S30A to protect the BSS feeder-link space station from a transmit FSS space station, it is proposed to use the same value when the interference is caused by a transmit BSS feeder-link earth station.

It should be noted that section 1 of Annex 4 of Appendix S30A contains thresholds to determine the need for coordination between non-planned FSS or BSS transmit space stations in the 17.3-18.1 GHz band. These thresholds are a combination of a delta T/T method (4%) and pfd limits, depending on the orbital separation with space stations in the Plan. This dual criterion does not appear to adequately protect the Plan (if the pfd value provides more protection that the delta T/T for the corresponding orbital separations, it is overly protective; if it provides less protection, it does not protect the Plan; if it provides the same protection, it is introduces an unnecessary complexity). It is therefore proposed that only the criterion of a 4% delta T/T be retained in this case.

3.8 As outlined in section 5.2.3.3.3 of the CPM Report, in order to enable the coordination of non-planned BSS transmit space stations in the frequency band 17.3-17.8 GHz with the Appendix S30A Plan, it is proposed to replace the words "station in the FSS" in No. S9.9 by "station in the FSS or in the BSS".

3.9 Section 5.2.3.3.4 of the CPM Report outlines the need to enable the protection of non-planned BSS receive earth stations in Region 2 from modifications to the BSS feeder-link Plan in the band 17.3-17.8 GHz band. Under the proposed approach, this protection is already covered under S9.19.

3.10 Associated with the proposed use of S9.19 to protect the BSS service area from interference caused by terrestrial stations or earth stations in the opposite direction of transmission, it is proposed that consideration be given to modify the method of Annex 3 of Appendix S30, taking advantage of the work performed in ITU-R on the revision of Appendix S7. This would have the clear advantage of benefiting from the results of the most recent ITU-R studies in propagation and system characteristics. In contrast, the method of Annex 3 of Appendix S30, which was not updated since 1977 for Regions 1 and 3, contains major inconsistencies with respect to the calculation of the interfering levels. It also has the major disadvantage of not taking into account the elevation of the horizon around the interfering station, which is an unrealistic assumption.

4 Detailed proposals

On the basis of the potential solutions described in the CPM Report and recalled in the previous sections to correct the deficiencies identified in the current procedures of Article S9 and Appendices S30 and S30A in relation to the coordination between planned and non-planned services, this section contains proposals for regulatory text that would reflect these solutions by modifications or additions to the current provisions of Article S9 and the associated provisions in Appendix S5, and in Appendices S30 and S30A. These proposals are based on the replacement of Articles 6 and 7 of Appendices S30 and S30A by these provisions and the suppression of these Articles ("Approach B").

Proposed modifications to Article S9

Sub-Section IIA – Requirement and request for coordination

NOC

S9.6 to S9.7

MOD EUR/13/200

S9.8 *b)*~~[12]~~ for a transmitting space station~~ of the fixed-satellite service~~ using the geostationary-satellite orbit, in the fixed-satellite service or in the broadcasting-satellite service, in a frequency band ~~shared on an equal primary basis with the broadcasting-satellite service,~~and in a Region where this service is not subject to a Plan, in respect of stations ~~of the latter service~~in the broadcasting-satellite service which are subject to the Appendix **S30** Plans;

Reasons: Cover the case of non-planned interfering into the Plan or its modifications. This provision would replace Article 7 of Appendix S30.

MOD EUR/13/201

S9.9 *c)*~~[12]~~ for a transmitting~~ space~~ station ~~of~~in the fixed-satellite service or in the broadcasting-satellite service using the geostationary-satellite orbit in a frequency band ~~shared on an equal primary basis with the feeder links of~~and in a Region where this service is not subject to a Plan, in respect of a receiving feeder-link space station for the broadcasting-satellite service which are subject to the Appendix **S30A** Plans;

Reasons: Cover the case of interference into Appendix S30A Plan from non-planned BSS in Region 2 (17.3-17.8 GHz) and from non-planned feeder links in Region 2 (17.8-18.1 GHz). This provision would replace section 7.1 of Article 7 of Appendix S30A.

MOD EUR/13/202

S9.17 *f)*~~[13]~~ for any specific earth station or typical mobile earth station in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services, in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**;

~~[12] **S9.8.1** and **S9.9.1** Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending a decision of WRC-99 on the revision of these two Appendices.~~

Reasons: As a consequence of the proposed changes, S9.8, S9.9, S9.17A and S9.19 and the associated provisions in Appendix S5 and Article S11 effectively replace Articles 6 and 7 of Appendices S30 and S30A procedures by equivalent provisions, hence the suspension of these provisions is no longer necessary.

~~[13] **S9.17.1** Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending a decision of WRC-99 on the revision of these two Appendices.~~

Reasons: As a consequence of the proposed changes, S9.8, S9.9, S9.17A and S9.19 and the associated provisions in Appendix S5 and Article S11 effectively replace Articles 6 and 7 of Appendices S30 and S30A procedures by equivalent provisions, hence the suspension of these provisions is no longer necessary.

MOD EUR/13/203

S9.17A *g)* for any specific earth station, in respect of other earth stations operating in the opposite direction of transmission, in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission and where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of another earth station~~, with the exception of the frequency bands subject to the Appendix **S30A** Plans~~with the exception of the coordination under No. **S9.19**;

Reasons: This coordination must be undertaken by the administration on the territory of which the earth stations are located, which is not the case in Article 4 or in Article 7 of Appendix S30A. The words deleted were introduced by WRC-97 in order to avoid any unintended consequences. Their suppression would allow to replace both Nos. 4.2.1.2/4.2.3.2 of Article 4 of Appendix S30A and section 7.2 of Article 7 of Appendix S30A. The proposed addition to except coordination under S9.19 is to allow S9.19 to ensure the protection of the BSS service area from interference caused by earth stations operating in the opposite direction of transmission. In contrast, S9.17A only applies to protect specific earth stations.

NOC S9.18

MOD EUR/13/204

S9.19 *i)* for any transmitting station of a terrestrial service or a transmitting earth station in the fixed-satellite service (Earth-to-space) in a frequency band shared on an equal primary basis with the broadcasting-satellite service, with respect to a~~n~~ typical earth station within the service area of a space station in the broadcasting-satellite service~~, except where this service is subject to the Appendix **S30** Plans~~;

Reasons: The first proposed addition is to ensure the protection of the BSS service area from interference caused by earth stations operating in the opposite direction of transmission (S9.17A, which only applies to protect specific earth stations, could not readily achieve this). The second addition is to clarify that this provision is intended to protect the BSS service area. The proposed deletion ensures that S9.19 effectively replaces Article 6 of Appendix S30. The use of S9.19 also allows, without requiring any additional provision, that this coordination be undertaken by the administrations on the territory of which the earth stations and/or terrestrial stations are located, in line with Resolution 1 (Rev.WRC-97).

Proposed modifications to Appendix S5

APPENDIX S5

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article S9

NOC

1 *a)* to 1 *e)*

MOD EUR/13/205

f) where appropriate, in conformity with a world or regional allotment or assignment plan and the associated provisions and whose characteristics appear in the relevant Plan as adopted by a world or regional radiocommunication conference; or

ADD EUR/13/206

fbis) in applying Nos. **S9.8** and **S9.9**, for which the procedure of Article 4 of Appendix **S30** or Appendix **S30A**, as applicable, has been initiated or successfully completed, with effect from the date of receipt by the Bureau of the complete relevant information as specified in Appendix **S4**/Annex 2; or

Reasons: Protect modifications to Appendices S30 or S30A Plans from other space networks from the date the Plan modification process is initiated. This provision is essential to avoid recording in the Master Register and inclusion in a Plan of incompatible assignments, with no possible recourse for any of the parties involved.

ADD EUR/13/207

fter) in applying No. **S9.19**, for which the procedure of Article 4 of Appendix **S30**, as applicable, has been successfully completed; or

Reasons: In the case of the protection of the BSS service area from terrestrial stations or earth stations operating in the opposite direction of transmission, it is proposed, in order to resolve the divergences of views expressed at the CPM, to keep the current approach in Appendix S30, i.e. to protect the assignments only from the date of entry in the Plan.

NOC

1 *g)* to 6 *g)*

MOD EUR/13/208

TABLE S5-1
Technical conditions for coordination
(see Article **S9**)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service ~~for which coordination is sought~~requesting coordination**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.8** GSO/GSO	~~A transmitting space station in the fixed-satellite service (FSS) using the GSO in a frequency band shared with the broadcasting-satellite service (BSS) on an equal primary basis, in respect of space stations in the latter service which are subject to the Plans in Appendix **S30**~~A transmitting space station using the geostationary-satellite orbit, in the fixed-satellite service or in the broadcasting-satellite service, in a frequency band and in a Region where this service is not subject to a plan, in respect of stations in the broadcasting-satellite service which are subject to the Appendix **S30** Plans **Reasons:** Align text with proposed S9.8.	11.7-12.2 GHz (Region 2) 12.2-12.7 GHz (Region 3) 12.5-12.7 GHz (Region 1)	i) There is an overlap in the necessary bandwidths of the ~~FSS and BSS~~interfering and wanted space stations; and ii) the power flux-density (pfd) of the ~~FSS~~interfering space station, under assumed free-space propagation conditions, exceeds the following values~~ given in Annex 4 of Appendix **S30**~~ on the territory of another administration located in another Region:	Check by using the assigned frequencies and bandwidths~~;~~	~~See also Article 7 of Appendix **S30**.~~ ~~Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices.~~

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service ~~for which coordination is sought~~requesting coordination**	**Threshold/condition**	**Calculation method**	**Remarks**
			–147 dB(W/m²/27 MHz) for 0° ≤ θ < 0.44°; –138 + 25 log θ dB(W/m²/27 MHz) for 0.44° ≤ θ < 19.1°; –106 dB(W/m²/27 MHz) for θ ≥ 19.1°; where θ is the difference in degrees between the longitude of the interfering space station and the longitude of the affected broadcasting-satellite space station. **Source:** Annex 4 of APS30.		

MOD EUR/13/209

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service ~~for which coordination is sought~~requesting coordination	Threshold/condition	Calculation method	Remarks
No. **S9.9** GSO/GSO	~~A station of the FSS in a frequency band shared on an equal primary basis with the feeder links of the BSS, which are subject to the Plans in Appendix **S30A**~~A transmitting station in the fixed-satellite service or in the broadcasting-satellite service using the geostationary-satellite orbit in a frequency band and in a Region where this service is not subject to a Plan, in respect of a receiving feeder-link space station for the broadcasting-satellite service which is subject to the Appendix **S30A** Plans **Reasons:** Align text with proposed S9.9.	17.7-18.1 GHz (Region 1) 17.7-18.1 GHz (Region 3) ~~17.7-17.8~~17.3-18.1 GHz (Region 2)	~~i)~~ Value of $\Delta T_S/T_S$ exceeds 4% ~~(see Section I of Annex 4 of Appendix **S30A**); and~~ ~~ii) geocentric inter-satellite angular separation is less than 3° or greater than 150°~~ **Reasons:** Harmonize the protection of the Plan with the generally agreed criterion of 4% delta T/T.	[~~i) Case II of Appendix **S8**~~ ~~ii) Annex 1 of Appendix **S8**~~]*	[~~The threshold/conditions do not apply when the geocentric angular separation, between an FSS transmitting space station and a receiving space station in the feeder-link plan, exceeds 150° of arc and the free-space pfd of the FSS transmitting space station does not exceed a value of –137 dB(W/m²/MHz) on the surface of the Earth at the equatorial limb.~~ ~~Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices.~~]*

MOD EUR/13/210

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service ~~for which coordination is sought~~requesting coordination	Threshold/condition	Calculation method	Remarks
No. **S9.17** GSO, non-GSO/ terrestrial	A specific earth station or a typical mobile earth station in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**	Any frequency band allocated to a space service~~, except those mentioned in the Plans in Appendix **S30A**~~	The coordination area of the earth station covers the territory of another administration	Appendix **S7** (for earth stations in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz, 2 483.5-2 500 MHz and 2 500-2 516.5 MHz, see Remarks column) 1) The coordination area of aircraft earth stations is determined by increasing the service area by 1 000 km with respect to the aeronautical mobile service (terrestrial) or 500 km with respect to terrestrial services other than the aeronautical mobile service	NOTE – For RDSS earth stations, a uniform coordination distance of 400 km corresponding to an airborne earth station shall be used. In cases where the earth stations are all ground-based, a coordination distance of 100 km shall be used

NOTE - Additional modifications to this table are proposed under agenda items 1.3 and 1.13.

MOD EUR/13/211

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service ~~for which coordination is sought~~requesting coordination**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.17** GSO, non-GSO/ terrestrial (*cont.*)				2) For receiving earth stations in the meteo-rological-satellite service in frequency bands shared with the meteorological aids service, the coordina-tion distance is consi-dered to be the visibility distance as a function of the earth station horizon elevation angle for a radiosonde at an altitude of 20 km above mean sea level, assuming 4/3 Earth radius	~~Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices~~

NOTE - Additional modifications to this table are proposed under agenda items 1.3 and 1.13.

MOD EUR/13/212

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service ~~for which coordination is sought~~requesting coordination**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.17A** GSO, non-GSO/ GSO, non-GSO	A specific earth station in respect of other earth stations operating in the opposite direction of transmission in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission, where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of a coordinated earth station~~, with the exception of the frequency bands subject to the Plans in Appendix **S30A**~~with the exception of coordination under **S9.19**	Any frequency band allocated to a space service	The coordination area of the earth station covers the territory of another administration or the earth station is located within the coordination area of an earth station	i) For bands in Table S5-2, see § 2 of Annex 1 of this Appendix ii) See ~~Recommendations ITU-R IS.847, ITU-R IS.848 and ITU-R IS.849~~Appendix **S7**	

NOTE - Additional modifications to this table are proposed under agenda items 1.3 and 1.13.

NOC EUR/13/213

S9.18

MOD EUR/13/214

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service ~~for which coordination is sought~~requesting coordination	Threshold/condition	Calculation method	Remarks
No. **S9.19** Terrestrial/ GSO	~~A transmitting station in a terrestrial service in a frequency band shared on an equal primary basis with the BSS, except where the service is subject to the Plans in Appendix **S30**~~Any transmitting station of a terrestrial service or a transmitting earth station in the fixed-satellite service (Earth-to-space) in a frequency band shared on an equal primary basis with the broadcasting-satellite service, with respect to a typical earth station within the service area of a space station in the broadcasting-satellite service **Reasons:** Align text with proposed S9.19.	Bands listed in No. **S9.11** and 11.7-12.5 GHz in Region 1 11.7-12.2 GHz in Region 3 and 12.2-12.7 GHz in Region 2	i) Necessary bandwidths overlap; and ii) the pfd of the ~~terrestrial~~interfering station at the edge of the BSS service area exceeds the permissible level	~~Check by using the assigned frequencies and bandwidths~~Method of Annex 3 of Appendix **S30***	

* NOTE - There is a need to modify the Method of Annex 3 of Appendix S30 in order to cover the case of an interfering earth station, correct its current discrepancies, taking into account the results of the studies carried out by ITU-R in conjunction with the revision of Appendix S7. The appropriateness of using this method in the case of unplanned BSS also needs to be addressed.

Proposed modifications to Appendix S30

SUP EUR/13/215

ARTICLE 6

Coordination, notification and recording in the Master International Frequency Register of frequency assignments to terrestrial stations affecting broadcasting-satellite frequency assignments in the frequency bands 11.7-12.2 GHz (in Region 3), 11.7-12.5 GHz (in Region 1) and 12.2-12.7 GHz (in Region 2)[5]

NOC EUR/13/216

ANNEX 3

Method for determining the limiting interfering power flux-density at the edge of a broadcasting-satellite service area in the frequency bands 11.7-12.2 GHz (in Region 3), 11.7-12.5 GHz (in Region 1) and 12.2-12.7 GHz (in Region 2) and for calculating the power flux-density produced there by a terrestrial station

NOTE - There is a need to modify the Method of Annex 3 of Appendix S30 in order to cover the case of an interfering earth station, correct its current discrepancies, taking into account the results of the studies carried out by ITU-R in conjunction with the revision of Appendix S7. The appropriateness of using this method in the case of unplanned BSS also needs to be addressed.

SUP EUR/13/217

ARTICLE 7

Procedures for coordination, notification and recording in the Master International Frequency Register of frequency assignments to stations in the fixed-satellite service in the frequency bands 11.7-12.2 GHz (in Region 2), 12.2-12.7 GHz (in Region 3) and 12.5-12.7 GHz (in Region 1), when frequency assignments to broadcasting-satellite stations in conformity with the Regions 1 and 3 Plan, or the Region 2 Plan, respectively, are involved[8]

SUP EUR/13/218

ANNEX 4

Need for coordination of a space station in the fixed-satellite service: in Region 2 (11.7-12.2 GHz) with respect to the Regions 1 and 3 Plan, in Region 1 (12.5-12.7 GHz) and in Region 3 (12.2-12.7 GHz) with respect to the Region 2 Plan

(See Article 7)

Reasons: Consequential to the suppression of Article 7 of Appendix S30, which would be superseded by No. S9.8, with the coordination thresholds described in Appendix S5, unchanged from the current levels in Annex 4 of Appendix S30.

Proposed modifications to Appendix S30A

ARTICLE 4

Procedure for modifications to the Plans

4.2 Proposed modifications to a frequency assignment in conformity with one of the Regional Plans or proposed inclusion in that Plan of a new frequency assignment

For Regions 1 and 3

NOC

4.2.1 to 4.2.1.1

SUP EUR/13/219

4.2.1.2

Reasons: This coordination should be undertaken by the administration on the territory of which the feeder-link transmit earth station is located, not by the administration intending to modify the Plan, which is the administration with the feeder-link space station. The appropriate provision in this case is No. S9.17A.

ADD EUR/13/220

4.2.1.2A of Region 2 having a feeder-link frequency assignment in the fixed-satellite service (Earth-to-space) in the band 17.8-18.1 GHz in the same channel or an adjacent channel, which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **S9.7**; *or*

Reasons: Include the requirement for a proposed modification of the Regions 1 and 3 Plan to protect non-planned feeder links in Region 2 and the space operations functions in Region 2.

SUP EUR/13/221

4.2.1.3

Reasons: This coordination should be undertaken by the administration on the territory of which the feeder-link transmit earth station is located, not by the administration intending to modify the Plan, which is the administration with the feeder-link space station. The appropriate provision in this case is No. S9.17. Consequential is the deletion of Article 6 of Appendix S30A, since the protection of receive terrestrial stations from transmit feeder-link earth stations is taken into account when applying No. S9.17.

NOC

4.2.1.4 to 4.2.3.1

SUP EUR/13/222

4.2.3.2

Reasons: The coordination should be undertaken by the administration on the territory of which the feeder-link transmit earth station is located, not by the administration intending to modify the Plan, which is the administration with the feeder-link space station. The appropriate provision in this case is No. S9.17A.

SUP EUR/13/223

4.2.3.3

Reasons: This coordination should be undertaken by the administration on the territory of which the feeder-link transmit earth station is located, not by the administration intending to modify the Plan, which is the administration with the feeder-link space station. The appropriate provision in this case is No. S9.17. Consequential is the deletion of Article 6 of Appendix S30A, since the protection of receive terrestrial stations from transmit feeder-link earth stations is taken into account when applying No. S9.17.

NOC

4.2.3.4 to 4.2.4

ANNEX 1

Limits for determining whether a service of an administration is considered to be affected by a proposed modification to one of the regional Plans or when it is necessary under this Appendix to seek the agreement of any other administration

SUP EUR/13/224

1

Reasons: Consequential to the suppression of the corresponding provisions in Article 4.

SUP EUR/13/225

2

Reasons: Consequential to the suppression of the corresponding provisions in Article 4.

ADD EUR/13/226

6 Limits applicable to protect a frequency assignment in the bands 17.8-18.1 GHz (Region 2) to a receiving space station in the fixed-satellite service (Earth-to-space)

An administration in Region 2 shall be considered affected by a proposed modification in Regions 1 and 3 when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder-link station would cause an increase in the noise temperature of the feeder-link space station which exceeds the threshold value of $\Delta T/T$ corresponding to 4% where $\Delta T/T$ is calculated in accordance with the method given in Appendix **S8**, except that the maximum power densities per hertz averaged over the worst 1 MHz are replaced by power densities per hertz averaged over the total RF bandwidth of the feeder-link carriers.

Reasons: Protect non-planned BSS feeder links in Region 2 from modifications to the feeder-link Plan in Regions 1 and 3.

SUP EUR/13/227

ARTICLE 6

Procedure concerning coordination, notification and recording in the Master International Frequency Register of frequency assignments to receiving terrestrial stations in Regions 1 and 3 in the bands 14.5-14.8 GHz and 17.7-18.1 GHz, and in Region 2 in the band 17.7-17.8 GHz, when frequency assignments to feeder-link transmitting earth stations for the broadcasting-satellite service in conformity with the Regions 1 and 3 Plan or the Region 2 Plan are involved

Reasons: No longer required since the protection of FS stations is taken into account in the application of No. S9.17.

SUP EUR/13/228

ARTICLE 7

Procedure concerning coordination, notification and recording in the Master International Frequency Register of frequency assignments to stations in the fixed-satellite service (space-to-earth) in Regions 1 and 3 in the band 17.7-18.1 GHz and in Region 2 in the band 17.7-17.8 GHz, and to stations in the broadcasting-satellite service in Region 2 in the band 17.3-17.8 GHz when frequency assignments to feeder-links for broadcasting-satellite stations appearing in the Regions 1 and 3 Plan or the Region 2 Plan are involved

Reasons: Section 7.1 if replaced by No. S9.9, and section 7.2 if replaced by No. S9.17A.

SUP EUR/13/229

ANNEX 4

Criteria for sharing between services

Reasons: Consequential to the suppression of Article 7 of Appendix S30A and the reciprocal provisions in Article 4 of Appendix S30A. Provisions superseded by Appendix S8 and Appendix S7 respectively.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

PART 4

Space science services and radio astronomy

CONTENTS

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Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 4A

Agenda item 1.16 - Allocation of frequency bands above 71 GHz to the Earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution 723 (WRC-97)

Introduction

During WRC-97, work on the allocation above 71 GHz to science services could not be completed, as studies had not yet fully finished; therefore WRC-97 decided to reconsider these allocations once more at WRC-2000 (see Resolution 723 (WRC-97)).

The present RR Table of Frequency Allocations with regard to frequencies above 71 GHz, adopted during WARC-79, does not any more correspond fully to the needs of the Earth exploration-satellite service (EESS), the space research service (SR) and the radio astronomy service (RA). Considerable progress has been made in this science area, resulting in the situation that the ITU Table of Frequency Allocations needs to be adapted to modern needs.

The following general principles for the revision of the Table of Frequency Allocations above 71 GHz are the basis for the review of the Table of Frequency Allocations:

- the allocations to the passive services should be in response to physical processes in space or the atmosphere;
- passive sensors of the EESS are operated on a global basis, and coordination with other services is not practical. The only sharing possibility resides in a strict compliance with the interference threshold of the passive sensors;
- no satellite downlinks within important RA bands or within bands adjacent to those in which an allocation for radio astronomy is foreseen;
- co-allocation of RA and terrestrial services (except high altitude platforms) is possible, provided there is the necessary coordination around the radio astronomy station; (The number of mm-wave observatories worldwide is expected to remain very limited, because, *inter alia*, few sites on Earth fulfil the stringent requirements that justify the required investment. Locations of mm-wave radio observatories are selected mostly on the basis of low water vapour content of the atmosphere, and stability of the climate. Preferred locations are, therefore, high mountain tops or plateaux in a desert environment, far from major cities and centres of urbanization. Therefore, this service will be able to share its frequency bands with terrestrial services). See also Article S29;

- there should be, wherever possible, no difference between the total amount of frequency spectrum allocated to the various services in the present Radio Regulations, and the total amount of frequency spectrum after the rearrangements, except for those allocations, subject to the agenda item 1.16; however, this principle should not be applied at the expense of the usability of spectrum for the individual services allocated to a band due to protection requirements or interference from other allocated services. Thus, unfavourable combinations of allocations in a band should be avoided;
- wherever there are conflicts between requirements from the different services, the services with a justified need for that specific band will have priority over the others. The other service(s) will then be reallocated to other bands taking into account general spectrum requirements of the different services. (Although most of the active radio services are not about to utilize the frequency bands above 71 GHz in the immediate future, adequate spectrum resources must be provided to allow for the development of radio equipment);
- taking due account of the convergence of the fixed and mobile services, these two services could have a co-allocation in various frequency bands concerned, although convergence may not take place in all co-allocated bands;
- primary allocations should be mentioned in the Table of Frequency Allocations itself, not in footnotes to the table.
- the above-mentioned countries propose to use this review of the allocations to passive services above 71 GHz, for inclusion of allocations to the EESS (active) in the band 130-130.5 GHz (for high accuracy altimetry) and to the EESS (active) and SR (active) in the band 237.9-238 GHz (for spaceborne cloud radars).

Noting that the provisional agenda for WRC-02/3 includes agenda item 3 (results of studies with a view to consider for inclusion in a future agenda: .... 3.2 allocations above 275 GHz), it is concluded that the proposal to WRC-2000 shall be limited to frequency bands below 275 GHz.

The best way to proceed at this Conference with views for the spectrum above 275 GHz is to extend the Table of Frequency Allocations to 1 000 GHz in order to allow the indication in footnote S5.565 that certain frequency bands in this range are of interest for the science services.

Annex 1A gives a comprehensive overview of the totals of primary allocations within the current Article S5 of the Radio Regulations for the range above 71 GHz; Annex 1B gives such an overview for the newly proposed Table of Frequency Allocations, as well as a comparison between the total amount of allocations in the current and newly proposed Radio Regulations.

Annex 2 specifies the European common proposal in detail.

ANNEX 1A

Summary table of primary allocations in the current RR: 71-275 GHz

Band GHz	FS	FSS		MS	MSS			ISS	AM	AM SAT	RAD LOC	BC	BC SAT	EESS (p)	EESS (a)	SR (p)	SR (a)	RA	RAD NAV	RAD NAV SAT
		↑	↓		↑	↓	↑↓													
71-74	3	3		3	3															
74-75.5	1.5	1.5		1.5																
75.5-76									0.5	0.5										
76-81											5									
81-84	3		3	3		3														
84-86	2			2								2	2							
86-92														6		6		6		
92-94	2	2		2							2									
94-94.1											0.1				0.1		0.1			
94.1-95	0.9	0.9		0.9							0.9									
95-100				5			5												5	5
100-102	2			2										2		2				
102-105	3		3	3																
105-116														11		11		11		
116-119.98	3.98			3.98				3.98						3.98		3.98				
119.98-120.02	0.04			0.04				0.04						0.04		0.04				
120.02-126	5.98			5.98				5.98						5.98		5.98				
126-134	8			8				8			8									
134-142				8			8												8	8
Subtotal	**35.4**	**7.4**	**6**	**48.4**	**3**	**3**	**13**	**18**	**0.5**	**0.5**	**16**	**2**	**2**	**29**	**0.1**	**29**	**0.1**	**17**	**13**	**13**

Band GHz	FS	FSS ↑	FSS ↓	MOB	MOB SAT ↑	MOB SAT ↓	MOB SAT ↑↓	INT SAT	AM	AM SAT	RAD LOC	BC	BC SAT	EESS (p)	EESS (a)	SR (p)	SR (a)	RA	RAD NAV	RAD NAV SAT
Transfer	35.4	7.4	6	48.4	3	3	13	18	0.5	0.5	16	2	2	29	0.1	29	0.1	17	13	13
142-144									2	2										
144-149											5									
149-150	1		1	1																
150-151	1		1	1										1		1				
151-156	5		5	5																
156-158	2		2	2										2						
158-164	6		6	6																
164-168														4		4		4		
168-170	2			2																
170-174.5	4.5			4.5				4.5												
174.5-176.5	2			2				2						2		2				
176.5-182	5.5			5.5				5.5												
182-185														3		3		3		
185-190	5			5				5												
190-200				10			10												10	10
200-202	2			2										2		2				
202-217	15	15		15																
217-231														14		14		14		
231-235	4		4	4																
Subtotal	**90.4**	**22.4**	**25**	**113.4**	**3**	**3**	**23**	**35**	**2.5**	**2.5**	**21**	**2**	**2**	**57**	**0.1**	**55**	**0.1**	**38**	**23**	**23**

Band GHz	**FS**	**FSS**		**MOB**	**MOB SAT**			**INT SAT**	**AM**	**AM SAT**	**RAD LOC**	**BC**	**BC SAT**	**EESS (p)**	**EESS (a)**	**SR (p)**	**SR (a)**	**RA**	**RAD NAV**	**RAD NAV SAT**
		↑	↓		↑	↓	↑↓													
Transfer	90.4	22.4	25	113.4	3	3	23	35	2.5	2.5	21	2	2	57	0.1	55	0.1	38	23	23
235-238	3		3	3										3		3				
238-241	3		3	3																
241-248											7									
248-250									2	2										
250-252														2		2				
252-265				13			13												13	13
265-275	10	10		10														10		
S5.555 allocations																		2.31		
Total	**106.4**	**32.4**	**31**	**142.4**	**3**	**3**	**36**	**35**	**4.5**	**4.5**	**28**	**2**	**2**	**62**	**0.1**	**60**	**0.1**	**50.31**[1]	**36**	**36**

[1] Via footnote S5.149 it is urged to protect RA over an additional range of 9.39 GHz; S5.149 and S5.555 partly overlap each other.

ANNEX 1B

Summary of the European common proposals on the rearrangement of the frequency bands above 71 GHz

Band GHz	**FS**	**FSS**			**MS**	**MSS**			**ISS**	**AM**	**AMS**	**RL**	**BC**	**BSS**	**EESS (p)**	**EESS (a)**	**SR (p)**	**SR (a)**	**RA**	**RN**	**RNSS**
		↑	↓	↑↓		↑	↓	↑↓													
71-74	3		3		3		3														
74-76	2		2		2									2							
76-77.5												1.5							1.5		
77.5-78										0.5	0.5										
78- 81												3							3		
81-84	3	3			3	3													3		
84-86	2	2			2								2						2		
86-92															6		6		6		
92-94	2				2							2							2		
94-94.1												0.1				0.1		0.1			
94.1-95	0.9				0.9							0.9							0.9		
95-100	5				5							5							5	5	5
100-102															2		2		2		
102-105	3				3														3		
105-109.5	4.5				4.5												[4.5][2]		4.5		
109.5-111.8															2.3		2.3		2.3		
111.8-114.25	2.45				2.45												[2.45][2]		2.45		
114.25-116															1.75		1.75		1.75		
116-119.98									3.98						3.98		3.98				
119.98-120.02									0.04						0.04		0.04				
120.02-122.25									2.23						2.23		2.23				

Band GHz	FS	FSS			MS	MSS			ISS	AM	AMS	RL	BC	BSS	EESS (p)	EESS (a)	SR (p)	SR (a)	RA	RN	RNSS
		↑	↓	↑↓		↑	↓	↑↓													
122.25-123	0.75				0.75				0.75												
123-130			7				7													7	7
130-134	4				4				4							0.5			4		
134-136										2	2										
136-141												5							5		
141-148.5	7.5				7.5							7.5							7.5		
148.5-151.5															3		3		3		
151.5-155.5	4				4							4							4		
155.5-158.5	3*				3*										3**		3**		3		
158.5-164	5.5		5.5		5.5		5.5														
164-167															3		3		3		
167-174.5	7.5		7.5		7.5				7.5												
174-174.8	0.3				0.3				0.3												
174.8-176.5									1.7						1.7		1.7				
176.5-182									5.5						5.5		5.5				
182-185															3		3		3		
185-190									5						5		5				
190-191.8															1.8		1.8				
191.8-200	8.2				8.2			8.2	8.2											8.2	8.2
200-209															9		9		9		
209-217	8	8			8														8		
217-226	9	9			9												9[2]		9		
226-231.5															5.5		5.5		5.5		
231.5-232	0.5				0.5																

Band GHz	**FS**	**FSS** ↑	↓	↑↓	**MS**	**MSS** ↑	↓	↑↓	**ISS**	**AM**	**AMS**	**RL**	**BC**	**BSS**	**EESS (p)**	**EESS (a)**	**SR (p)**	**SR (a)**	**RA**	**RN**	**RNSS**
232-235	3		3		3																
235-238			3												3	0.1	3	0.1			
238-240	2		2		2							2								2	2
240-241	1				1							1									
241-248												7							7		
248-250										2	2										
250-252															2		2		2		
252-265	13				13	13													13	13	13
265-275	10	10			10														10		
Total	**112.1**	**32**	**33**	**0.0**	**112.1**	**16**	**15.5**	**8.2**	**39.2**	**4.5**	**4.5**	**39**	**2**	**2**	**60.8**	**0.7**	**60.8**	**0.2**	**135.4**	**35.2**	**35.2**
Additional/ Notes	3*				3*				[1]						3**		16.25[2] + 3**				

NOTES:

* Allocation only valid from 01/01/2018.

** Allocation valid until 01/01/2018.

[1] For 18.45 GHz of the ISS allocation, the operation is limited to GSO with suitable pfd limits.

[2] Only space-based RA.

Comparison totals newly proposed table and existing RR table

Band GHz	FS	FSS			MS	MSS			ISS	AM	AMS	RL	BC	BSS	EESS (p)	EESS (a)	SR (p)	SR (a)	RA	RN	RNSS
		↑	↓	↑↓		↑	↓	↑↓													
Total new	112.1	32	33	0.0	112.1	16	15.5	8.2	39.2	4.5	4.5	39	2	2	60.8	0.7	60.8	0.2	135.4	35.2	35.2
Total old	106.4	32.4	31	0	142.4	3	3	36	35	4.5	4.5	28	2	2	62	0.1	60	0.1	50.31	36	36
New - old	5.7	–0.4	2	0.0	–30.3	13	12.5	–27.8	4.2	0	0	11	0	0	–1.2	0.6	0.8	0.1	85.09	–0.8	–0.8

ANNEX 2

European common proposals for agenda item 1.16

MOD EUR/13/154

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
71-74	FIXED FIXED-SATELLITE (~~Earth-to-space~~space-to-Earth) MOBILE MOBILE-SATELLITE (~~Earth-to-space~~space-to-Earth) ~~S5.149 S5.556~~	
74-~~75.5~~76	~~AMATEUR~~ ~~AMATEUR-SATELLITE~~ BROADCASTING-SATELLITE FIXED FIXED-SATELLITE (~~Earth-to-space~~space-to-Earth) MOBILE Space research (space-to-Earth) MOD S5.561 ADD S5.EEE	
76-~~81~~77.5	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth) ~~S5.560~~ADD S5.149A	
77.5-78	~~RADIOLOCATION~~ AMATEUR AMATEUR-SATELLITE ~~Amateur~~ ~~Amateur-satellite~~ Radio astronomy Space research (space-to-Earth) ~~S5.560~~ADD S5.149A	
78-81	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth) S5.560 ADD S5.149A	

Reasons: The uplinks and downlinks of the fixed-satellite and mobile-satellite services, which had an allocation in the bands 71-74 GHz and 81-84 GHz are interchanged to avoid downlinks in band 81-84 GHz, as downlinks in the band 81-84 GHz cause interference to the radio astronomy service, which needs an allocation in the band 81-84 GHz; the paired uplinks for the FSS and MSS are in band 81-84 GHz.

In the band 74-76 GHz (originally 74-75.5 GHz) the link direction of the fixed-satellite service has been changed from Earth-to-space into space-to-Earth.

The broadcasting-satellite service has been moved from its original allocation 84-86 GHz to the band 74-76 GHz, as it is thought that a co-allocation of the BSS with the FSS allows a more efficient use of the spectrum than a co-allocation with the terrestrial broadcasting service, still allocated in the band 84-86 GHz. By doing so, one also achieves the result that interference is avoided to the radio astronomy service, which needs an allocation in the band 84-86 GHz.

In the band 76-77.5 GHz an additional allocation was given to the radio astronomy service. Throughout this proposal footnote S5.149 has been suppressed with the objective to replace it by a new footnote, either S5.149A, S5.149B, S5.149C or S5.149D. The objective of this proposal is to simplify this fairly complex footnote, and to improve its clarity. Detailed reasons are given in proposals EUR/13/163 to 166.

The amateur and amateur-satellite service are reallocated from the band 75.5-76 GHz to the band 77.5-78 GHz. In the sub-band 75.5-76 GHz, the footnote S5.EEE (EUR/13/182) is added to foresee a transition period up to the year 2005.

The allocation for the radiolocation service, originally in the band 76-81 GHz, is now only in the bands 76-77.5 GHz and 78-81 GHz. Additional allocations for the radiolocation service are given in the band 95-100 GHz. It should be noted that the band 76-77 GHz is used for vehicle anti-collision devices.

Primary allocations to the radio astronomy service have been added in the band 78-81 GHz. Both for the bands 76-77.5 GHz and 78-81 GHz, sharing with the radiolocation service is possible, based on geographical separation. With these allocations better opportunities are created for the radio astronomy service for observations in the so-called three mm window (76-102 GHz), which is of extreme importance for the RA service.

A secondary allocation to the radio astronomy service is added in the band 77.5-78 GHz (i.e. the newly proposed amateur band).

MOD EUR/13/155

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
81-84	FIXED FIXED-SATELLITE (~~space-to-Earth~~Earth-to-space) MOBILE MOBILE-SATELLITE (~~space-to-Earth~~Earth-to-space) RADIO ASTRONOMY Space research (space-to-Earth) ADD S5.149A ADD S5.DDD	

84-86	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE BROADCASTING ~~BROADCASTING-SATELLITE~~ RADIO ASTRONOMY ~~S5.561~~ADD S5.149A

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
86-92	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340	
92-94	FIXED ~~FIXED-SATELLITE (Earth-to-space)~~ MOBILE RADIO ASTRONOMY RADIOLOCATION ~~S5.149 S5.556~~ADD S5.149A ADD S5.FFF	

Reasons: The uplinks and downlinks of the fixed-satellite and mobile-satellite services, which had an allocation in the bands 71-74 GHz and 81-84 GHz are interchanged to avoid downlinks in band 81-84 GHz, as downlinks in the band 81-84 GHz cause interference to the radio astronomy service, which needs an allocation in the band 81-84 GHz; the paired downlinks for the FSS and MSS are in band 71-74 GHz.

S5.DDD (EUR/13/181) appears for the sub-band 81-81.5 GHz to maintain the total of 5 GHz secondary allocation for the amateur services.

The broadcasting-satellite service has been reallocated from the band 84-86 GHz to the band 74-76 GHz, to avoid interference to the radio astronomy service, which needs an allocation in the band 84-86 GHz. Furthermore, it is assumed that convergence of services will lead to a more efficient use of the spectrum when the BSS and FSS are co-allocated. Sharing between comparable satellite services will be easier than sharing between satellite services and terrestrial services.

Footnote S5.561 has been moved, with its related services, to the band 74-76 GHz.

The fixed-satellite service (Earth-to-space) which was removed from the band 74-75.5 GHz, has been given a new allocation in the bands 84-86 GHz.

For the band 86-92 GHz, no change is proposed: this band is of crucial importance for the EESS and SR; it is the window for the EESS (p) and SR (p) band around 118.75 GHz; it is also used to detect precipitation. The fact that no active services are acceptable in this band is reflected via footnote MOD S5.340.

Footnote S5.556 is deleted since it is not necessary any more: the radio astronomy service has now a primary allocation in the band 92-94 GHz.

The FSS has been removed from the band 92-94 GHz, as it cannot share with the RA; compensation has been given in the bands 81-84 GHz and 84-86 GHz.

MOD EUR/13/156

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
94-94.1	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) Radio astronomy S5.562 ADD S5.FFF	
94.1-95	FIXED ~~FIXED-SATELLITE (Earth-to-space)~~ MOBILE RADIO ASTRONOMY RADIOLOCATION ADD S5.149A ADD S5.FFF	
95-100	FIXED MOBILE ~~S5.553~~ ~~MOBILE-SATELLITE~~ RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE ~~Radiolocation~~ ~~S5.149~~ ADD S5.149A MOD S5.554 ~~S5.555~~	
100-102	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341	
102-105	FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY ADD S5.149A S5.341	

Reasons: As already indicated in the current Article S5 of the Radio Regulations via footnotes S5.149, S5.555 and S5.556 these bands are of importance for the radio astronomy service. The band 95-100 GHz had already a primary allocation in the European common Table of Frequency Allocations. With these allocations better opportunities are created for the radio astronomy service for observations in the so-called three mm window (76-102 GHz), which is of extreme importance for the RA service.

The RA has been given a secondary allocation in the band 94-94.1 GHz since it has already allocations in the adjacent bands above and below; due to the wideband characteristics of the RA receivers, the use of this band during the observations cannot be avoided. Available band stop filter technology in radio astronomy receivers, in combination with geographical coordination will avoid damage to RA receivers. Footnote S5.FFF (EUR/13/183) indicates the need for coordination of the activities of EESS (a) and RAS users.

Footnote S5.149, needs modification as a consequence of this allocation proposal; see relevant proposal elsewhere (see EUR/13/163 to 167). EUR/13/173 proposes the required modification for S5.556, which in this frequency band can be deleted as a consequential.

The fixed-satellite service has been removed from the band 94.1-95 GHz, and the MSS was removed from the band 95-100 GHz, as these services cannot share with the radio astronomy service; compensation for these lost allocations has been given in the bands 81-84 GHz and 84-86 GHz.

Footnote S5.553 can be deleted from the band 95-100 GHz; apart from the radionavigation-satellite service there are no space radiocommunications any more in this band.

The band 100-102 GHz (NO line at 100.49 GHz) is used by the IKAR satellite for limb sounding; sharing between EESS (p) and SR (p) and fixed or mobile services is, for the time being, considered not to be feasible. Potential sharing in the future with the fixed and mobile services needs sharing constraints for the FS and MS which have to be laid down in an ITU-R recommendation.

For footnote MOD S5.554, see EUR/13/171 (the proposed modification is not relevant for the band 95-100 GHz).

MOD EUR/13/157

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
105-~~116~~109.5	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC ~~S5.340~~ADD S5.149A S5.341	
109.5-111.8	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341	
111.8-114.25	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC ~~S5.340~~ADD S5.149A S5.341	
114.25-116	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341	

116-119.98	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.JJJ ~~MOBILE S5.558~~ SPACE RESEARCH (passive) S5.341

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
119.98-120.02	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.JJJ ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~Amateur~~ S5.341	
120.02-~~126~~122.25	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.JJJ ~~MOBILE S5.558~~ SPACE RESEARCH (passive) S5.138	

Reasons: The EESS (p) does not need the bands 105-109.5 GHz and 111.8-114.25 GHz.

The SR (p) needs the band 105-109.5 GHz and 111.8-114.25 GHz for space-based radio astronomy; this is explained in S5.CCC (EUR/13/180).

With the deletion of the EESS (p) from the band 105-109.5 GHz, an additional allocation can be made to the fixed and mobile services; therefore S5.340 is no longer applicable.

For the band 109.5-111.8 GHz, no change is proposed, as compared to the current allocation; only footnote S5.340 needs modification to reflect the correct frequency bands; this band is and will be used by the EESS (p) for limb sounding (Ozone line at 110.8 GHz); sharing with active services in this band is considered not to be feasible; for potential future sharing scenario's the draft new Resolution XXX [EUR/13/7] is proposed (see EUR/13/188).

The band 105-116 GHz, in particular 109.5-111.8 GHz is of vital importance to the radio astronomy service for spectral line observations. Observations of the CO molecule and its isotopic variants are carried out. Moreover, it should be noted that observations of the stratospheric ozone line at 110.836 GHz are carried out by ground-based stations.

The band 114.25-122.25 GHz is of crucial importance for the EESS and SR as it is the oxygen absorption band. The centre of the oxygen absorption band is at 118.73-118.77 GHz. The associated window (reference) is in band 86-92 GHz. It has to be clean passive band; however the inter-satellite service can share with the EESS (p), SR (p) and RA when certain conditions are fulfilled (footnote S5.JJJ, see EUR/13/184). Therefore the fixed and mobile services have been removed from this band (reallocated to the bands 105-109.5 GHz and 111.8-114.25 GHz). Also the secondary allocation for the amateur services has been reallocated (to the bands 122.25-123 GHz and 136-141 GHz. Much radio astronomy work is done in this frequency range, especially again CO spectral line measurements (the main CO line is at the frequency 115.27 GHz).

The Odin and other satellites use both the allocations to the EESS (p) and RA service to observe the O2 line within the range 118.25-119.25 GHz.

The deletions or modifications to S5.340 and S5.351 are consequential.

MOD EUR/13/158

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
122.25-123	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED INTER-SATELLITE MOBILE MOD S5.558 ~~SPACE RESEARCH (passive)~~ Amateur S5.138	
123-130	~~EARTH EXPLORATION-SATELLITE (passive)~~ ~~FIXED~~ ~~INTER-SATELLITE~~ ~~MOBILE S5.558~~ ~~RADIOLOCATION S5.559~~ ~~SPACE RESEARCH (passive)~~ FIXED-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) RADIONAVIGATION RADIONAVIGATION-SATELLITE Radio astronomy ~~S5.138~~MOD S5.554	
130-134	EARTH EXPLORATION-SATELLITE (active) ADD S5.LLL FIXED INTER-SATELLITE MOBILE MOD S5.558 ~~RADIOLOCATION S5.559~~ RADIO ASTRONOMY ADD S5.149A	

Reasons: The bands 122.25-123 GHz and 123-130 GHz are not needed by EESS and SR. In the lower band an allocation has been given to the fixed and mobile services; in the upper band services which had to be removed from bands above 134 GHz have found an allocation (e.g. the radionavigation and radionavigation-satellite services. By splitting the band 122.25-130 GHz into two sub-bands, a guardband between these allocations and the allocation for the passive services in the adjacent lower band was created. The fixed, mobile and inter-satellite services were removed from the band 123-130 GHz to avoid sharing difficulties.

S5.558 has been modified to reflect the new frequency bands.

In the band 130-134 GHz the radiolocation service was removed in order to create a “good quality” band for the fixed and mobile service; radiolocation found a new allocation in the band 136-141 GHz.

In order to allow the use of a frequency band above 100 GHz for EESS (active) for altimetry, an allocation for this service has been added, with footnote S5.LLL (EUR/13/186), limiting this allocation to the range 130-130.5 GHz.

S5.340 is not applicable any more in the bands 105-109.5 GHz, and 111.8-114.25 GHz (see EUR/13/168).

S5.149 has been replaced by S5.149A according to the principles explained in EUR/13/163 to 167.

Footnote S5.554, relating specific use within the mobile-satellite and radionavigation-satellite services, originally in the band 134-142 GHz, has been moved to the new band for these services: 123-130 GHz (see EUR/13/171).

MOD EUR/13/159

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
134-~~142~~136	AMATEUR AMATEUR-SATELLITE ~~MOBILE S5.553~~ ~~MOBILE-SATELLITE~~ ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ ~~Radiolocation~~ Radio astronomy ~~S5.149 S5.340 S5.554 S5.555~~	
136-141	~~MOBILE S5.553~~ ~~MOBILE-SATELLITE~~ RADIO ASTRONOMY RADIOLOCATION ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ ~~Radiolocation~~ Amateur Amateur-satellite ~~S5.149 S5.340 S5.554 S5.555~~ADD S5.149A	
141-148.5	~~AMATEUR~~ ~~AMATEUR-SATELLITE~~ FIXED MOBILE~~ S5.553~~ ~~MOBILE-SATELLITE~~ RADIO ASTRONOMY RADIOLOCATION ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ ~~Amateur~~ ~~Amateur-satellite~~ ~~Radiolocation~~ ~~S5.149 S5.340 S5.554 S5.555~~ADD S5.149A	

148.5-151.5	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ RADIO ASTRONOMY ~~RADIONLOCATION~~ SPACE RESEARCH (passive) ~~Amateur~~ ~~Amateur-satellite~~ ~~S5.149 S5.385 S5.555~~MOD S5.340
151.5-155.5	FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY RADIOLOCATION ADD S5.149A
155.5-158.5	EARTH EXPLORATION-SATELLITE (passive) ADD S5.AAA FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC ADD S5.149A ADD S5.BBB

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
158.5-164	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth)	

Reasons: The amateur and amateur-satellite services have been reallocated from the band 142-144 GHz to the band 134-136 GHz, in order to avoid interference to the radio astronomy service which has a high interest in the band 142-144 GHz.

The mobile service originally in this band was moved to the band 141-148.5 GHz; the mobile-satellite, radionavigation and radionavigation-satellite services have been moved to the band 123-130 GHz.

The radiolocation service, now appearing in the bands 136-141 GHz, 141-148.5 GHz and 151.5-155.5 GHz, had originally its allocation in the bands 130-134 GHz and 144-149 GHz. These changes allow an easy sharing situation in the bands 136-155.5 GHz, taking into account in particular the need for the removal of active services from the band 148.5-151.5 GHz, as well as the fact that sharing between the radiolocation service and the radio astronomy service is considered to be feasible.

The radio astronomy service had up to now only several narrow-bands allocated in the frequency range 120-190 GHz, the so-called two mm window; with this new allocation picture a large contiguous block of spectrum could be allocated to this service necessary for observations of spectral lines from a large variety of molecules and for continuum observations (i.e. for cosmic background research).

The band 148.5-151.5 GHz is of crucial importance for the EESS (p) and SR (p); it has now been made available to these services, replacing the earlier allocation in the band 150-151 GHz, which was too narrow. In practice the band 149-151 GHz was already used.

The band will be used as a window (reference) for the observations in the band around 183.31 GHz. Nowadays also the bands 155.5-157.5 GHz and 166-168 GHz are in use as such windows. In this proposal, it is foreseen that in the future only two bands will be used for such a window; these will be the harmonized bands 148.5-151.5 GHz and 164-167 GHz. Two frequency bands will offer a better referencing than one wide frequency band. See further specific notes at band 155.5-157.5 GHz.

The fixed-satellite (space-to-Earth) allocation originally appearing in the band 151-156 GHz, was removed from the bands 151.5-155.5 GHz and 155.5-158.5 GHz, as downlinks are incompatible with primary radio astronomy bands, and the EESS (p) and SR (p); compensation is found in the bands 123-130 GHz and 167-174 GHz.

The band 155.5-158.5 GHz is now in use by the EESS and SR as a window for the observations in the band around 183.31 GHz. In the future (after 01/01/2018) the harmonized bands 148.5-151.5 GHz and 164-167 GHz are foreseen.

The date chosen (via footnote S5.AAA, see EUR/13/178) allows time for development and exploitation of a system presently under development. After 01/01/2018 the band can be used by the fixed and mobile service; such is foreseen via footnote S5.BBB, see EUR/13/179. The allocation to space research continues, but limited to space-based radio astronomy (footnote S5.CCC, EUR/13/180).

In the band 158.5-164 GHz, the mobile-satellite service was added in order to compensate for losses in allocation elsewhere:

– for footnote S5.149A, see EUR/13/163 to 167

– for footnote MOD S5.340, see EUR/13/168

– for the deletion of footnote S5.385, see EUR/13/169.

MOD EUR/13/160

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
164-~~168~~167	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340	
167-174.5	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558 ~~RADIO ASTRONOMY~~ ~~SPACE RESEARCH (passive)~~ ~~S5.149 S5.385~~	

174.5-174.8	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED INTER-SATELLITE MOBILE MOD S5.558 ~~SPACE RESEARCH (passive)~~ ~~S5.149 S5.385~~
174.8-176.5	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.KKK ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~S5.149 S5.385~~
176.5-182	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.KKK ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~S5.149 S5.385~~
182-185	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.563
185-190	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.KKK ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~S5.149 S5.385~~
190-~~200~~191.8	EARTH EXPLORATION-SATELLITE (passive) ~~MOBILE S5.553~~ ~~MOBILE-SATELLITE~~ ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ SPACE RESEARCH (passive) ~~S5.341 S5.554~~MOD S5.340
191.8-200	FIXED INTER-SATELLITE MOBILE ~~S5.553~~ MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE S5.341 MOD S5.554

Reasons: The band 164-167 GHz, together with the band 148.5-151.5 GHz, will in future be the harmonized “window” (reference) for the EESS observations of the 183.31 GHz water vapour line. This band is of crucial importance for the EESS and SR.

From the band 167-174.5 GHz, the 1 GHz used for the “passive services”, can be deleted; an allocation for the fixed-satellite service has been added to compensate for losses of allocation space elsewhere (e.g. 158-164 GHz).

The inter-satellite service had originally its allocation in the band 170-174.5 GHz.

The allocations in the band 174.5-174.8 GHz are identical with those proposed for the band 167-174 GHz, except for the fixed-satellite; this has been done to create a better protection scenario for the upper adjacent pure passive band.

The band 174.8-191.8 GHz is of crucial importance for passive sensing of the water vapour absorption line whose peak is at 183.31 GHz. The central part of the band, 182-185 GHz, is kept as a purely passive band. Radio astronomers wish to use this band for calibration of their receivers, and also to do observations from aircraft.

The ISS service needs to be limited to links between GSO satellites and to a pfd limit as specified in sharing studies, therefore footnote S5.KKK (see EUR/13/185). This allocation protects also the NO line at 175.86 GHz, the ozone line at 184.75 GHz, and the nitric-acid (HNO3) line at 191.595 GHz.

The fixed service has been added to the existing allocations in the band 191.8-200 GHz, taking account of the principle of convergence of the fixed and mobile services; also the inter-satellite service has been added to grant it more quantity and quality of allocation.

Footnotes S5.149, S5.340 and S5.558 are modified to reflect the new frequency bands (see EUR/13/163 to 167, EUR/13/168 and EUR/13/174 respectively).

Footnote S5.385, dealing with a secondary allocation for radio astronomy needs modification: partly because a primary allocation was made, partly because no allocation was made (see EUR/13/169).

Footnote S5.554 has been modified to reflect the correct frequency bands (see EUR/13/171).

MOD EUR/13/161

158-~~202~~235 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
200-~~202~~209	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341	
209-217	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY ADD S5.149A S5.341	

217-~~231~~226	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC ~~S5.340~~ ADD S5.149A S5.341
226-231.5	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) ~~Radiolocation~~ MOD S5.340 ~~S5.341~~
231.5-232	FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE Radiolocation
~~231~~232-235	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Radiolocation

Reasons: The band 200-209 GHz is needed by EESS (p) using the technique of Limb Sounding for Atmospheric Chemistry; also ground-based atmospheric remote sensing will take place. The physical phenomena are the water vapour line at 203.4 GHz, the nitrous-oxide lines at 200.08 and 200.98 GHz, and the Ozone line at 208.5 GHz. For the radio astronomy, this band is used for measurements of spectral line emissions. Therefore the band has to be pure passive.

The frequency band 209-217 GHz is allocated to the fixed and mobile services (convergence), the fixed-satellite service (uplinks) and radio astronomy, a combination that can share on a geographical basis.

The band 217-226 GHz has the same allocations as its lower adjacent band; it is also foreseen that this band is used by space-based radio astronomy; therefore the allocation for SR (p) with the footnote S5.CCC (EUR/13/180).

The EESS (p) and SR (p) need in this frequency range only 5.5 GHz instead of the earlier allocation of 14 GHz (217-231 GHz). The band 226-231.5 GHz is required for limb sounding of various atmospheric constituents and to provide for a 4 GHz window for reference.

With regard to the radio astronomy service: the frequency band 217-231.5 GHz is of vital importance for astronomers; spectral line observations of a large variety of molecules, including red-shifted emission from the CO molecule and its isotropic variants are carried out; observation of CO spectral lines are carried out in conjunction with observations in the band 105-116 GHz.

MOD EUR/13/162

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
235-238	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ FIXED-SATELLITE (space-to-Earth) ~~MOBILE~~ SPACE RESEARCH (passive) ADD S5.NNN	
238-~~241~~240	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE ~~Radiolocation~~	
240-241	FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIOLOCATION ~~Radiolocation~~	
241-248	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite S5.138 ADD S5.149A	
248-250	AMATEUR AMATEUR-SATELLITE Radio astronomy ADD S5.149A	
250-252	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) ~~S5.149 S5.555~~MOD S5.340	
252-265	FIXED MOBILE ~~S5.553~~ MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY RADIONAVIGATION RADIONAVIGATION-SATELLITE ~~S5.149~~ADD S5.149A ~~S5.385~~ MOD S5.554 ~~S5.555 S5.564~~	

265-275	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY ~~S5.149~~ADD S5.149A
275-~~400~~1 000	(Not allocated) MOD S5.565

Reasons: The frequency band 235-238 GHz is used by the EESS (p) for Limb Sounding (ozone lines at 235.71 and 237.15 GHz); there is no consensus whether sharing between the passive services and the fixed/mobile services is feasible; to avoid unnecessary problems, the allocations for the fixed and mobile services have been deleted; proposal EUR/13/188 contains a draft new Resolution XXX [EUR/13/7], which calls for ITU-R studies.

Sharing between the EESS/SR (p) and the FSS (downlink) is considered feasible. The FSS has in this frequency range now an allocation of total 8.5 GHz.

Footnote S5.NNN (see EUR/13/187) was added to foresee in a frequency band of 100 MHz which can be used by the EESS (a) and SR (a) for spaceborne cloud radars only, such to complement the measurements in the band 94-94.1 GHz.

In the band 238-240 GHz, additional allocations have been made for the radiolocation, radionavigation, and radionavigation-satellite services to compensate for “losses” in the frequency ranges 150-160 GHz and 170-200 GHz respectively. One could also say: in this range the secondary allocation for radiolocation was made a primary.

The band 240-241 GHz is allocated to terrestrial services only, to avoid interference problems with the adjacent upper band, which is important for radio astronomy.

With regard to the bands 241-248 GHz, and 250-252 GHz, the major change is the addition of the radio astronomy service; this service can share with the radiolocation, based on geographical separation.

With the development of “millimetre-technology” within the radio astronomy community, observations in the spectrum above 241 GHz have shown to be very important for this science: numerous spectral lines indicate a huge variety of physical/chemical processes.

The band 250-252 GHz is used by the EESS (p) and SR (p) for Limb Sounding (nitrous-oxide line at 251.21 GHz); sharing with terrestrial services is considered not to be feasible; (see the draft new Resolution XXX [EUR/13/7] in EUR/13/188).

In the band 252-265 GHz, the fixed service was added (apart from the addition of the radio astronomy service), taking into consideration the phenomena of convergence.

For the deletion of footnote S5.149 and addition of footnote S5.149A, see EUR/13/163 to 167.

For the modification of footnote S5.340, see EUR/13/168.

Footnote S5.385 has been deleted, since it specified an additional allocation for radio astronomy in certain bands; however to reflect the new situation, the footnote itself needs modification; see EUR/13/169.

For the modification of footnote S5.554, see EUR/13/171.

Footnote S5.564, specifying some countries that had a primary allocation for the radio astronomy service in the band 261-265 GHz is deleted, as this is now covered by the newly proposed Table of Frequency Allocations (see EUR/13/176).

Footnote S5.565 has been modified to indicate the interests of the radio astronomy, the Earth exploration-satellite and space research services in various specific frequency bands in the range 275-1 000 GHz (see EUR/13/177). To allow such an indication, the Table of Frequency Allocations has been extended to cover also the range 400-1 000 GHz.

SUP EUR/13/163

S5.149

ADD EUR/13/164

Add to the following frequency bands:

322-328.6 MHz,	92-94 GHz,	136-148.5 GHz,
1 610.6-1 613.8 MHz,	94.1-100 GHz,	151.5-158.5 GHz,
1 350-1 400 MHz,	102-109.5 GHz,	209-226 GHz,
14.47-14.5 GHz,	111.8-114.25 GHz,	241-250 GHz,
76-86 GHz,	130-134 GHz,	252-275 GHz.

ADD

S5.149A In making assignments to stations of other services to which this band is allocated, administrations are urged to take all practicable steps to protect the spectral line observations done in the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. **S4.5** and **S4.6** and Article **S29**).

ADD EUR/13/165

Add to the following frequency bands:

13 360-13 410 kHz,	406.1-410 MHz,	10.6-10.68 GHz,
25 550-25 670 kHz,	1 660-1 670 MHz,	22.21-22.5 GHz,
37.5-38.25 MHz,	2 655-2 690 MHz,	31.5-31.8 GHz in Regions 1 and 3,
150.05-153 MHz in Region 1,	4 990-5 000 MHz,	42.5-43.5 GHz.

ADD

S5.149B In making assignments to stations of other services to which this band is allocated, administrations are urged to take all practicable steps to protect the continuum observations done in the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. **S4.5** and **S4.6** and Article **S29**).

ADD EUR/13/166

S5.149C In making assignments to stations of other services to which the sub-bands:

1 330-1 350 MHz,	3 345.8-3 352.5 MHz,	22.81-22.86 GHz,
1 718.8 -1 722.2 MHz,	4 825-4 835 MHz,	23.07-23.12 GHz,
3 260-3 267 MHz,	6 650-6 675.2 MHz,	36.43-36.5 GHz,
3 332-3 339 MHz,	22.01-22.21 GHz,	48.94-49.04 GHz,

are allocated, administrations are urged to take all practicable steps to protect the spectral line observations done in the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. **S4.5** and **S4.6** and Article **S29**).

ADD EUR/13/167

S5.149D In making assignments to stations of other services to which the sub-bands:

73-74.6 MHz in Regions 1 and 3,	4 950-4 990 MHz,
608-614 MHz in Regions 1 and 3,	31.2-31.3 GHz,

are allocated, administrations are urged to take all practicable steps to protect the continuum observations done in the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. **S4.5** and **S4.6** and Article **S29**).

Reasons: The frequency bands mentioned in the current footnote S5.149 refer either to the boundaries of the cells specified in the Table of Frequency Allocations, or to sub-bands within the bands specified in these cells.

The present structure of S5.149 implies that any time a re-allocation is made touching any of the boundaries specified in the frequency bands mentioned in S5.149, the footnote itself needs modification. This has to be considered as an unnecessary complexity.

Noting that the prime objective of the footnote is to foresee protection of the radio astronomy, the solution to the problem can be found in making the footnote, wherever possible, independent from the frequency band to which it appears.

Further elaboration of this idea leads to the conclusion that S5.149 should be split into four new footnotes; a first division into two to allow a differentiation in protection of spectral line and continuum observations, and a second division of these two, which brings us to four, to enable the specification of (a) sub-band(s) within the band mentioned in a specific cell. In case a band is mentioned both for continuum and for spectral line observations, such a band will only be mentioned under continuum, as the protection requirements for continuum are more severe than those for spectral line observations. This leads to the four footnotes, which replace S5.149:

S5.149A for spectral line observations, applicable to the full frequency band mentioned in the cell in which it appears;

S5.149B for continuum observations, applicable to the full frequency band mentioned in the cell in which it appears;

S5.149C for spectral line observations, applicable to only a part of the frequency band mentioned in the cell in which it appears;

S5.149D for continuum observations, applicable to only a part of the frequency band mentioned in the cell in which it appears.

MOD EUR/13/168

S5.340 All emissions are prohibited in the following bands:

1 400-1 427 MHz,	
2 690-2 700 MHz,	except those provided for by Nos. **S5.421** and **S5.422**,
10.68-10.7 GHz,	except those provided for by No. **S5.483**,
15.35-15.4 GHz,	except those provided for by No. **S5.511**,
23.6-24 GHz,	
31.3-31.5 GHz,	

31.5-31.8 GHz,	in Region 2,
48.94-49.04 GHz,	from airborne stations,
50.2-50.4 GHz[2],	except those provided for by No. **S5.555A**,
52.6-54.25 GHz,	
86-92 GHz,	
100-102 GHz,	
~~105-116 GHz,~~	
109.5-111.8 GHz,	
114.25-116 GHz,	
~~140.69-140.98 GHz,~~	~~from airborne stations and from space stations in the space-to-Earth direction,~~
148.5-151.5 GHz,	
164-167 GHz,	
182-185 GHz,	except those provided for by No. **S5.563**,
190-191.8 GHz,	
200-209 GHz,	
~~217-231 GHz.~~	
226-231.5 GHz,	
250-252 GHz.	

Reasons: To reflect the new frequency bands.

MOD EUR/13/169

S5.385 *Additional allocation:* the bands 1 718.8-1 722.2 MHz~~, 150-151 GHz, 174.42-175.02 GHz, 177-177.4 GHz, 178.2-178.6 GHz, 181-181.46 GHz, 186.2-186.6 GHz and 257.5-258 GHz are~~ is also allocated to the radio astronomy service on a secondary basis for spectral line observations.

Reasons: To reflect the new allocations.

MOD EUR/13/170

S5.553 In the bands 43.5-47 GHz~~,~~ and 66-71 GHz~~, 95-100 GHz, 134-142 GHz, 190-200 GHz and 252-265 GHz~~, stations in the land mobile service may be operated subject to not causing harmful interference to the space radiocommunication services to which these bands are allocated (see No. **S5.43**).

Reasons: This footnote is not applicable any more to most of the bands above 71 GHz, because in most cases the sharing scenario has been changed in the newly proposed table; in some cases, the results of sharing studies have to be awaited, before “priority arrangements” are to be defined.

MOD EUR/13/171

S5.554 In the bands 43.5-47 GHz, 66-71 GHz, 95-100 GHz, ~~134-142~~123-130 GHz, ~~190~~191.8-200 GHz and 252-265 GHz, satellite links connecting land stations at specified fixed points are also authorized when used in conjunction with the mobile-satellite service or the radionavigation-satellite service.

Reasons: To reflect the new allocations.

MOD EUR/13/172

S5.555 *Additional allocation:* the bands 48.94-49.04 GHz~~, 97.88-98.08 GHz, 140.69-140.98 GHz, 144.68-144.98 GHz, 145.45-145.75 GHz, 146.82-147.12 GHz, 250-251 GHz and 262.24-262.76 GHz are~~ is also allocated to the radio astronomy service on a primary basis.

Reasons: To reflect to the new Table of Frequency Allocations correctly in this footnote; the radio astronomy has got a primary allocation in the table itself instead of via a footnote.

MOD EUR/12/173

S5.556 In the bands 51.4-54.25 GHz, 58.2-59 GHz~~,~~ and 64-65 GHz~~, 72.77-72.91 GHz and 93.07-93.27 GHz~~, radio astronomy observations may be carried out under national arrangements.

Reasons: In the newly proposed Table of Frequency Allocations, there is no need for this footnote to reflect frequency bands above 71 GHz.

MOD EUR/12/174

S5.558 In the bands 55.78-58.2 GHz, 59-64 GHz, 66-71 GHz, ~~116-134 GHz, 170-182 GHz and 185-190 GHz,~~122.25-123 GHz, 130-134 GHz, 167-174.5 GHz and 174.5-174.8 GHz, stations in the aeronautical mobile service may be operated subject to not causing harmful interference to the inter-satellite service (see No. **S5.43**).

Reasons: To reflect the new frequency bands.

MOD EUR/12/175

S5.561 In the band ~~84-86~~74-76 GHz, stations in the fixed~~,~~ and mobile~~ and broadcasting~~ services shall not cause harmful interference to stations of the fixed-satellite service or stations of the broadcasting-satellite ~~stations~~services operating in accordance with the decisions of the appropriate frequency assignment planning conference for the broadcasting-satellite service.

Reasons: To reflect the new frequency band and the new sharing-scenario in this band. A convergence between the BSS and FSS is assumed.

SUP EUR/12/176

S5.564

Reasons: Not needed any more, as allocation is foreseen in table.

MOD EUR/12/177

S5.565 The frequency band 275-~~400~~1 000 GHz may be used by administrations for experimentation with, and development of, various active and passive services. In this band a need has been identified for the following spectral line measurements for passive services:

– radio astronomy service: ~~278-280~~275-323 GHz~~ and 343-348 GHz,~~ 327-371 GHz, 388-424 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz, 795-909 GHz and 926-945 GHz;

– Earth exploration-satellite service (passive) and space research service (passive): 275-277 GHz, ~~300-302 GHz, 324-326 GHz, 345-347 GHz,~~ 294-306 GHz, 316-334 GHz, 342-349 GHz, 363-365 GHz~~ and 379-381 GHz~~, 371-389 GHz, 416-434 GHz, 442-444 GHz, 496-506 GHz, 546-568 GHz, 624-629 GHz, 634-654 GHz, 659-661 GHz, 684-692 GHz, 730-732 GHz, 851-853 GHz and 951-956 GHz.

Future research in this largely unexplored spectral region may yield additional spectral lines and continuum bands of interest to the passive services. Administrations are urged to take all practicable steps to protect these passive services from harmful interference until the next competent world radiocommunication conference.

Reasons: To indicate more precisely the interests of the radio astronomy, the Earth exploration-satellite and space research services in specific frequency bands in the range 275-1 000 GHz. In fact some of these frequency bands are already used for the radio astronomy and the EESS/SR (p). Satellites operating in frequency bands going up to 2.5 THz are under development.

ADD EUR/13/178

S5.AAA In the band 155.5-158.5 GHz, the allocation to the Earth exploration-satellite service (passive) and space research service (passive) shall terminate on 1 January 2018.

Reasons: The band 155.5-158.5 GHz is now in use by the EESS and SR as a window for the observations in the band around 183.31 GHz. In the future the harmonized bands 148.5-151.5 GHz and 164-167 GHz are foreseen. This provision allows time for development and exploitation of a system presently under development.

ADD EUR/13/179

S5.BBB The date of entry for the allocations to the fixed and mobile services in the band 155.5-158.5 GHz shall be 1 January 2018.

Reasons: The band 155.5-158.5 GHz is now in use by the EESS and SR as a window for the observations in the band around 183.31 GHz. In the future the harmonized bands 148.5-151.5 GHz and 164-167 GHz are foreseen. This provision allows time for development and exploitation of a system presently under development.

ADD EUR/13/180

S5.CCC The use of this allocation is limited to space-based radio astronomy only.

Reasons: To reflect the needs for the radio astronomy, whilst avoiding potential problems of interference.

ADD EUR/13/181

S5.DDD The band 81-81.5 GHz is also allocated to the amateur and amateur-satellite services on a secondary basis.

Reasons: The amateur and amateur-satellite services had in the current Table of Frequency Allocations a secondary allocation of 5 GHz in the band 76-81 GHz; in this proposal this allocation has been shifted to the bands 76-77.5 GHz and 78-81.5 GHz.

ADD EUR/13/182

S5.EEE The band 75.5-76 GHz is also allocated to the amateur and amateur-satellite services on a primary basis until the year 2005.

Reasons: To allow a time period for the amateur and amateur-satellite services to move to the newly allocated bands.

ADD EUR/13/183

S5.FFF Due to the common scientific nature of the two services, the operations of the space station in the Earth exploration-satellite service (active) in the frequency band 94-94.1 GHz shall be coordinated with the radio astronomy stations operating in the frequency bands 92-94 GHz and 94.1-95 GHz to avoid damage to the radio astronomy receivers, to minimize the time duration of harmful interference to radio astronomy stations and to maximize the observation time of the space station.

Reasons: Coordination between the cloud radar operations and the affected radio astronomy stations would prevent physical damage to radio astronomy systems and would allow time sharing between these different scientific applications.

Coordination methods could be:

– specification of pfd limits to protect the radio astronomy service;

– adequate filtering;

– switching off the space station transmissions over the affected radio astronomy stations;

– switching off the radio telescopes of the affected radio astronomy stations during passes of the cloud radar satellite.

Reason to indicate coordination purpose:

To explain the coordination goal and prevent future confusion. At this moment, those who participated in the development of this footnote know the background and mutual agreements but it cannot be excluded that in the future other people interpret the coordination differently, e.g. full protection of radio astronomy at all times whilst putting inappropriate burden on the space station. It is felt that with this language this could be prevented.

ADD EUR/13/184

S5.JJJ The use of the band 116-122.25 GHz by the inter-satellite service is limited to satellites in the geostationary-satellite orbit. The single-entry power flux-density, at all altitudes from 0 km to 1 000 km above the Earth’s surface and in the vicinity of all geostationary orbital positions occupied by passive sensors, produced by a station in the inter-satellite service, for all conditions and for all methods of modulation, shall not exceed –148 dBW/m^2/MHz for all angles of arrival.

Reasons: To allow the sharing between the ISS and the EESS (p) and SR (p).

ADD EUR/13/185

S5.KKK The use of the band 174.8-182 GHz by the inter-satellite service is limited to satellites in the geostationary-satellite orbit. The single-entry power flux-density, at all altitudes from 0 km to 1 000 km above the Earth’s surface and in the vicinity of all geostationary orbital positions occupied by passive sensors, produced by a station in the inter-satellite service, for all conditions and for all methods of modulation, shall not exceed –144 dBW/m^2/MHz for all angles of arrival.

Reasons: To allow the sharing between the ISS and the EESS (p) and SR (p).

ADD EUR/13/186

S5.LLL The allocation to the Earth exploration-satellite service (active) and the space research service (active) is limited to the band 130-130.5 GHz.

Reasons: To allow the EESS (a) and SR (a) the use of some frequencies above 71 GHz for high resolution altimetry.

ADD EUR/13/187

S5.NNN The frequency band 237.9-238 GHz is also allocated to the Earth exploration-satellite service (active) and the space research service (active) for spaceborne cloud radars only.

Reasons: To allow the use of this small part of the spectrum to carry out these measurements which are complementary to the measurements done in the band 94-94.1 GHz, such to improve the accuracy.

ADD EUR/13/188

RESOLUTION XXX [EUR/13/7] (WRC-2000)

Consideration by a future competent world radiocommunication conference of issues dealing with sharing and adjacent band compatibility above 71 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-2000 made changes to the Table of Frequency Allocations above 71 GHz, following consideration of science service issues;

b) that several bands above 71 GHz are already used by EESS (passive) and SR (passive) because they are unique bands to measure specific atmospheric parameters;

c) that several bands above 71 GHz are already used by the radio astronomy service;

d) that in order to ensure the protection of passive services above 71 GHz, WRC-2000 avoided co-allocations of active and passive services to prevent potential sharing problems;

e) that there are several co-primary active services in some bands above 71 GHz in the Table of Frequency Allocations as revised by WRC-2000;

f) that in some cases satellite downlink allocations have been made within bands adjacent to those where radio astronomy is allocated;

g) that sharing between multiple co-primary active services may hinder the development of each active service in bands above 71 GHz,

noting

a) that preliminary sharing studies between active and passive services performed by ITU-R have not yet reached final conclusions due to the fact that the technical characteristics of the active services above 71 GHz are not yet known;

b) that sharing studies between active services have not yet been performed;

c) that interference criteria for passive sensors have been developed and are given in Recommendation ITU-R SA.1029;

d) that interference criteria for radio astronomy have been developed and are given in Recommendation ITU-R RA.769-1,

resolves

1 that sharing criteria for active services and their spectrum requirements be developed in bands above 71 GHz;

2 that further studies be conducted:

2.1 to determine if and under what condition sharing is possible between terrestrial active services and passive services (EESS and SR) in the bands 100-102 GHz, 114.25-122.25 GHz, 148.5-151.5 GHz, 174.8-191.8 GHz, 226-231.5 GHz and 235-238 GHz;

2.2 to determine if and under what condition sharing is possible between active services in bands above 71 GHz;

2.3 on adjacent band interference from space services (downlink) into radio astronomy in bands above 71 GHz;

3 that the necessary studies be completed as soon as the technical characteristics of the active services in these bands are known;

4 that a future conference should review, if necessary, the allocations above 71 GHz in the light of the studies performed under *resolves* 1, 2 and 3,

invites ITU-R

to develop recommendations specifying sharing criteria for those bands where sharing is feasible,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 4B

Agenda item 1.17 - Worldwide allocation for the Earth exploration-satellite (passive) and space research services in the band 18.6-18.8 GHz

Introduction

The European common proposals for agenda item 1.17 seek to establish within the Radio Regulations the future sharing environment within which the FS, FSS and EESS (passive) must work. If agreement can be reached on the adoption of the technical constraints on the active services as proposed below, an upgrade of the EESS (passive) to worldwide primary status can be supported. These proposals are in line with technical options included in the CPM Report and represent the maximum constraint on the active services in this band which can be accepted by Europe.

In Europe the 18 GHz band is used extensively for fixed services in many countries and is likely to be used by the fixed-satellite service in the near future. The fixed service uses this band to provide mobile network infrastructure and medium hop links for public telecommunications networks. These requirements are expected to continue with the liberalization of European telecommunications and the introduction of new services. The proposal below is intended to safeguard the future increasing use of the band for all the allocated services.

MOD EUR/13/189

18.6-22.21 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) ~~S5.523~~ MOBILE except aeronautical mobile ~~Earth exploration-satellite (passive)~~ Space research (passive)	**18.6-18.8** EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) ~~S5.523~~ MOBILE except aeronautical mobile SPACE RESEARCH (passive)	**18.6-18.8** EARTH EXPLORATION-SATELLITE (passive) FIXED FIXED-SATELLITE (space-to-Earth) ~~S5.523~~ MOBILE except aeronautical mobile ~~Earth exploration-satellite (passive)~~ Space research (passive)
~~S5.522~~ADD S5.522A	~~S5.522~~ADD S5.522A	~~S5.522~~ADD S5.522A

ADD EUR/13/190

S5.522A In the band 18.6-18.8 GHz the sharing environment within which the EESS (passive) and SR (passive) services shall operate is defined by the limitations on the operation of fixed and fixed-satellite services that are given in Nos. **S21.5.1** and **S21.16.2**.

SUP EUR/13/191

S5.522

SUP EUR/13/192

S5.523

MOD EUR/13/193

TABLE **S21-2**

Frequency band	**Service**	**Limit as specified in Nos.**
17.7-18.4 GHz 18.6-18.8 GHz 19.3-19.6 GHz 24.45-24.75 GHz 24.75-25.25 GHz (Region 3) 25.25-29.5 GHz	Fixed-satellite Inter-satellite	**S21.2, S21.3** ~~and~~, **S21.5** and **S21.5A**

ADD EUR/13/194

S21.5A As an exception to the power levels given in No. **S21.5** the sharing environment within which the EESS (passive) and SR (passive) services shall operate in the band 18.6-18.8 GHz is defined by the following limitations on the operation of the fixed service: the power of each RF carrier frequency delivered to each antenna of a station in the fixed service in the band 18.6-18.8 GHz shall not exceed –3 dBW.

MOD EUR/13/195

[8] **S21.16.2** ~~The band 18.6-18.8 GHz is allocated to the earth exploration-satellite (passive) and space research (passive) services. Administrations should endeavour to reduce to a minimum the risks of interference to passive sensors. The interference criteria for satellite passive sensors are contained in Recommendation ITU-R SA.1029.~~ In addition to the limits given in Table **S21-4**, in the band 18.6-18.8 GHz the sharing environment within which the EESS (passive) and SR (passive) services shall operate is defined by the following limitations on the operation of the fixed-satellite service: the power flux-density across the 200 MHz band 18.6-18.8 GHz produced at the surface of the Earth by emissions from a space station under assumed free-space propagation conditions shall not exceed –95 dBW/m^2, except for less than 5% of time when the limit may be exceeded by up to 3 dB. The provisions of No. **S21.17** do not apply in this band.

Reasons: The above proposals reflect those technical solutions suggested in the CPM Report which are acceptable to Europe and are believed to represent a good compromise solution to this subject.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 1 to
Addendum 3 to
Document 13-E
25 March 2000
Original: French
English
Spanish

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

PART 3

AGENDA ITEM 1.13 - NON-GSO FSS

CONTENTS

Proposals submitted by the following administrations

Germany, Austria, Bosnia and Herzegovina, Croatia, Denmark, Estonia, Finland, France, Ireland, Iceland, Liechtenstein, Norway, Netherlands, Portugal, San Marino, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 3E

Agenda item 1.13 - Proposed modifications to Article S5

Add the following text at the end of this Part.

EUR/13/134 to EUR/13/137 propose that S5.441, S5.484A, S5.487A and S5.516, the current four footnotes in Article S5 referring to non-GSO FSS operation under the provisions of Resolutions 130 (WRC-97) and 538 (WRC-97) be amended in order to include the relevant provisions currently included in these Resolutions which do not contain transitional or superfluous measures.

Among these superfluous measures is *resolves* 6 of Resolution 130 (WRC-97), which states:

> that, as of 22 November 1997, in the frequency bands specified in No. **S22.29** and Tables 1 and 2 of Annex 1 to this Resolution, non-GSO systems shall not claim protection from GSO networks in the FSS operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO FSS systems and of the complete coordination information for the GSO networks;

In EUR/13/152, it is proposed to suppress this *resolves* 6, on the basis that, with the establishment of minimum constraints on GSO FSS systems, as those proposed to Section VI of Article S22 in EUR/13/108 to 123 for the earth station off-axis power limits, the fact that non-GSO systems cannot claim protection from GSO systems is inherent in the concept of limits as enabled by Article S22.

To satisfy agenda item 1.13.1, great care must be exercised to preserve the balance established by WRC-97 decisions in order to avoid undue constraints on the systems involved in the sharing situations covered by Resolutions 130 (WRC-97) and 538 (WRC-97). As shown hereafter, this balance was established by WRC-97 in linking various provisions contained in these resolutions, in Section VI of Article S22 and in the relevant footnotes of Article S5. The European common proposals relating with these three areas (respectively in Parts 3B, 3E and 3I of these proposals) are intended to preserve this balance, which is critical in satisfying agenda item 1.13.1.

Resolution 130 (WRC-97)

Considering further h) of Resolution 130 (WRC-97) states "that non-GSO FSS systems have been proposed in some of these bands which could meet these limits and would not require specific protection from existing and future GSO FSS systems, provided that minimum constraints are applied to GSO FSS systems, such as off-axis earth station e.i.r.p. limits;"

Based on this consideration, WRC-97 resolved:

- in *resolves* 6 of the same Resolution, "that, as of 22 November 1997, in the frequency bands specified in No. **S22.29** and Tables 1 and 2 of Annex 1 to this Resolution, non-GSO systems shall not claim protection from GSO networks in the FSS operating in accordance with the Radio Regulations"…
- in *resolves* 5 of the same Resolution: "that, as of the end of WRC-99, in the frequency bands specified in No. **S22.29** and § 2.4 of Annex 1 to this Resolution, GSO FSS systems for which complete coordination information has been received by the Bureau after the end of WRC-99 shall be subject to the limits in Article **S22** and in § 2.1, 2.2 and 2.3 of Annex 1 to this Resolution, as revised, if appropriate, by WRC-99;"

Section VI of Article S22

The suspension of the limits mentioned in the current S22.29 (Section VI of Article S22) is consistent with the review foreseen in *resolves* 5, and with the fact that the final limits for GSO earth stations were intended to apply only after the end of WRC-99 (now WRC-2000).

Consistent with WRC-97 decisions, and along with Option 2 of Annex 7 of Chapter 3 of the CPM Report, Europe proposes (EUR/13/108 to 123) to update Section VI of Article S22 (earth station off-axis e.i.r.p. density limits), taking into account the results of the ITU-R studies, and the need for relaxed values for these limits, compared with the ones included in the corresponding ITU-R recommendations. This proposal only addresses limits for GSO earth stations. Further studies are required on the applicability of such limits to earth stations within non-GSO systems.

Footnotes to Article S5

Europe also proposes not to reflect *resolves 6* of Resolution 130 (WRC-97) in the revised RR, since specifying hard limits implies, from a regulatory point of view, that as long as these limits are met by GSO systems (i.e. as long as GSO systems are operated in accordance with the RR), non-GSO systems cannot claim protection from them. This interpretation was recently confirmed by the RRB upon a request from one administration relating to a similar situation in the 13.75-14 GHz band.

Conclusion

From the above, it appears that there are only two ways of fulfilling the decisions of WRC-97 in this respect:

- maintain Section VI mandatory application and deleting the current *resolves* 6 of Resolution 130 (WRC-97). In this case, the existence of hard limits means that non-GSO systems cannot claim protection from GSO systems meeting these limits.
- suppress Section VI of Article S22, or make it non-mandatory, and deleting the current *resolves* 6 of Resolution 130 (WRC-97). In this case, the absence of hard limits means that non-GSOs can claim protection from GSOs. Otherwise, it would mean that non-GSO systems have to accept unlimited interference from GSOs.

An hybrid decision, e.g. suppressing Section VI of Article S22, or, which is equivalent from a regulatory point of view, making its application non-mandatory, while retaining a regulatory provision reflecting the current *resolves* 6 of Resolution 130 (WRC-97), would clearly be in contradiction with WRC-97 decisions.

It should be noted that the inclusion in Section VI of Article S22 of mandatory limits does not imply that BR will request verification of the compliance of GSO earth stations with the limits of Section VI of Article S22. Simply, in case of harmful interference into a non-GSO system, the provisions of Article S15 apply and the earth station may have to reduce its e.i.r.p. if it is demonstrated that it is exceeding these limits.

It should also be noted that, if the current drafting of *resolves* 6 of Resolution 130 (WRC-97) was reflected in the Radio Regulations, the current RRB interpretation of S5.43 may be understood as downgrading non-GSO FSS to less than a secondary status, which is obviously not in line with WRC-97 decisions.

Proposals submitted by the following administrations

Germany, Austria, Bosnia and Herzegovina, Croatia, Denmark, Spain, Estonia, Finland, France, Ireland, Iceland, Liechtenstein, Norway, Netherlands, Portugal, San Marino, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 3F

Agenda item 1.13 - Proposed modifications to Articles S9 and S11

Add the following proposals at the end of Part 3F in Addendum 3 to Document WRC2000/13.

1 Framework

Among other studies, Resolutions 130 (WRC-97) and 538 (WRC-97) request ITU-R "to conduct, as a matter of urgency, and complete, in time for consideration by WRC-99, the studies relating to the sharing criteria to be applied for determining the need for coordination between non-GSO FSS systems and the need for coordination between terrestrial services and non-GSO systems in the FSS, with a view to promoting efficient use of spectrum/orbit resources and equitable access to these resources by all countries."

In response to the first of these requests, ITU-R has developed detailed methodologies which are now part of agreed Recommendations in order to specify the level of permissible interference into non-GSO FSS systems. Based on these recommendations, ITU-R is currently developing methodologies to be used under coordination involving non-GSO FSS systems. Although these methodologies are not at this time been fully developed, they are now expected to become part of an ITU-R recommendation within the next study period and will be used in detailed coordinations relating to this sharing situation.

In response to the second request, ITU-R has developed methodologies which are now included in Recommendation [Doc. 1/1004], relating to the coordination area of non-GSO FSS earth stations.

The existence of such Recommendations will help in resolving a long standing lack of harmonization in the provisions of Article S11, which results in a situation where the coexistence between GSO and non-GSO systems and between non-GSO earth stations and terrestrial stations may lead to arbitrary blockage of the recording process by a previous user of the frequency band.

As highlighted in section 7.5.2.7 of the CPM Report, in the cases where the coordination of an assignment under S9.7, S9.17, S9.17A and S9.18 could not be concluded successfully, Article S11 foresees a two-step approach to record this assignment in the Master Register:

- in the first step, the Bureau conducts an examination of the probability of harmful interference (S11.32A for S9.7 and S11.33 for S9.17, S9.17A and S9.18). If this examination is favourable, the assignment is recorded;

- in the second step, should the examination under the first step be unfavourable, the assignment may be resubmitted and recorded if the Bureau is informed that it has been in use, together with the assignment which was the basis for the unfavourable finding, for at least four months without any complaint of harmful interference being made (S11.41). After this second step, the assignment remains under the Damocles of S11.42, i.e. any harmful interference has to be ceased if it occurs into the assignments which was the basis of the unfavourable finding.

This approach, which follows the pattern previously used under Articles 11 and 13 since 1971, ensures that an administration cannot block the recording process, hence the establishment of the rights of other administrations, for undue reasons.

This two-step approach does not exist in the case where coordination under the other entry points in Article S9 could not be successfully concluded. In particular, the entry points corresponding to Resolution 46 (S9.12 to S9.16) are not covered by these provisions. This means that in case of disagreement in the coordination process under any S9.12 to S9.16, recording in the Master Register is not possible.

This is of particular concern in the case of S9.12 and S9.13 (coordination between non-GSO and GSO satellite systems) because the coordination is triggered by bandwidth overlap only, and no coordination threshold or method currently exists in these cases. This means that disagreeing to a coordination request, without any technical reason, is sufficient to prevent the access to frequencies of subsequent satellite systems (GSO or non-GSO), even if in practice no interference would occur.

Given that recommendations also exist on coordination methods relating to S9.14 (e.g. the application of the system specific methodology described in Recommendation ITU-R IS.1143 (see Annex 1 to Appendix S5)) and are under development in relation to S9.11, the proposed modifications to S11 should also include a reference to these provisions.

2 Proposal

It is therefore proposed to harmonize the ways in which recording is conducted under Article S11. To this effect, it would be sufficient to modify S11.32A and S11.33 as follows:

MOD EUR/13/335

S11.32A *c)* with respect to the probability of harmful interference that may be caused to or by assignments recorded with a favourable finding under Nos. **S11.36** and **S11.37** or **S11.38**, or recorded in application of No. **S11.41**, or published under Nos. **S9.38** or **S9.58** but not yet notified, as appropriate, for those cases for which the notifying administration states that the procedure for coordination under Nos. **S9.7**, **S9.7A**, **S9.7B**, **S9.11**, **S9.12**, **S9.13** or **S9.14** could not be successfully completed (see also No. **S9.65**);[10] or

MOD EUR/13/336

S11.33 *d)* with respect to the probability of harmful interference that may be caused to or by other assignments recorded with a favourable finding in application of Nos. **S11.36** and **S11.37** or **S11.38** or in application of No. **S11.41**, as appropriate, for those cases for which the notifying administration states that the procedure for coordination or prior agreement under Nos. **S9.15**[11], **S9.16**[11], **S9.17**[11], **S9.17A** or **S9.18**[11] could not be successfully completed (see also No. **S9.65**);[12] or

MOD EUR/13/337

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10 **S11.32A.1** The examination of such notices with respect to any other frequency assignment for which a request for coordination under Nos. **S9.7**, **S9.7A**, **S9.7B**, **S9.12** or **S9.13** as appropriate, has been published under No. **S9.38** but not yet notified shall be effected by the Bureau in the order of their publication under the same number using the most recent information available.

MOD EUR/13/338

S11.35 ~~Not used.~~In cases where the Bureau is not in a position to conduct the examination under **S11.32A** (**S11.33**), the Bureau shall immediately inform the notifying administration, which may then resubmit its notice under **S11.41**, under the assumption that the finding under **S11.32A** (**S11.33**) is unfavourable.

NOTE **-** These proposals also reflect proposals EUR/13/129 and 130.

Proposals submitted by the following administrations

Germany, Austria, Bosnia and Herzegovina, Croatia, Denmark, Spain, Estonia, Finland, France, Ireland, Iceland, Italy, Liechtenstein, Norway, Netherlands, Portugal, San Marino, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 3J

Agenda item 1.13 - Proposed modifications to Articles S15 and S13

Procedure in a case of unacceptable interference

1 Introduction

Article S15 of the Radio Regulations contains the various provisions dealing with interferences. Section VI of this article contains specific provisions applicable in case of harmful interference (see S1.169). At present, there is no provision applicable in case of unacceptable interference. Unacceptable interference corresponds to levels of interference which are in excess of permissible interference (see S1.167) and shall be reduced to the levels of permissible interference or to a higher level that is acceptable to the affected administration: acceptable interference (see S1.169).

During the preparation of WRC-2000, several attempts have been made to build new procedures from scratch to cover this case in the very specific case of non-GSO FSS systems vs GSO systems in certain bands where power limits have been established. While fully recognizing the benefits of developing such procedures, it is considered more appropriate to:

- develop a generic procedure, based on the existing, well thought and experience proven provisions, which relate to cases of harmful interference. This avoids both to re-invent what already exists in the Radio Regulations, and to put on non-GSO systems more constraints that was considered until now as adequate for S4.4 operations;
- to insert the new procedure as a new Section VII of Article S15, as another case of an infraction to the Radio Regulations;
- to strengthen the current provisions contained in Section I of Article S13, so that some burden is placed on the interfering administration in case of no action.

The following presents proposals for a new Section VII of Article S15, compared in a tabular form the existing Section VI of Article S15, as well as proposed modifications to Section I of Article S13 and to Appendix S10.

2 Proposals

2.1 New Section VII of Article S15

ADD EUR/13/339

Section VII – Procedure in a case of unacceptable interference[2]

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[2] Unacceptable interference corresponds to levels in excess of:

a) the power and power flux-density limits in Article **S21**; or

b) the off-axis power density limits and aggregate/equivalent power flux-density limits in Article **S22**; or

c) the mandatory power and power flux-density limits specified in footnotes of Article **S5**; or

d) the aggregate equivalent power flux-density levels specified in Resolution **WWW** (WRC-2000); or

e) the levels previously agreed between administrations, as appropriate.

ADD EUR/13/340

S15.47 It is essential that Member States ‡ exercise the utmost goodwill and mutual assistance in the application of the provisions of this section to the settlement of problems of unacceptable interference.

ADD EUR/13/341

S15.48 In the settlement of these problems, due consideration shall be given to all factors involved, including the relevant technical and operating factors, such as: adjustment of frequencies, characteristics of transmitting and receiving antennas, time sharing, change of channels within multichannel transmissions.

ADD EUR/13/342

S15.49 For the purpose of this section, the term “administration” may include the centralizing office designated by the administration, in accordance with No. **S16.3**.

ADD EUR/13/343

S15.50 Administrations shall cooperate in the detection and elimination of unacceptable interference, employing where appropriate the facilities described in Article **S16** and the procedures detailed in this section.

ADD EUR/13/344

S15.51 Where practicable, and subject to agreement by administrations concerned, the case of unacceptable interference may be dealt with directly by their specially designated monitoring stations or by direct coordination between their operating organizations.

ADD EUR/13/345

S15.52 Full particulars relating to unacceptable interference shall, whenever possible, be given in the form indicated in Appendix **S10**.

ADD EUR/13/346

S15.53 In cases of unacceptable interference where rapid action is required, communications between administrations shall be transmitted by the quickest means available and, subject to prior authorization by the administrations concerned in such cases, information may be exchanged directly between specially designated stations of the international monitoring system.

ADD EUR/13/347

S15.54 When a case of such unacceptable interference is reported by a receiving station, it shall give to the transmitting station whose service is being interfered with all possible information which will assist in determining the source and characteristics of the interference.

ADD EUR/13/348

S15.55 If a case of unacceptable interference so justifies, the administration having jurisdiction over the receiving station experiencing the interference shall inform the administration having jurisdiction over the transmitting station whose service is being interfered with, giving all possible information.

ADD EUR/13/349

S15.56 If further observations and measurements are necessary to determine the source and characteristics of and to establish the responsibility for the unacceptable interference, the administration having jurisdiction over the transmitting station whose service is being interfered with may seek the cooperation of other administrations, particularly of the administration having jurisdiction over the receiving station experiencing the interference, or of other organizations.

ADD EUR/13/350

S15.57 When cases of unacceptable interference occur as a result of emissions from space stations, the administrations having jurisdiction over these interfering stations shall, upon request from the administration having jurisdiction over the station experiencing the interference, furnish current ephemeral data necessary to allow determination of the positions of the space stations when not otherwise known.

ADD EUR/13/351

S15.58 Having determined the source and characteristics of the unacceptable interference, the administration having jurisdiction over the transmitting station whose service is being interfered with shall inform the administrations having jurisdiction over the interfering stations, giving all useful information in order that these administrations may take such steps as may be necessary to reduce the interference at the permissible level of interference or at a higher level that is acceptable to the administration having jurisdiction over the transmitting station whose service is being interfered with.

ADD EUR/13/352

S15.59 On being informed that a station over which it has jurisdiction is believed to have been the cause of unacceptable interference, an administration shall, as soon as possible, acknowledge receipt of that information by telegram. Such acknowledgement shall not constitute an acceptance of responsibility.

ADD EUR/13/353

S15.60 Subject to the prior approval of the administration having jurisdiction over the transmitting station whose service is being interfered with, the administration having jurisdiction over the receiving station experiencing the interference may also approach directly the administrations having jurisdiction over the interfering stations.

ADD EUR/13/354

S15.61 When the service rendered by an earth station suffers unacceptable interference, the administration having jurisdiction over the receiving station experiencing such interference may also approach directly the administrations having jurisdiction over the interfering station.

ADD EUR/13/355

S15.62 If the unacceptable interference persists in spite of the action taken in accordance with the procedures outlined above, the administration having jurisdiction over the transmitting station whose service is being interfered with may address to the administrations having jurisdiction over the interfering station a report of irregularity or infraction in accordance with the provisions of Section V.

ADD EUR/13/356

S15.63 If there is a specialized international organization for a particular service, reports of irregularities and of infractions relating to unacceptable interference caused or suffered by stations in this service may be addressed to such organization at the same time as to the administration concerned.

ADD EUR/13/357

S15.64 1) If it is considered necessary, and particularly if the steps taken in accordance with the procedures described above have not produced satisfactory results, the administration concerned shall forward details of the case to the Bureau for its information.

ADD EUR/13/358

S15.65 2) In such a case, the administration concerned may also request the Bureau to act in accordance with the provisions of Section I of Article **S13**; but it shall then supply the Bureau with the full facts of the case, including all the technical and operational details and copies of the correspondence.

ADD EUR/13/359

S15.66 1) In the case where an administration has difficulty in identifying a source of unacceptable interference in the HF bands and urgently wishes to seek the assistance of the Bureau, it shall promptly inform the Bureau.

ADD EUR/13/360

S15.67 2) On receipt of this information, the Bureau shall immediately request the cooperation of appropriate administrations or specially designated stations of the international monitoring system that may be able to help in identifying the source of unacceptable interference.

ADD EUR/13/ 361

S15.68 3) The Bureau shall consolidate all reports received in response to requests under No. **S15.67** and, using such other information as it has available, shall promptly attempt to identify the source of unacceptable interference.

ADD EUR/13/362

S15.69 4) The Bureau shall thereafter forward its conclusions and recommendations to the administration reporting the case of unacceptable interference. These shall also be forwarded to the administrations believed to be responsible for the source of unacceptable interference, together with a request for prompt action.

NOTE **-** The following table provides a detailed justification for the proposed new provisions, by comparison with the current provisions in Section VI of Article **S15**.

Section VI – Procedure in a case of harmful interference	**Section VII – Procedure in a case of ~~harmful~~ unacceptable interference[2]**	**Comments**
S15.22 § 14 It is essential that Member States ‡ exercise the utmost goodwill and mutual assistance in the application of the provisions of Article 45 of the Constitution and of this Section to the settlement of problems of harmful interference.	**S15.47~~22~~** ~~§ 14~~ It is essential that Member States ‡ exercise the utmost goodwill and mutual assistance in the application of the provisions ~~of Article 45 of the Constitution and~~ of this Section to the settlement of problems of ~~harmful~~ unacceptable interference.	**Article 45 of the Constitution covers only harmful interference**
S15.23 § 15 In the settlement of these problems, due consideration shall be given to all factors involved, including the relevant technical and operating factors, such as: adjustment of frequencies, characteristics of transmitting and receiving antennae, time sharing, change of channels within multichannel transmissions.	**S15.48~~23~~** ~~§ 15~~ In the settlement of these problems, due consideration shall be given to all factors involved, including the relevant technical and operating factors, such as: adjustment of frequencies, characteristics of transmitting and receiving antennae, time sharing, change of channels within multichannel transmissions.	**Editorial**

[2] Unacceptable interference corresponds to levels in excess of:

a) the power and power flux-density limits in Article **S21**; or

b) the off-axis power density limits and aggregate/equivalent power flux-density limits in Article **S22**; or

c) the mandatory power and power flux-density limits specified in footnotes of Article **S5**; or

d) the aggregate equivalent power flux-density levels specified in Resolution **WWW** (WRC-2000); or

e) the levels previously agreed between administrations, as appropriate.

S15.24 § 16 For the purpose of this Section, the term “administration” may include the centralizing office designated by the administration, in accordance with No. **S16.3**.	**S15.49~~24~~** ~~§ 16~~ For the purpose of this Section, the term “administration” may include the centralizing office designated by the administration, in accordance with No. **S16.3**.	**Editorial**

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S15.25 § 17 Administrations shall cooperate in the detection and elimination of harmful interference, employing where appropriate the facilities described in Article **S16** and the procedures detailed in this Section.	**S15.**<u>**50**</u>~~**25**~~ ~~§ 17~~ Administrations shall cooperate in the detection and elimination of ~~harmful~~ <u>unacceptable</u> interference, employing where appropriate the facilities described in Article **S16** and the procedures detailed in this Section.	**Editorial**
S15.26 § 18 Where practicable, and subject to agreement by administrations concerned, the case of harmful interference may be dealt with directly by their specially designated monitoring stations or by direct coordination between their operating organizations.	**S15.**<u>**51**</u>~~**26**~~ ~~§ 18~~ Where practicable, and subject to agreement by administrations concerned, the case of ~~harmful~~ <u>unacceptable</u> interference may be dealt with directly by their specially designated monitoring stations or by direct coordination between their operating organizations.	**Editorial**
S15.27 § 19 Full particulars relating to harmful interference shall, whenever possible, be given in the form indicated in Appendix **S10**.	**S15.**<u>**52**</u>~~**27**~~ ~~§ 19~~ Full particulars relating to ~~harmful~~ <u>unacceptable</u> interference shall, whenever possible, be given in the form indicated in Appendix **S10**.	**Editorial** **The existing form can be used.**
S15.28 § 20 Recognizing that transmissions on the distress and safety frequencies (see Article **S31** and Appendix **S13**) require absolute international protection and that the elimination of harmful interference to such transmissions is imperative, administrations undertake to act immediately when their attention is drawn to any such harmful interference.	~~**S15.28** § 20 Recognizing that transmissions on the distress and safety frequencies (see Article **S31** and Appendix **S13**) require absolute international protection and that the elimination of harmful interference to such transmissions is imperative, administrations undertake to act immediately when their attention is drawn to any such harmful interference.~~	**It is proposed to consider that any excess of interference to transmissions on the distress and safety frequencies as harmful interference.**
S15.29 § 21 In cases of harmful interference where rapid action is required, communications between administrations shall be transmitted by the quickest means available and, subject to prior authorization by the administrations concerned in such cases, information may be exchanged directly between specially designated stations of the international monitoring system.	**S15.**<u>**53**</u>~~**29**~~ ~~§ 21~~ In cases of ~~harmful~~ <u>unacceptable</u> interference where rapid action is required, communications between administrations shall be transmitted by the quickest means available and, subject to prior authorization by the administrations concerned in such cases, information may be exchanged directly between specially designated stations of the international monitoring system.	**Editorial**

S15.30 § 22 When a case of such harmful interference is reported by a receiving station, it shall give to the transmitting station whose service is being interfered with all possible information which will assist in determining the source and characteristics of the interference.	**S15.54~~30~~** ~~§ 22~~ When a case of such ~~harmful~~ unacceptable interference is reported by a receiving station, it shall give to the transmitting station whose service is being interfered with all possible information which will assist in determining the source and characteristics of the interference.	**Editorial**
S15.31 § 23 If a case of harmful interference so justifies, the administration having jurisdiction over the receiving station experiencing the interference shall inform the administration having jurisdiction over the transmitting station whose service is being interfered with, giving all possible information.	**S15.55~~31~~** ~~§ 23~~ If a case of ~~harmful~~ unacceptable interference so justifies, the administration having jurisdiction over the receiving station experiencing the interference shall inform the administration having jurisdiction over the transmitting station whose service is being interfered with, giving all possible information.	**Editorial**
S15.32 § 24 If further observations and measurements are necessary to determine the source and characteristics of and to establish the responsibility for the harmful interference, the administration having jurisdiction over the transmitting station whose service is being interfered with may seek the cooperation of other administrations, particularly of the administration having jurisdiction over the receiving station experiencing the interference, or of other organizations.	**S15.56~~32~~** ~~§ 24~~ If further observations and measurements are necessary to determine the source and characteristics of and to establish the responsibility for the ~~harmful~~ unacceptable interference, the administration having jurisdiction over the transmitting station whose service is being interfered with may seek the cooperation of other administrations, particularly of the administration having jurisdiction over the receiving station experiencing the interference, or of other organizations.	**Editorial**
S15.33 § 25 When cases of harmful interference occur as a result of emissions from space stations, the administrations having jurisdiction over these interfering stations shall, upon request from the administration having jurisdiction over the station experiencing the interference, furnish current ephemeral data necessary to allow determination of the positions of the space stations when not otherwise known.	**S15.57~~33~~** ~~§ 25~~ When cases of ~~harmful~~ unacceptable interference occur as a result of emissions from space stations, the administrations having jurisdiction over these interfering stations shall, upon request from the administration having jurisdiction over the station experiencing the interference, furnish current ephemeral data necessary to allow determination of the positions of the space stations when not otherwise known.	**Editorial**

S15.34 § 26 Having determined the source and characteristics of the harmful interference, the administration having jurisdiction over the transmitting station whose service is being interfered with shall inform the administration having jurisdiction over the interfering station, giving all useful information in order that this administration may take such steps as may be necessary to eliminate the interference.	**S15.58~~34~~** ~~§ 26~~ Having determined the source and characteristics of the ~~harmful~~ unacceptable interference, the administration having jurisdiction over the transmitting station whose service is being interfered with shall inform the administrations having jurisdiction over the interfering stations, giving all useful information in order that ~~this~~ these administrations may take such steps as may be necessary to ~~eliminate~~ reduce the interference at the permissible level of interference or at a higher level that is acceptable to the administration having jurisdiction over the transmitting station whose service is being interfered with.	**Editorial** **Covers the case of single-entry or aggregate interference, by adding a "s" to administration.**
S15.35 § 27 On being informed that a station over which it has jurisdiction is believed to have been the cause of harmful interference, an administration shall, as soon as possible, acknowledge receipt of that information by telegram. Such acknowledgement shall not constitute an acceptance of responsibility.	**S15.59~~35~~** ~~§ 27~~ On being informed that a station over which it has jurisdiction is believed to have been the cause of ~~harmful~~ unacceptable interference, an administration shall, as soon as possible, acknowledge receipt of that information by telegram. Such acknowledgement shall not constitute an acceptance of responsibility.	**Editorial**
S15.36 § 28 When a safety service suffers harmful interference the administration having jurisdiction over the receiving station experiencing the interference may also approach directly the administration having jurisdiction over the interfering station. The same procedure may also be followed in other cases with the prior approval of the administration having jurisdiction over the transmitting station whose service is being interfered with.	**S15.60~~36~~** ~~§ 28 When a safety service suffers harmful interference the administration having jurisdiction over the receiving station experiencing the interference may also approach directly the administration having jurisdiction over the interfering station. The same procedure may also be followed in other cases with~~Subject to the prior approval of the administration having jurisdiction over the transmitting station whose service is being interfered with, the administration having jurisdiction over the receiving station experiencing the interference may also approach directly the administrations having jurisdiction over the interfering stations.	**Make it more general. Furthermore, interference to safety services are viewed as harmful interference.**

S15.37 § 29 An administration receiving a communication to the effect that one of its stations is causing harmful interference to a safety service shall promptly investigate the matter and take any necessary remedial action.	~~**S15.37** § 29 An administration receiving a communication to the effect that one of its stations is causing harmful interference to a safety service shall promptly investigate the matter and take any necessary remedial action.~~	**Not relevant as it is proposed to consider that any excess of interference to transmissions on the distress and safety frequencies as harmful interference.**
S15.38 § 30 When the service rendered by an earth station suffers harmful interference, the administration having jurisdiction over the receiving station experiencing such interference may also approach directly the administration having jurisdiction over the interfering station.	**S15.61~~38~~** ~~§ 30~~ When the service rendered by an earth station suffers ~~harmful~~ unacceptable interference, the administration having jurisdiction over the receiving station experiencing such interference may also approach directly the administrations having jurisdiction over the interfering station.	**Editorial** **Covers the case of single-entry or aggregate interference (see Resolution WWW (WRC-2000)), by adding a "s" to administration.**
S15.39 § 31 If the harmful interference persists in spite of the action taken in accordance with the procedures outlined above, the administration having jurisdiction over the transmitting station whose service is being interfered with may address to the administration having jurisdiction over the interfering station a report of irregularity or infraction in accordance with the provisions of Section V.	**S15.62~~39~~** ~~§ 31~~ If the ~~harmful~~ unacceptable interference persists in spite of the action taken in accordance with the procedures outlined above, the administration having jurisdiction over the transmitting station whose service is being interfered with may address to the administrations having jurisdiction over the interfering station a report of irregularity or infraction in accordance with the provisions of Section V.	**Editorial** **NOTE - S15.21 applies. It indicates that** if an administration has information of an infringement of the Convention or Radio Regulations, committed by a station over which it may exercise authority, it shall ascertain the facts, fix the responsibility and take the necessary action.
S15.40 § 32 If there is a specialized international organization for a particular service, reports of irregularities and of infractions relating to harmful interference caused or suffered by stations in this service may be addressed to such organization at the same time as to the administration concerned.	**S15.63~~40~~** ~~§ 32~~ If there is a specialized international organization for a particular service, reports of irregularities and of infractions relating to ~~harmful~~ unacceptable interference caused or suffered by stations in this service may be addressed to such organization at the same time as to the administration concerned.	**Editorial**

S15.41 § 33 1) If it is considered necessary, and particularly if the steps taken in accordance with the procedures described above have not produced satisfactory results, the administration concerned shall forward details of the case to the Bureau for its information.	**S15.64~~41~~** ~~§ 33~~ 1) If it is considered necessary, and particularly if the steps taken in accordance with the procedures described above have not produced satisfactory results, the administration concerned shall forward details of the case to the Bureau for its information.	**Editorial**
S15.42 2) In such a case, the administration concerned may also request the Bureau to act in accordance with the provisions of Section I of Article **S13**; but it shall then supply the Bureau with the full facts of the case, including all the technical and operational details and copies of the correspondence.	**S15.65~~42~~** 2) In such a case, the administration concerned may also request the Bureau to act in accordance with the provisions of Section I of Article **S13**; but it shall then supply the Bureau with the full facts of the case, including all the technical and operational details and copies of the correspondence.	**Editorial** **There is a need for a consequential editorial modification to S13.2 to cover the case of unacceptable interference.** **There is a need to strengthen the current wording of Section I, so that some burden is placed on the interfering administrations.**
S15.43 § 34 1) In the case where an administration has difficulty in identifying a source of harmful interference in the HF bands and urgently wishes to seek the assistance of the Bureau, it shall promptly inform the Bureau.	**S15.66~~43~~** ~~§ 34~~ 1) In the case where an administration has difficulty in identifying a source of ~~harmful~~ unacceptable interference in the HF bands and urgently wishes to seek the assistance of the Bureau, it shall promptly inform the Bureau.	**Editorial** **Specific to HF. It may not be relevant in case of unacceptable interference.**
S15.44 2) On receipt of this information, the Bureau shall immediately request the cooperation of appropriate administrations or specially designated stations of the international monitoring system that may be able to help in identifying the source of harmful interference.	**S15.67~~44~~** 2) On receipt of this information, the Bureau shall immediately request the cooperation of appropriate administrations or specially designated stations of the international monitoring system that may be able to help in identifying the source of ~~harmful~~ unacceptable interference.	**Editorial** **Specific to HF. It may not be relevant in case of unacceptable interference.**

S15.45 3) The Bureau shall consolidate all reports received in response to requests under No. **S15.44** and, using such other information as it has available, shall promptly attempt to identify the source of harmful interference.	**S15.68~~45~~** 3) The Bureau shall consolidate all reports received in response to requests under No. **S15.67~~44~~** and, using such other information as it has available, shall promptly attempt to identify the source of ~~harmful~~ unacceptable interference.	**Editorial** **Specific to HF. It may not be relevant in case of unacceptable interference.**
S15.46 4) The Bureau shall thereafter forward its conclusions and recommendations to the administration reporting the case of harmful interference. These shall also be forwarded to the administration believed to be responsible for the source of harmful interference, together with a request for prompt action.	**S15.69~~46~~** 4) The Bureau shall thereafter forward its conclusions and recommendations to the administration reporting the case of ~~harmful~~ unacceptable interference. These shall also be forwarded to the administrations believed to be responsible for the source of ~~harmful~~ unacceptable interference, together with a request for prompt action.	**Editorial** **Specific to HF. It may not be relevant in case of unacceptable interference.**

2.2 Modifications to Section I of Article S13

MOD EUR/13/363

S13.2 When an administration has difficulty in resolving a case of harmful interference or a case of unacceptable interference and seeks the assistance of the Bureau~~,~~: ~~the latter shall, as appropriate, help in identifying the source of the interference and seek the cooperation of the responsible administration in order to resolve the matter, and prepare a report for consideration by the Board, including draft recommendations to the administrations concerned.~~

ADD EUR/13/364

S13.2A the latter shall, as appropriate, help in identifying the source of the interference and seek the cooperation of the responsible administration as well as of other administrations, particularly of the administration having jurisdiction over the receiving station experiencing the interference, or of other organizations to do so;

ADD EUR/13/365

S13.2B having determined the source and characteristics of the interference, the Bureau shall inform the administrations having jurisdiction over the interfering stations, giving all useful information in order that these administrations may take such steps as may be necessary to eliminate the case of harmful, or unacceptable as appropriate, interference;

ADD EUR/13/366

S13.2C on being informed that a station over which it has jurisdiction is believed to have been the cause of harmful, or unacceptable as appropriate, interference, an administration shall, as soon as possible, acknowledge receipt of that information by telegram. Such acknowledgement shall not constitute an acceptance of responsibility;

ADD EUR/13/367

S13.2D the Bureau shall then publish in a special section to the Weekly Circular stating that the use of the frequency assignment(s) is subject to an unresolved complaint of harmful, or unacceptable as appropriate, interference;

ADD EUR/13/368

S13.2E if, within [one month] of the date of publication of the Weekly Circular under No. **S13.2D**, an administration which may exercise authority over the interfering station using a frequency assignment listed in the special section referred in No. **S13.2D**, has not taken the necessary actions, the following statement shall be entered, immediately or at the appropriate time, in the remark column of the MIFR for the above-mentioned frequency assignment: "this frequency assignment is subject of an unresolved complaint of harmful, or unacceptable as appropriate, interference with respect of the frequency assignment(s) [details on these frequency assignments]";

ADD EUR/13/369

S13.2F when an administration which may exercise authority over the interfering station using a frequency assignment listed in the special section referred in No. **S13.2D**, has taken the necessary actions after the application of No. **S13.2E**, the statement entered in the remark column of the MIFR for the above-mentioned frequency assignment shall be removed.

2.3 Modifications to Appendix S10

MOD EUR/13/370

APPENDIX S10

Report of harmful interference or of unacceptable interference

(See Article **S15**, Sections VI and VII)

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Corrigendum 1 to
Addendum 3 to
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

Proposals submitted by the following administrations

[Albania, Germany, Andorra, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Cyprus, Vatican, Croatia, Denmark, Spain, Estonia, Finland, France, Greece, Hungary, Ireland, Iceland, Italy, Latvia, The Former Yugoslav Republic of Macedonia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Monaco, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, San Marino, Slovenia, Sweden, Switzerland, Turkey, Ukraine]

PART 3D

Agenda item 1.13 - Proposed provisions for earth stations with very large antennas

Please replace proposal EUR/13/133 by the following. As anticipated, this issue has been successfully completed during the February 2000 meeting of ITU-R WP 4A, and a complete set of values agreed in relation to the $epfd_{down}$ levels that should be included in Appendix S5 as part of the coordination thresholds to be used for the protection of very large antennas under S9.7A and S9.7B. Europe supports the agreement reached at that meeting.

APPENDIX S5

ADD EUR/13/133

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.7A** GSO earth station/ non-GSO system	A specific earth station in a geostationary-satellite network in the fixed-satellite service in respect of a non-geostationary-satellite system in the fixed-satellite service	The following frequency bands: 10.7-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 17.8-18.6 GHz (space-to-Earth), and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) the frequency bands overlap; and ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations and meets all of the following conditions: a) Earth station antenna maximum isotropic gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; b) G/T_1 of 44 dB/K or higher; c) space station emission bandwidth of 250 MHz or higher for the frequency bands 10.7-12.75 GHz or 800 MHz or higher for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; iii) the $epfd_{down}$ from the satellite system using the non-geostationary orbit exceeds:	i) compare frequency bands; ii) use the maximum antenna gain of the specific receive earth station (Appendix **S4** C.10 *c)* 2)), the lowest equivalent satellite link noise temperature (Appendix **S4** C.10 *c)* 5)), and the space station emission bandwidth (Appendix **S4** C.7 *a)*) in the geostationary-satellite network as given in Appendix **S4** data; and iii) use the $epfd_{down}$ radiated by the non-GSO FSS system into the earth station employing the very large antenna when this antenna is pointed towards the wanted GSO satellite	The threshold/ condition for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit

			a) either –174.5 dB(W/(m^2 · 40 kHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude, or –202 dB(W/(m^2 · 40 kHz)) for any percentage of time for non-GSO systems with any satellites operating above 2 500 km altitude, in the frequency band 10.7-12.75 GHz; b) either –157 dB(W/(m^2 · MHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude, or –185 dB(W/(m^2 · MHz)) for any percentage of time for non-GSO systems with any satellites operating above 2 500 km altitude, in the frequency bands 17.8-18.6 GHz or 19.7-20.2 GHz		
No. **S9.7B** non-GSO system/ GSO earth station/	A non-geostationary-satellite system in the fixed-satellite service in respect of a specific earth station in a geostationary-satellite network in the fixed-satellite service.	The following frequency bands: 10.7-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 17.8-18.6 GHz (space-to-Earth), and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) the frequency bands overlap; and ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations and meets all of the following conditions: a) Earth station antenna maximum isotropic gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; b) G/T_1 of 44 dB/K or higher;	i) compare frequency bands; ii) use the maximum antenna gain of the specific receive earth station (Appendix **S4** C.10 *c)* 2)), the lowest equivalent satellite link noise temperature (Appendix **S4** C.10 *c)* 5)), and the space station emission bandwidth (Appendix S4 C.7 *a)*) in the geostationary-satellite network as given in Appendix **S4** data; and	The threshold/ condition for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit.

			c) space station emission bandwidth of 250 MHz or higher for the frequency bands 10.7-12.75 GHz or 800 MHz or higher for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; iii) the epfd_{down} from the satellite system using the non-geostationary orbit exceeds: a) either –174.5 dB(W/($m^2 \cdot$ 40 kHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude, or –202 dB(W/($m^2 \cdot$ 40 kHz)) for any percentage of time for non-GSO systems with any satellites operating above 2 500 km altitude, in the frequency band 10.7-12.75 GHz; b) either –157 dB(W/($m^2 \cdot$ MHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude, or –185 dB(W/($m^2 \cdot$ MHz)) for any percentage of time for non-GSO systems with any satellites operating above 2 500 km altitude, in the frequency bands 17.8-18.6 GHz or 19.7-20.2 GHz.	iii) use the epfd_{down} radiated by the non-GSO FSS system into the earth station employing the very large antenna when this antenna is pointed towards the wanted GSO satellite.	

Reasons: This is consequential to ADD **S9.7A** and **S9.7B**.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 3 to
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PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

PART 3

Agenda item 1.13 - Non-GSO FSS

CONTENTS

Introduction

The ITU-R studies have addressed the issue of the power limits for non-GSO FSS and came to clear conclusions with respect to the appropriate levels of these limits to ensure coexistence of the various systems and services allocated in the frequency bands covered by Resolutions 130 (WRC-97), 131 (WRC-97) and 538 (WRC-97).

Europe supports the conclusions of the CPM on this issue, and accordingly, propose the following to WRC-2000, regarding modifications to Articles S5, S9, S11, S21, S22, Appendices S4 and S5 and Resolutions 130 (WRC-97) and 538 (WRC-97). Resolution 131 (WRC-97) is proposed for suppression. Concerning several items where several possible options were identified by the CPM, the following proposals are made:

- Along with Option 2 of Annex 7 of Chapter 3 of the CPM Report, a proposal is made to update Section VI of Article S22 (earth station off-axis e.i.r.p. density limits), taking into account the results of the ITU-R studies, and the need for relaxed values for these limits, compared with the ones included in the corresponding ITU-R recommendations. Depending on the outcome of the ITU-R studies prior to WRC-2000 on the applicability of such limits to earth stations within non-GSO systems, this proposal may need to be updated.
- The proposals under Article S5 and Article S22 reflect the incorporation in these Articles of provisions currently appearing in Resolutions 130 (WRC-97) and 538 (WRC-97), and the suppression in these resolutions of transitional measures, which are no longer considered relevant after WRC-2000, as highlighted in Annex 5 of Chapter 3 of the CPM Report.
- Along with Option 2C of Section 2 of Annex 6 of Chapter 3 of the CPM Report, it is also proposed to exempt from the national or subregional restrictions appearing in S5.488 and S5.491 both GSO and non-GSO systems.
- Along with Section 3 of Annex 6 of Chapter 3 of the CPM Report, and in view of the results of the ITU-R studies reported in Section 3.2 of the CPM Report, it is proposed, in order to minimize the constraints on the development of the BSS in the 17.3-17.7 GHz band in Region 2, to restrict the use of non-GSO FSS uplinks in this band and Region to antennas of more than 4.5 metre in diameter. The $epfd_{up}$ limits proposed in this band and Region to protect BSS feeder links are the same as in the other Regions.

On the limits to enable coexistence between GSO FSS, non-GSO FSS, radiolocation, radionavigation and space research in the 13.75-14 GHz band, Europe proposes the suppression of the minimum e.i.r.p. limit of 68 dBW currently included in S5.502. It is also proposed that, in line with the information provided in Recommendation ITU-R S.1068, the e.i.r.p. density limit specified in S5.502 be extended to all directions of space. Europe also proposes the introduction in S5.503 of a maximum e.i.r.p. density limit for non-GSO earth stations operating in the band 13.772-13.778 GHz.

In addition, improvements are proposed to the CPM example text in four areas:

- As agreed within ITU-R, but not currently reflected in the CPM example text, the validation limits included in Tables S22-1A, S22-1B, S22-1C and S22-1D for a given GSO earth station antenna diameter should be specified as continuous curves, by straight line interpolation between the points corresponding to the same GSO earth station antenna, in the appropriate scale (linear scale for the epfd expressed in decibels and logarithmic scale for the percentage of time).

- The operational limit which applies for the protection of the 2.4 m BSS antennas in a part of Region 2 towards some orbital locations in the Region 2 BSS Plan is proposed to be moved to Table S22-4, and S22.5I (S22.5G in the CPM Report) is proposed to be slightly amended in order to give this limit a regulatory status.
- In the draft resolution relating to the limits on the aggregate interference from all non-GSO FSS systems, it should be made clear that these limits only apply for GSO orbital inclination of up to 2.5°, with a 3 dB relaxation for orbital inclinations between 2.5 and 4.5°.
- In the proposed modifications to Resolutions 130 (WRC-97) and 538 (WRC-97), the *requests the Radiocommunication Bureau* to review the findings previously made with respect to the compliance with the provisional limits are proposed to be suppressed, since, in the absence of a verification tool, the BR could not have been in a position to make such a finding.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 3A

Agenda item 1.13 - Proposed modifications to Article S21

Introduction

Resolution 131 (WRC-97) requested ITU-R to study the appropriate pfd values to be applied to non-geostationary networks in the 10.7-12.75 GHz and 17.7-19.3 GHz bands to ensure protection of the fixed service without unduly constraining the development of either type of network.

This proposal reflects the conclusions included in Annex 4 to Chapter 3 of the CPM Report.

MOD EUR/13/79

TABLE **S21-4** *(continued)*

Frequency band	**Service***	**Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane**			**Reference bandwidth**
		0°-5°	**5°-25°**	**25°-90°**	
10.7-11.7 GHz	Fixed-satellite (space-to-Earth) geostationary-satellite orbit	–150 ~~14~~	–150 + 0.5(δ – 5) ~~14~~	–140 ~~14~~	4 kHz
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	–126	–126 + 0.5(δ – 5)	–116	1 MHz
11.7-12.5 GHz (Region 1) 12.5-12.75 GHz (Region 1 countries listed in Nos. **S5.494** and **S5.496**) 11.7-12.~~2~~7 GHz (Region 2) 11.7-12.~~2~~75 GHz (Region 3) ~~12.2-12.7 GHz (Region 2)~~	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	~~–148 15~~ –124	~~–148 + 0.5(δ – 5) 15~~ –124 + 0.5(δ – 5)	~~–138 15~~ –114	~~4 kHz~~ 1 MHz

12.2-12.~~5~~75 GHz[7] (Region 3) 12.5-12.75 GHz[7] (Region 1 ~~and Region 3~~ countries listed in Nos. **S5.494** and **S5.496**)	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	–148 ~~14~~	–148 + 0.5(δ – 5) ~~14~~	–138 ~~14~~	4 kHz
15.43-15.63 GHz	Fixed-satellite (space-to-Earth)	–127	5°-20°: –127 20°-25°: –127 + 0.56(δ – 20)^2	25°-29°: –113 29°-31°: –136.9 + 25 log (δ – 20) 31°-90°: –111	1 MHz
17.7-19.3 GHz[7, 8]	Fixed-satellite (space-to-Earth) Meteorological-satellite (space-to-Earth)	–115[12bis] or ~~–125 12~~ –115 – X[12]	–115 + 0.5 (δ – 5)[12bis] or ~~–125 + (δ – 5) 12~~ –115 – X((10 + X)/20) (δ – 5)[12]	–105 or –105 [12]	1 MHz
19.3-19.7 GHz 22.55-23.55 GHz 24.45-24.75 GHz 25.25-27.5 GHz	Fixed-satellite (space-to-Earth) Earth exploration-satellite (space-to-Earth) Inter-satellite	–115	–115 + 0.5(δ – 5)	–105	1 MHz

MOD EUR/13/80

[12] **S21.16.6** ~~These values shall apply provisionally only to emissions of space stations on non-geostationary satellites in networks operating with a large number of satellites, that is systems operating with more than 100 satellites (see Resolution **131 (WRC-97)**).~~ The function X is defined as a function of the number, N, of satellites in the non-GSO FSS constellation as follows:

– for N ≤ 50 $X = 0$ (dB)

– for 50 < N ≤ 288 $X = \frac{5}{119}(N - 50)$ (dB)

– for N > 288 $X = \frac{1}{69}(N + 402)$ (dB)

In the band 18.8-19.3 GHz, these limits apply to emissions of a space station on a non-geostationary FSS satellite for which complete coordination or notification information, as appropriate, has been received by the Radiocommunication Bureau after 17 November 1995, and which was not operational by that date.

ADD EUR/13/81

[12bis] **S21.16.6*bis*** These limits apply to emissions of a space station on a meteorological-satellite and on a geostationary FSS satellite. These limits also apply to emissions of a space station on a non-geostationary FSS satellite in the bands 18.8-19.3 GHz for which complete coordination or notification information has been received by the Radiocommunication Bureau by 17 November 1995, or are in operation by that date.

Reasons: The above regulatory text reflects the date-specific provisions currently in Resolution 131 (WRC-97). It maintains the original limits for non-GSO FSS systems in the band 18.8-19.3 GHz that were notified or operational prior to the end of WRC-95 per the decision in Resolution 131 (WRC-97). In the band 17.7-18.8 GHz, the new limits would apply to all non-GSO systems irrespective of the date of receipt of information or date of bringing into operation.

NOC EUR/13/82

[13] **S21.16.7**

SUP EUR/13/83

[14] **S21.16.8**

SUP EUR/13/84

[15] **S21.16.9**

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 3B

Agenda item 1.13 - Proposed modifications to Article S22

Introduction

Resolution 130 (WRC-97) requested ITU-R to conduct, the appropriate technical, operational and regulatory studies to review the regulatory conditions relating to the coexistence of non-GSO and GSO systems in the FSS, in order to ensure that they do not impose undue constraints on the development of non-GSO and GSO FSS systems.

Resolution 538 (WRC-97) requested ITU-R to conduct the appropriate technical, operational and regulatory studies to review the regulatory provisions concerning the operation of non-GSO FSS systems in the frequency bands covered by Appendices S30 and S30A in order to ensure that these provisions ensure appropriate protection of the Plans and their future modifications and do not place unreasonable constraints on the development of non-GSO systems in these bands.

The above-mentioned administrations support the conclusions of the studies undertaken by the ITU-R in response to these two resolutions, as indicated in the CPM Report (Annex 1 to Chapter 3 and Option 2 of Annex 7 to Chapter 3). In order to reflect these conclusions, the following modifications are proposed to Article S22.

In addition, improvements are proposed to the CPM example text in two areas:

- As agreed within ITU-R, but not currently reflected in the CPM example text, the validation limits included in Tables S22-1A, S22-1B, S22-1C and S22-1D for a given GSO earth station antenna diameter should be specified as continuous curves, by straight line interpolation between the points corresponding to the same GSO earth station antenna, in the appropriate scale (linear scale for the epfd expressed in decibels and logarithmic scale for the percentage of time).
- The operational limit which applies for the protection of the 2.4 m BSS antennas in a part of Region 2 towards some orbital locations in the Region 2 BSS Plan is proposed to be moved to Table S22-4, and S22.5I (S22.5G in the CPM Report) is proposed to be slightly amended in order to give this limit a regulatory status.

ARTICLE S22

Space services[1]

Section II – Control of interference to geostationary-satellite systems

NOC EUR/13/85

S22.2 § 2 1) Non-geostationary-satellite systems shall not cause unacceptable interference to geostationary-satellite systems in the fixed-satellite service and the broadcasting-satellite service operating in accordance with these Regulations.

S22.3 2) Whenever the emissions from geostationary satellites in the inter-satellite service are directed towards space stations at distances from Earth greater than that of the geostationary-satellite orbit, the boresight of the antenna mainbeam of the geostationary satellite shall not be pointed within 15° of any point on the geostationary-satellite orbit.

S22.4 § 3 In the frequency band 29.95-30 GHz space stations in the earth exploration-satellite service on board geostationary satellites and operating with space stations in the same service on board non-geostationary satellites shall have the following restriction:

Whenever the emissions from the geostationary satellites are directed towards the geostationary-satellite orbit and cause unacceptable interference to any geostationary-satellite space system in the fixed-satellite service, these emissions shall be reduced to a level at or less than accepted interference.

S22.5 § 4 In the frequency band 8 025-8 400 MHz, which the Earth exploration-satellite service using non-geostationary satellites shares with the fixed-satellite service (Earth-to-space) or the meteorological-satellite service (Earth-to-space), the maximum power flux-density produced at the geostationary-satellite orbit by any Earth exploration-satellite service space station shall not exceed –174 dB(W/m^2) in any 4 kHz band.

S22.5A § 5 In the frequency band 6 700-7 075 MHz, the maximum aggregate power flux-density produced at the geostationary-satellite orbit and within ±5° of inclination around the geostationary-satellite orbit by a non-geostationary-satellite system in the fixed-satellite service shall not exceed –168 dB(W/m^2) in any 4 kHz band. The maximum aggregate power flux-density shall be calculated in accordance with Recommendation ITU-R S.1256.

SUP EUR/13/86

S22.5B

MOD EUR/13/87

S22.5C § ~~5~~6 1) The equivalent power flux-density[2], epfd$_{down}$ at any point on the Earth's surface visible from the geostationary-satellite orbit, produced by emissions from all the space stations of a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Tables **~~S22-1~~S22-1A** to **S22-1D**, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the limits given in Tables **~~S22-1~~** **S22-1A** to **S22-1D** for the given percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions, into a reference antenna and in the reference bandwidth specified in Tables **~~S22-1~~S22-1A** to **S22-1D**, for all pointing directions towards the geostationary-satellite orbit.

MOD EUR/13/87*bis*

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2 **S22.5C.1, D.1, F.1** The equivalent power flux-density is defined as the sum of the power flux-densities produced at a ~~point~~GSO receive station on the Earth's surface or in the geostationary orbit, as appropriate, by all ~~space~~the transmit stations within a non-geostationary-satellite system, taking into account the off-axis discrimination of a reference receiving antenna assumed to be pointing ~~towards the geostationary-satellite orbit~~in its nominal direction. The equivalent power flux-density is calculated using the following formula:

$$\cancel{epfd = 10 \cdot \log_{10} \left[\sum_{i=1}^{N_s} 10^{pfd_i/10} \cdot \frac{G_r(\theta_i)}{G_{max}} \right]}$$

$$epfd = 10 \cdot \log_{10} \left[\sum_{i=1}^{N_a} 10^{\frac{P_i}{10}} . \frac{G_t(\theta_i)}{4.\pi d_i^2} . \frac{G_r(\phi_i)}{G_{r,\max}} \right]$$

where:

~~N_s: number of non-geostationary space stations visible from the point considered at the Earth's surface, within an elevation angle greater than or equal to 0°;~~

~~i: index of the non-geostationary space station considered;~~

~~pfd_i: power flux-density produced at the point considered on the Earth's surface in dB(W/m^2) in the reference bandwidth;~~

~~θ_i: angle between the direction considered towards the geostationary-satellite orbit and the direction of the interfering space station in the non-geostationary-satellite system;~~

~~$G_r(\theta_i)$: gain (as a ratio) of the receive reference antenna to be considered as part of a geostationary-satellite network;~~

~~G_{max}: maximum gain (as a ratio) of the above receive reference antenna;~~

~~*epfd*: computed equivalent power flux-density in dB(W/m^2) in the reference bandwidth.~~

N_a: is the number of transmit stations in the non-geostationary-satellite system that are visible from the GSO receive station considered on the Earth's surface or in the geostationary orbit, as appropriate;

i: is the index of the transmit station considered in the non-geostationary-satellite system;

P_i: is the RF power at the input of the antenna of the transmit station, considered in the non-geostationary satellite system in dBW in the reference bandwidth;

θ_i: is the off-axis angle between the boresight of the transmit station considered in the non-geostationary satellite system and the direction of the GSO receive station;

$G_t(\theta_i)$: is the transmit antenna gain (as a ratio) of the station considered in the non-geostationary satellite system in the direction of the GSO receive station;

d_i: is the distance in metres between the transmit station considered in the non-geostationary satellite system and the GSO receive station;

ϕ_i: is the off-axis angle between the boresight of the antenna of the GSO receive station and the direction of the ith transmit station considered in the non-geostationary satellite system;

$G_r(\phi_i)$: is the receive antenna gain (as a ratio) of the GSO receive station in the direction of the ith transmit station considered in the non-geostationary satellite system;

$G_{r,max}$: is the maximum gain (as a ratio) of the antenna of the GSO receive station;

epfd: is the computed equivalent power flux-density in dB(W/m^2) in the reference bandwidth.

~~NOTE – Tables **S22-1** to **S22-4** and Nos. **S22.26** to **S22.29** contain provisional limits corresponding to an interference level caused by one non-geostationary fixed-satellite service system in the frequency bands to be applied in accordance with Resolutions **130 (WRC-97)** and **538 (WRC-97)**. These provisional limits are subject to review by ITU-R and are subject to confirmation by WRC-99.~~

SUP EUR/13/88

TABLE **S22-1**

ADD EUR/13/89

TABLE **S22-1A**[3, 5, 6]

Limits to the epfd$_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	epfd$_{down}$ dB(W/m^2)	Percentage of time during which epfd$_{down}$ level may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[4]
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3	–175.4 –174.0 –170.8 –165.3 –160.4 –160.0 –160.0	0 90 99 99.73 99.991 99.997 100	40	60 cm Recommendation ITU-R S.(4/57)
	–181.9 –178.4 –173.4 –173.0 –164.0 –161.6 –161.4 –160.8 –160.5 –160.0 –160.0	0 99.5 99.74 99.857 99.954 99.984 99.991 99.997 99.997 99.9993 100	40	1.2 m Recommendation ITU-R S.(4/57)
	–190.45 –189.45 –187.45 –182.4 –182 –168 –164 –162 –160 –160	0.00 90.00 99.50 99.70 99.855 99.971 99.988 99.995 99.999 100.000	40	3 m Recommendation ITU-R S.(4/57)
	–195.45 –195.45 –190.00 –190 –172.5 –160 –160	0.00 99.00 99.65 99.71 99.99 99.998 100.000	40	10 m Recommendation ITU-R S.(4/57)

3 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

4 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

5 In addition to the limits shown in this table, the epfd$_{down}$ limits in Table **S22-1A'** apply to all antenna sizes greater than 60 cm in the frequency bands listed in Table **S22-1A**.

TABLE **S22-1A'**

Limits to the epfd$_{down}$ radiated by non-GSO FSS systems at certain latitudes

100% of the time epfd$_{down}$ dB(W/(m^2 · 40 kHz))	**Latitude (North or South) (°)**
–160	0 < |Latitude| ≤ 57.5
–160 + 3.4(57.5 – |Latitude|)/4	57.5 < |Latitude| ≤ 63.75
–165.3	63.75 ≤ |Latitude|

[6] For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the epfd levels and logarithmic for the time percentages, with straight lines joining the data points.

ADD EUR/13/90

TABLE **S22-1B**[7, 9]

Limits to the epfd$_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**epfd$_{down}$ dB(W/m^2)**	**Percentage of time during which epfd$_{down}$ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference pattern**[8]
17.8-18.6	–164 –164 –167 –172.5 –175.4 –175.4	100 99.971 99.714 99 90 0	40	1 m Recommendation ITU-R S.(4/57)
	–150 –150 –153 –158.5 –161.4 –161.4	100 99.971 99.714 99 90 0	1 000	
17.8-18.6	–164 –164 –166 –170.5 –171.4 –178.4 –178.4	100 99.977 99.971 99.913 99.9 99.4 0	40	2 m Recommendation ITU-R S.(4/57)
	–150 –150 –152 –156.5 –157.4 –164.4 –164.4	100 99.977 99.971 99.913 99.9 99.4 0	1 000	

17.8-18.6	–164 –164 –172 –180 –180 –185.4 –185.4	100 99.998 99.943 99.943 99.8 99.8 0	40	5 m Recommendation ITU-R S.(4/57)
	–150 –150 –158 –166 –166 –171.4 –171.4	100 99.998 99.943 99.943 99.8 99.8 0	1 000	

7 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

8 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

9 For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the epfd levels and logarithmic for the time percentages, with straight lines joining the data points.

ADD EUR/13/91

TABLE **S22-1C**[10, 12]

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$epfd_{down}$ dB(W/m^2)	Percentage of time during which $epfd_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference pattern[11]
19.7-20.2	–154 –154 –172 –182 –187.4	100 99.983 97.143 71.429 0	40	70 cm Recommendation ITU-R S.(4/57)
	–140 –140 –158 –168 –173.4	100 99.983 97.143 71.429 0	1 000	
19.7-20.2	–154 –154 –160 –165 –168.6 –170.4 –181.4 –190.4	100 99.997 99.943 99.943 99.8 99.8 91 0	40	90 cm Recommendation ITU-R S.(4/57)

	–140 –140 –146 –151 –154.6 –156.4 –167.4 –176.4	100 99.997 99.943 99.943 99.8 99.8 91 0	1 000	
19.7-20.2	–154 –154 –162 –196.4	100 99.99943 99.98 0	40	2.5 m Recommendation ITU-R S.(4/57)
	–140 –140 –148 –182.4	100 99.99943 99.98 0	1 000	
	–154 –154 –154.6 –164.2 –175 –184 –187.8 –189.4 –200.4	100 99.9992 99.999 99.99 99.886 97.143 94 90 0	40	5 m Recommendation ITU-R S.(4/57)
	–140 –140 –140.6 –150.2 –161 –170 –173.8 –175.4 –186.4	100 99.9992 99.999 99.99 99.886 97.143 94 90 0	1 000	

[10] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[11] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

[12] For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the epfd levels and logarithmic for the time percentages, with straight lines joining the data points.

ADD EUR/13/92

TABLE **S22-1D**[13, 15]

Limits to the epfd$_{down}$ radiated by non-GSO FSS systems in certain frequency bands 30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm and 300 cm BSS antennas

Frequency band (GHz)	epfd$_{down}$ dB(W/m^2)	Percentage of time during which epfd$_{down}$ level may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[14]
11.7-12.5 GHz in Region 1 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3 12.2-12.7 GHz in Region 2	–165.841 –165.541 –164.041 –158.600 –158.600 –158.330 –158.330	0.000 25.000 96.000 98.857 99.429 99.429 100.000	40	30 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	–175.441 –172.441 –169.441 –164.000 –160.750 –160.000 –160.000	0.000 66.000 97.750 99.357 99.809 99.986 100.000	40	45 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	–176.441 –173.191 –167.750 –162.000 –161.000 –160.200 –160.000 –160.000	0.000 97.800 99.371 99.886 99.943 99.971 99.997 100.000	40	60 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]
	–178.94 –178.44 –176.44 –171.00 –165.50 –163.00 –161.00 –160.00 –160.00	0.000 33.000 98.000 99.429 99.714 99.857 99.943 99.991 100.000	40	90 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

11.7-12.5 GHz in Region 1 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3 12.2-12.7 GHz in Region 2	–182.440 –180.690 –179.190 –178.440 –174.940 –173.750 –173.000 –169.500 –167.800 –164.000 –161.900 –161.000 –160.400 –160.000	0.000 90.000 98.900 98.900 99.500 99.680 99.680 99.850 99.915 99.940 99.970 99.990 99.998 100	40	120 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	–184.941 –184.101 –181.691 –176.250 –163.250 –161.500 –160.350 –160.000 –160.000	0.000 33.000 98.500 99.571 99.946 99.974 99.993 99.999 100.000	40	180 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	–187.441 –186.341 –183.441 –178.000 –164.400 –161.900 –160.500 –160.000 –160.000	0.000 33.000 99.250 99.786 99.957 99.983 99.994 99.999 100.000	40	240 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	–191.941 –189.441 –185.941 –180.500 –173.000 –167.000 –162.000 –160.000 –160.000	0.000 33.000 99.500 99.857 99.914 99.951 99.983 99.991 100.000	40	300 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

[13] For BSS antenna diameters 180 cm, 240 cm and 300 cm, in addition to the single-entry limits shown in Table **S22-1D**, the following single-entry 100% of the time $epfd_{down}$ limits also apply in the frequency band listed in Table **S22-1D'**:

TABLE **S22-1D'**

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems at certain latitudes

100% of the time $epfd_{down}$ dB(W/(m^2 · 40 kHz))	**Latitude (North or South) (°)**
–160.0	0 ≤ |latitude| ≤ 57.5
–160.0 + 3.4 * (57.5 – |latitude|)/4	57.5 ≤ |latitude| ≤ 63.75
–165.3	63.75 ≤ |latitude|

[14] Under this Section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO BSS systems.

[15] For each reference antenna diameter, the limit consists of the complete curve on a plot which is linear in decibels for the epfd levels and logarithmic for the time percentages, with straight lines joining the data points.

MOD EUR/13/93

S22.5D 2) The ~~aggregate~~equivalent power flux-density~~[3]~~[2], $epfd_{up}$, produced at any point in the geostationary-satellite orbit by emissions from all the earth stations in a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Table **S22-2**, for all conditions and for all methods of modulation, shall not exceed the limits given in Table **S22-2** for the specified percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions, into a reference antenna and in the reference bandwidth specified in Table **S22-2**, for all pointing directions towards the Earth's surface visible from any given location in the geostationary-satellite orbit.

~~[3] **S22.5D.1** The aggregate power flux-density is defined as the sum of the power flux- densities produced at a point in the geostationary-satellite orbit by all the earth stations of a non-geostationary-satellite system. The aggregate power flux-density is computed by means of the following formula:~~

$$\cancel{apfd = 10 \cdot \log_{10}\left[\sum_{i=1}^{N_e} 10^{P_i/10} \cdot \frac{G_t(\theta_i)}{4 \pi d_i^2}\right]}$$

~~where:~~

~~N_e: number of earth stations in the non-geostationary-satellite system with an elevation angle greater than or equal to 0°, from which the point considered in the geostationary-satellite orbit is visible;~~

~~i: index of the earth station considered in the non-geostationary-satellite system;~~

~~P_i: RF power at the input of the transmitting antenna of the earth station considered in the non-geostationary-satellite system in dBW in the reference bandwidth;~~

~~θ_i: off-axis angle between the boresight of the earth station considered in the non-geostationary-satellite system and the direction of the point considered in the geostationary-satellite orbit;~~

~~$G_t(\theta_i)$: transmit antenna gain (as a ratio) of the earth station considered in the non-geostationary-satellite system in the direction of the point considered in the geostationary-satellite orbit;~~

~~d_i: distance in metres between the earth station considered in the non-geostationary-satellite system and the point considered in the geostationary-satellite orbit;~~

~~*apfd*: aggregate power flux-density in dB(W/m^2) in the reference bandwidth.~~

~~NOTE – Tables **S22-1** to **S22-4** and Nos. **S22.26** to **S22.29** contain provisional limits corresponding to an interference level caused by one non-geostationary fixed-satellite service system in the frequency bands to be applied in accordance with Resolutions **130 (WRC-97)** and **538 (WRC-97)**. These provisional limits are subject to review by ITU-R and are subject to confirmation by WRC-99.~~

MOD EUR/13/94

TABLE **S22-2**

~~**Frequency band (GHz)**~~	~~**Aggregate pfd dB(W/m²/4 kHz)**~~	~~**Percentage of time during which aggregate pfd level may not be exceeded**~~
~~17.3-18.1 in Regions 1 and 3 and 17.8-18.1 in Region 2~~	~~–163~~	~~100%~~

Limits to the $epfd_{up}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$epfd_{up}$ dB(W/m^2)**	**Percentage of time $epfd_{up}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna beamwidth and reference radiation pattern**[16]
12.50-12.75 12.75-13.25 13.75-14.5	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20[17]
17.3-18.1 *	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20[17]
27.5-28.6	–162	100	40	1.55 degrees Rec. ITU-R S.672, Ls = –10[17]
29.5-30.0	–162	100	40	1.55 degrees Rec. ITU-R S.672, Ls = –10[17]

16 Reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

17 For the case of Ls = –10, the values a = 1.83 and b = 6.32 should be used in the equations in Annex 1 of Recommendation ITU-R S.672 for single-feed circular beams. In all cases of Ls, the parabolic main beam equation should start at zero.

* This $epfd_{up}$ limit applies to the bands 17.3-18.1 GHz (Regions 1 and 3) and 17.8-18.1 GHz (Region 2). It is also applicable to the frequency band 17.3-17.8 GHz (Region 2), in order to protect BSS feeder links in Region 2 from non-GSO FSS uplinks in Regions 1 and 3.

NOTE - Part 3H of these proposals contains a proposal to modify this table under WRC-2000 agenda item 1.13.2.

SUP EUR/13/95

S22.5E

MOD EUR/13/96

S22.5F 4) The ~~aggregate~~equivalent power flux-density~~5~~2, $epfd_{is}$ produced at any point in the geostationary-satellite orbit by emissions from all the ~~earth~~space stations in a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Table **S22-3**, including emissions from a reflecting satellilte, for all conditions and for all methods of modulation, shall not exceed the limits given in Table **S22-4~~3~~** for ~~any~~the specified percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-

~~5 **S22.5F.1** See No. **S22.5D.1**.~~

space propagation conditions into ~~the~~a reference antenna and in the reference bandwidth specified in Table **S22-43**, for all pointing directions towards the Earth's surface visible from any given location in the geostationary orbit.

MOD EUR/13/97

TABLE **S22-3**

Limits to the epfd$_{is}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**epfd$_{is}$ dB(W/m^2)**	**Percentage of time epfd$_{is}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna beamwidth and reference radiation pattern[18]**
10.7-11.7 (Region 1) 12.5-12.75 (Region 1) 12.7-12.75 (Region 2)	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20
17.8-18.4	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20

[18] Under this section, this reference pattern is to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

~~PART A~~

~~**Frequency band (GHz)**~~	~~**Equivalent pfd dB(W/m^2)**~~	~~**Percentage of time during which equivalent pfd level may not be exceeded**~~	~~**Reference bandwidth (kHz)**~~	~~**Reference antenna diameter, and reference radiation pattern**~~
~~10.7-11.7; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3~~	~~–179~~	~~–99.7~~	~~4~~	~~60 cm, Rec. ITU-R S.465-5~~
	~~–192~~	~~–99.9~~	~~4~~	~~3 m, Rec. ITU-R S.465-5~~
	~~–186~~	~~–99.97~~	~~4~~	~~3 m, Rec. ITU-R S.465-5~~
	~~–195~~	~~–99.97~~	~~4~~	~~10 m, Rec. ITU-R S.465-5~~
	~~–170~~	~~–99.999~~	~~4~~	~~60 cm, Rec. ITU-R S.465-5~~
	~~–173~~	~~–99.999~~	~~4~~	~~3 m, Rec. ITU-R S.465-5~~
	~~–178~~	~~–99.999~~	~~4~~	~~10 m, Rec. ITU-R S.465-5~~
	~~–170~~	~~100~~	~~4~~	~~≥ 60 cm, Rec. ITU-R S.465-5~~

~~TABLE **S22-3**~~

~~PART B~~

~~**Frequency band (GHz)**~~	~~**Equivalent pfd dB(W/m²)**~~	~~**Percentage of time during which equivalent pfd level may not be exceeded**~~	~~**Reference bandwidth (kHz)**~~	~~**Reference antenna diameter, and reference radiation pattern**~~
~~17.8-18.6~~	~~–165~~ ~~–151~~	~~99.0~~	~~–40~~ ~~1 000~~	~~30 cm, Rec. ITU-R S.465-5~~
	~~–165~~ ~~–151~~	~~99.0~~	~~–40~~ ~~1 000~~	~~70 cm, Rec. ITU-R S.465-5~~
	~~–165~~ ~~–151~~	~~99.5~~	~~–40~~ ~~1 000~~	~~90 cm, Rec. ITU-R S.465-5~~
	~~–167~~ ~~–153~~	~~99.8~~	~~–40~~ ~~1 000~~	~~1.5 m, Rec. ITU-R S.465-5~~
	~~–180~~ ~~–166~~	~~99.9~~	~~–40~~ ~~1 000~~	~~5 m, Rec. ITU-R S.465-5~~
	~~–184~~ ~~–170~~	~~99.9~~	~~–40~~ ~~1 000~~	~~7.5 m, Rec. ITU-R S.465-5~~
	~~–188~~ ~~–174~~	~~99.9~~	~~–40~~ ~~1 000~~	~~12 m, Rec. ITU-R S.465-5~~
	~~–165~~ ~~–151~~	~~100~~	~~–40~~ ~~1 000~~	~~30 cm to 12 m,~~ ~~Rec. ITU-R S.465-5~~
~~19.7-20.2~~	~~–154~~ ~~–140~~	~~99.0~~	~~–40~~ ~~1 000~~	~~30 cm, Rec. ITU-R S.465-5~~
	~~–164~~ ~~–150~~	~~99.9~~	~~–40~~ ~~1 000~~	~~90 cm, Rec. ITU-R S.465-5~~
	~~–167~~ ~~–153~~	~~99.8~~	~~–40~~ ~~1 000~~	~~2 m, Rec. ITU-R S.465-5~~
	~~–174~~ ~~–160~~	~~99.9~~	~~–40~~ ~~1 000~~	~~5 m, Rec. ITU-R S.465-5~~
	~~–154~~ ~~–140~~	~~100~~	~~–40~~ ~~1 000~~	~~30 cm to 12 m,~~ ~~Rec. ITU-R S.465-5~~

MOD EUR/13/98

S22.5G The limits given in Tables **S22-1A** to **S22-1D**~~ and **S22-3**~~ may be exceeded on the territory of any country whose administration has so agreed.

ADD EUR/13/99

S22.5H The limits specified in Nos. **S22.5C** to **S22.5D** and **S22.5F** apply to non-GSO FSS systems for which complete coordination or notification information, as appropriate, has been received after 22 November 1997.

Reasons: Reflect the "*instructs the Radiocommunication Bureau*" in Resolutions 130 (WRC-97) and 538 (WRC-97), and *resolves* 2 of Resolution 130 (WRC-97). Review of the findings by the Bureau under "*instructs the Radiocommunication Bureau*" in Resolution 130 (WRC-97) and Resolution 538 (WRC-97) should be kept in an updated version of these resolutions to cover transitional aspects. It was noted that no notification was received prior to 22 November 1997 for non-GSO FSS systems (Earth-to-space) in the bands 17.3-18.1 GHz (Regions 1 and 3) and 17.8-18.1 GHz (Region 2).

ADD EUR/13/100

S55.5I An administration operating a non-GSO FSS system which is in compliance with the limits in Nos. **S22.5C**, **S22.5D** and **S22.5F** (see also Resolution **WWW**) shall be considered as having fulfilled its obligations under No. **S22.2** with respect to any GSO network, irrespective of the dates of receipt by the Bureau of the complete coordination or notification information, as appropriate, for the non-GSO system and of the complete coordination information for the GSO network, provided that the $epfd_{down}$ radiated by the non-GSO FSS system into any operating GSO FSS earth station does not exceed the operational limits given in Tables **S22-4A** to **S22-4C**, when the gain, or the diameter, as appropriate, of this earth station is equal to or greater than the corresponding value given in Tables **S22-4A** to **S22-4C** for the corresponding orbital inclination of the GSO FSS satellite as given in Tables **S22-4A** to **S22-4C**. Except as otherwise agreed between concerned administrations, an administration operating a non-GSO FSS system that is subject to the limits in Nos. **S22.5C**, **S22.5D** and **S22.5F** and which radiates $epfd_{down}$ into any operating GSO FSS earth station at levels in excess of the operational limits given in Tables **S22-4A** to **S22-4C**, when the gain or the diameter, as appropriate, of this earth station is equal to or greater than the corresponding value given in Tables **S22-4A** to **S22-4C** for the corresponding orbital inclination of the GSO FSS satellite as given in Tables **S22-4A** to **S22-4C**, shall be considered to be in violation of its obligations under No. **S22.2**.

Reasons: Reflect the *resolves* 4 and 1.4 of Resolutions 130 (WRC-97) and 538 (WRC-97), and the principles provided in section 3.1.2.1.4.2 c). Other additions to the provision correct the language, and make explicit the intention that any non-GSO FSS system that exceeds the validation or operational limits, as applicable, shall, except otherwise agreed between concerned administrations be deemed to be in violation of its obligations under No. S22.2. This proposal also includes the operational limits for BSS protection.

SUP EUR/13/101

TABLE **S22-4**

PART A

PART B

ADD EUR/13/102

TABLE **S22-4A**[20, 22]

Operational limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$epfd_{down}$ $dB(W/m^2)$	Percentage of time during which $epfd_{down}$ may not be exceeded	Reference bandwidth (kHz)	Receive GSO earth station antenna diameter[21] (m)	Orbital inclination of GSO satellite (degrees)
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3 (prior to 31 December 2005)	–163 –166 –167.5 –169.5	100	40	3 6 9 ≥ 18	≤ 2.5
	–160 –163 –164.5 –166.5	100	40	3 6 9 ≥ 18	≤ 4.5
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3 (after 31 December 2005)	–161.25 –164 –165.5 –167.5	100	40	3 6 9 ≥ 18	≤ 2.5
	–158.25 –161 –162.5 –164.5	100	40	3 6 9 ≥ 18	≤ 4.5

[20] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[21] Linear interpolation of epfd levels in decibels should be performed for other intermediate antenna diameters using a logarithmic scale for diameter.

[22] In addition to the operational limits shown in Table **S22-4A**, the additional operational limits in Tables **S22-4A1** and **S22-4A2** apply to certain GSO FSS earth station antenna sizes in the frequency bands listed in Table **S22-4A**.

ADD EUR/13/103

TABLE **S22-4A1**

Additional operational limits to the $epfd_{down}$ radiated by non-GSO FSS systems into 3 m GSO FSS earth station antenna

$epfd_{down}$ (dB(W/(m^2/40 kHz)))	**Percentage of time during which $epfd_{down}$ may be exceeded**
–182	0.1
–179	0.06
–176	0.03
–171	0.02
–168	0.016
–165	0.007
–163	0.001
–161.25	0.00025
–161.25	0

ADD EUR/13/104

TABLE **S22-4A2**

Additional operational limits to the $epfd_{down}$ radiated by non-GSO FSS systems into 10 m GSO FSS earth station antenna

$epfd_{down}$ (dB(W/(m^2/40 kHz)))	**Percentage of time during which $epfd_{down}$ may be exceeded**
–185	0.03
–183	0.02
–179	0.01
–175	0.004
–171	0.002
–168	0.001
–166	0.0002
–166	0

ADD EUR/13/105

TABLE **S22-4B**[23]

Operational limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$epfd_{down}$ dB(W/m^2)	Percentage of time during which $epfd_{down}$ may not be exceeded	Reference bandwidth (kHz)	Receive GSO earth station antenna Gain (dBi)	Orbital inclination of GSO satellite (degrees)
19.7-20.2	–157 –157 –155	100 100 100	40 40 40	≥ 49 ≥ 43[24] ≥ 49	≤ 2.5 ≤ 2.5 > 2.5 and ≤ 4.5
19.7-20.2	–143 –143 –141	100 100 100	1 000 1 000 1 000	≥ 49 ≥ 43[24] ≥ 49	≤ 2.5 ≤ 2.5 > 2.5 and ≤ 4.5
17.8-18.6	–164 –162	100 100	40 40	≥ 49 ≥ 49	≤ 2.5 > 2.5 and ≤ 4.5
17.8-18.6	–150 –148	100 100	1 000 1 000	≥ 49 ≥ 49	≤ 2.5 > 2.5 and ≤ 4.5

23 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

24 The operational limit applies to non-GSO systems operating at altitudes of 7 000 km or above in order to protect GSO FSS systems employing adaptive coding.

ADD EUR/13/106

TABLE **S22-4C**[25]

Operational limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$epfd_{down}$ dB(W/m^2)	Percentage of time during which $epfd_{down}$ may not be exceeded	Reference bandwidth (kHz)	Receive GSO earth station antenna diameter (m)	Orbital inclination of GSO satellite (degrees)
12.2-12.7 GHz in Region 2	–167	100	40	2.4	≤ 0.5

25 These limits apply into GSO earth stations located in Region 2 west of 140° W, north of 60° N, pointing toward GSO BSS satellites at 91° W, 101° W, 110° W, 119° W and 148° W with elevation angles greater than 5°. [This limit is implemented during a transition period of [15] years.]*

* Comment: This transitional regime would be applicable only if the pfd limits in section 5c of Annex 1 to Appendix S30 are sufficiently relaxed. It is expected that WRC-2000 will decide such a relaxation.

ADD EUR/13/107

S22.5J In case of *force majeure*, telecommand and ranging carriers transmitted to non-geostationary satellites in the fixed-satellite service are not subject to the limits given in Table **S22-2**.

Reasons: Specific provision needed to cover emergency situations.

MOD EUR/13/108

Section VI – GSO ~~E~~earth station off-axis power limitations in the fixed-satellite service~~[11]~~

MOD EUR/13/109

S22.26 § 9 The level of equivalent isotropically radiated power (e.i.r.p.) emitted by an earth station shall within a geostationary-satellite network not exceed the following values for any off-axis angle φ which is ~~2.5~~3° or more off the main-lobe axis of an earth station antenna:

Off-axis angle	*Maximum e.i.r.p.*
~~2.5~~3° ≤ φ ≤ 7°	(~~39~~42 – 25 log φ) dB(W/40 kHz)
7° < φ ≤ 9.2°	~~18~~21 dB(W/40 kHz)
9.2° < φ ≤ 48°	(~~42~~45 – 25 log φ) dB(W/40 kHz)
48° < φ ≤ 180°	~~0~~3 dB(W/40 kHz)

MOD EUR/13/110

S22.27 For FM-TV emissions with energy dispersal, the limits in No. **S22.26** above may be exceeded by up to 3 dB provided that the off-axis total e.i.r.p. of the transmitted FM-TV carrier does not exceed the following values:

Off-axis angle	*Maximum e.i.r.p.*
~~2.5~~3° ≤ φ ≤ 7°	(~~53~~56 – 25 log φ) dBW
7° < φ ≤ 9.2°	~~32~~35 dBW
9.2° < φ ≤ 48°	(~~56~~59 – 25 log φ) dBW
48° < φ ≤ 180°	~~14~~17 dBW

MOD EUR/13/111

S22.28 FM-TV carriers which operate without energy dispersal should be modulated at all times with programme material or appropriate test patterns. In this case, the off-axis total e.i.r.p. of the emitted FM-TV carrier shall not exceed the following values:

Off-axis angle	*Maximum e.i.r.p.*
~~2.5~~3° ≤ φ ≤ 7°	(~~53~~56 – 25 log φ) dBW
7° < φ ≤ 9.2°	~~32~~35 dBW
9.2° < φ ≤ 48°	(~~56~~59 – 25 log φ) dBW
48° < φ ≤ 180°	~~14~~17 dBW

~~[11] **S22.VI.1** The provisions of this section are suspended pending the review of the values in Nos. **S22.26**, **S22.27** and **S22.28** by WRC-99.~~

NOC EUR/13/112

S22.29

ADD EUR/13/113

S22.30 The e.i.r.p. limits given in Nos. **S22.26, S22.27** and **S22.28** do not apply to earth station antennas ready to be in service[12] prior to 2 June 2000 nor to earth stations associated with a satellite network in the fixed-satellite service for which complete coordination or notification information has been received before 2 June 2000.

ADD EUR/13/114

[12] **S22.30.1** "Ready to be in service" relates to the case where antennas have been installed but the start of service has been delayed due to *force majeure*.

ADD EUR/13/115

S22.31 Telecommand and ranging carriers transmitted to geostationary satellites in the fixed-satellite service in normal mode of operation (i.e. earth station transmitting telecommand and ranging carriers to a directive receiving antenna on the space station) may exceed the levels given in **S22.26** by no more than 16 dB in the frequency bands 12.75-13.25 and 13.75-14.5 GHz. In all other modes of operation, and in case of *force majeure*, telecommand and ranging carriers transmitted to geostationary satellites in the fixed-satellite service are exempted from the levels given in **S22.26**.

ADD EUR/13/116

S22.32 § 10 The level of equivalent isotropically radiated power (e.i.r.p.) density emitted by an earth station within a geostationary-satellite network in the 29.5-30.0 GHz frequency band shall not exceed the following values for any off-axis angle φ which is 3° or more off the main-lobe axis of an earth station antenna:

Off-axis angle	*Maximum e.i.r.p. density*
$3° \le \varphi \le 7°$	$(28 - 25 \log \varphi)$ dB(W/40 kHz)
$7° < \varphi \le 9.2°$	7 dB(W/40 kHz)
$9.2 < \varphi \le 48°$	$(31 - 25 \log \varphi)$ dB(W/40 kHz)
$48° < \varphi \le 180°$	-1 dB(W/40 kHz)

ADD EUR/13/117

S22.33 The e.i.r.p. limits given in **S22.32** do not apply to earth station antennas ready to be in service prior to [XXXX] nor to earth stations associated with satellite networks in the fixed-satellite service which have been brought into use before 2 June 2000.

ADD EUR/13/118

S22.34 Telecommand and ranging[***] carriers transmitted to geostationary satellites in the fixed-satellite service in normal mode of operation (i.e. earth station transmitting telecommand and ranging carriers to a directive receiving antenna on the space station) may exceed the levels given in **S22.32** by no more than 10 dB[**] in the frequency band 29.5-30.0 GHz.

[***] Measurement of the distance to the satellite.

[**] Further studies are required to confirm the value of 10 dB.

In all other modes of operation, and in case of *force majeure*, telecommand and ranging carriers transmitted to geostationary satellites in the fixed-satellite service are exempted from the levels given in **S22.32**.

ADD EUR/13/119

S22.35 For GSO systems in which the earth stations are expected to transmit simultaneously in the same 40 kHz band, e.g. for the GSO systems employing CDMA, the maximum e.i.r.p., values in **S22.32** should be decreased by 10*log(N) dB, where N is the number of earth stations which are in the receive satellite beam of the satellite to which these earth stations are communicating and which are expected to transmit simultaneously on the same frequency.

ADD EUR/13/120

S22.36 Earth stations operating in the 29.5-30 GHz frequency band should be designed in such a manner that 90% of the their peak off-axis e.i.r.p. density levels do not exceed the values given in **S22.32**. Further study is needed to determine the off-axis angular range over which these exceedances would be permitted, taking into account the interference level into adjacent satellites. The statistical processing of the off-axis e.i.r.p. density peaks should be dealt with using the method given in Recommendation ITU-R S.732.

ADD EUR/13/121

S22.37 The values given in **S22.32** are maximal values under clear-sky conditions. In case of systems employing uplink power control, these levels include any additional margins above the minimum clear-sky level necessary for the implementation of uplink power control. During rain faded conditions, the levels in **S22.32** may be exceeded by earth stations when implementing uplink power control.

ADD EUR/13/122

S22.38 FSS earth stations operating in the 29.5-30 GHz band, which have lower elevation angles to the GSO will require higher e.i.r.p. levels relative to the same terminals at higher elevation angles to achieve the same power flux-densities at the GSO due to the combined effect of increased distance and atmospheric absorption. Earth stations with low elevation angles may exceed the levels given in **S22.32** by the following amount:

Elevation angle to GSO (ε)	*Increase in e.i.r.p. density (dB)*
$\varepsilon \leq 5°$	2.5
$5 < \varepsilon \leq 30°$	$0.1(25 - \varepsilon) + 0.5$

ADD EUR/13/123

S22.39 The values in **S22.32** applicable to the off-axis angle range from 48° to 180° is intended to account for spillover effects.

NOTE - The above proposal to restrict the application of Section VI of Article S22 to earth stations within GSO systems is based on the need for further studies within ITU-R on the applicability of this section to earth stations within non-GSO systems. Depending on the outcome of these studies prior to WRC-2000, this proposal may need to be updated.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 3C

Agenda item 1.13 - Proposed resolution on aggregate non-GSO interference

ADD EUR/13/124

PROPOSED RESOLUTION [EUR/13/6] (WRC-2000)

Protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where epfd limits have been adopted

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-97 has adopted, in Article **S22**, provisional epfd limits to be met by non-GSO FSS systems in order to protect GSO FSS and GSO BSS networks in parts of the frequency range 10.7-30 GHz;

b) that WRC-2000 has revised these limits to ensure that they provide adequate protection to GSO systems without causing undue constraints to any of the systems and services sharing these frequency bands;

c) that Article **S22** includes single entry epfd limits which apply to non-GSO FSS systems in these bands;

d) that these single-entry limits have been derived from aggregate equivalent power flux-density (epfd) masks that are intended to protect GSO networks, assuming a maximum effective number of non-GSO FSS systems of 3.5;

e) that the aggregate interference caused by all co-frequency non-GSO FSS systems in these bands into GSO FSS systems should not exceed the maximum interference levels that are necessary to protect these GSO systems;

f) that WRC-97 decided, and WRC-2000 confirmed, that non-GSO FSS systems in these bands are to coordinate the use of these frequencies between themselves under the provisions of No. **S9.12** of the Radio Regulations;

g) that the orbital characteristics of such systems are likely to be inhomogeneous;

h) that as a result of this likely inhomogeneity, the aggregate epfd levels from multiple non-GSO FSS systems are not directly related to the number of actual systems sharing a frequency band, and the number of such systems operating co-frequency is likely to be small;

i) that the possible misapplication of single entry limits should be avoided,

recognizing

a) that non-GSO FSS systems are likely to need to implement interference mitigation techniques to share frequencies among themselves;

b) that because the use of such interference mitigation techniques will likely keep the number of non-GSO systems small, the aggregate interference caused by non-GSO FSS systems into GSO systems will also likely be small;

c) that notwithstanding *considering d)*, there may be instances where the aggregate interference from non-GSO systems could exceed the interference levels given in Annex 1;

d) that administrations operating GSO systems may wish to ensure that the aggregate epfd produced by all operating co-frequency non-GSO FSS systems in the frequency bands referred to in *considering a)* above into GSO FSS and/or GSO BSS networks does not exceed the aggregate interference levels given in Annex 1,

resolves

1 that administrations operating or planning to operate non-GSO FSS systems in the frequency bands referred to in *considering a)* above, individually or in collaboration, take all possible steps, including by means of appropriate modifications to their systems if necessary, to ensure that the actual aggregate interference into GSO FSS and GSO BSS networks caused by such systems operating co-frequency in these frequency bands does not exceed the aggregate power levels shown in Annex 1;

2 that, in the event that the aggregate interference levels in Annex 1 are exceeded into an operational GSO earth station, administrations operating non-GSO FSS systems in these frequency bands shall expeditiously take all necessary measures to reduce the aggregate epfd levels to those in Annex 1 or to reduce such interference to higher levels that are acceptable to the affected GSO administration,

requests ITU-R

1 to develop, as a matter of urgency, and complete, in time for consideration by the next WRC, a methodology for calculating the aggregate epfd produced by all non-GSO FSS systems operating or planning to operate co-frequency in the frequency bands referred to in *considering a)* above into GSO FSS and GSO BSS networks and for comparing the calculated levels with the aggregate power levels shown in Annex 1;

2 to continue its studies on the accurate modelling of interference from non-GSO FSS systems into GSO FSS and GSO BSS networks in the frequency bands referred to in *considering a)* above in order to assist the administrations planning or operating non-GSO FSS systems in their efforts to limit the aggregate epfd levels produced by their systems into GSO networks,

requests the Director of the Radiocommunication Bureau

to assist in the development of the methodology referred to in *requests ITU-R* 1 above.

ANNEX 1 (TO RESOLUTION [EUR/13/6])

This Annex contains tables of interference levels concerning aggregate interference from multiple non-GSO FSS systems, which individually meet the Table **S22-1A** limits, into GSO FSS and GSO BSS systems.

These levels relate to the $epfd_{down}$ into any operational antenna within a GSO FSS or GSO BSS system with an orbital inclination of up to 2.5°. Into GSO FSS or GSO BSS systems with an orbital inclination between 2.5° and 4.5°, these levels are relaxed by 3 dB (e.g. –167 dB(W/m^2/40 kHz) instead of –170 dB(W/m^2/40 kHz)).

TABLE **1A**[1, 3]

Limits to the aggregate $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$epfd_{down}$ dB(W/m^2)**	**Percentage of time during which $epfd_{down}$ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern**[2]
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3	–170.0	0	40	60 cm
	–168.6	90		Recommendation ITU-R S.(4/57)
	–165.3	99		
	–160.4	99.97		
	–160.0	99.99		
	–160.0	100		
	–176.5	0	40	1.2 m
	–173.0	99.5		Recommendation ITU-R S.(4/57)
	–164.0	99.84		
	–161.6	99.945		
	–161.4	99.97		
	–160.8	99.99		
	–160.5	99.99		
	–160	99.9975		
	–160	100		
	–185	0	40	3 m
	–184	90		Recommendation ITU-R S.(4/57)
	–182	99.5		
	–168	99.9		
	–164	99.96		
	–162	99.982		
	–160	99.997		
	–160	100.00		
	–190	0	40	10 m
	–190	99		Recommendation ITU-R S.(4/57)
	–166	99.99		
	–160	99.998		
	–160	100		

1 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

2 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

3 In addition to the limits shown in this table, the aggregate $epfd_{down}$ limits in Table **1A’** apply to all antenna sizes greater than 60 cm in the frequency bands listed in this table.

TABLE **1A’**

Aggregate $epfd_{down}$ radiated by non-GSO FSS systems at certain latitudes

100% of the time $epfd_{down}$ dB(W/(m^2 · 40 kHz))	**Latitude (North or South) (°)**
–160	0 < |Latitude| ≤ 57.5
–160 + 3.4(57.5 – |Latitude|)/4	57.5 < |Latitude| ≤ 63.75
–165.3	63.75 ≤ |Latitude|

TABLE **1B**[1]

Limits to the aggregate $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$epfd_{down}$ dB(W/m^2)**	**Percentage of time during which $epfd_{down}$ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern**[2]
17.8-18.6	–164 –164 –170 –170	100 99.9 90 0	40	1 m Recommendation ITU-R S.(4/57)
	–150 –150 –156 –156	100 99.9 90 0	1 000	
17.8-18.6	–164 –164 –166 –173 –173	100 99.92 99.9 99.4 0	40	2 m Recommendation ITU-R S.(4/57)
	–150 –150 –152 –159 –159	100 99.92 99.9 99.4 0	1 000	
17.8-18.6	–164 –164 –172 –180 –180	100 99.992 99.8 99.8 0	40	5 m Recommendation ITU-R S.(4/57)
	–150 –150 –158 –166 –166	100 99.992 99.8 99.8 0	1 000	

[1] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[2] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

TABLE **1C**[1]

Limits to the aggregate $\text{epfd}_{\text{down}}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$\text{epfd}_{\text{down}}$ dB(W/m²)	Percentage of time during which $\text{epfd}_{\text{down}}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[2]
19.7-20.2	–154 –154 –172 –182	100 99.94 90 0	40	70 cm Recommendation ITU-R S.(4/57)
	–140 –140 –158 –168	100 99.94 90 0	1 000	
19.7-20.2	–154 –154 –160 –165 –176 –185	100 99.99 99.8 99.8 91 0	40	90 cm Recommendation ITU-R S.(4/57)
	–140 –140 –146 –151 –162 –171	100 99.99 99.8 99.8 91 0	1 000	
19.7-20.2	–154 –154 –162 –191	100 99.998 99.933 0	40	2.5 m Recommendation ITU-R S.(4/57)
	–140 –140 –148 –177	100 99.998 99.933 0	1 000	
19.7-20.2	–154 –154 –161 –175 –184 –195	100 99.9992 99.984 99.6 90 0	40	5 m Recommendation ITU-R S.(4/57)
	–140 –140 –147 –161 –170 –181	100 99.9992 99.984 99.6 90 0	1 000	

[1] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[2] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

TABLE **1D**[2]

Limits to the aggregate epfd_{down} radiated by non-GSO FSS systems in certain frequency bands 30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm and 300 cm BSS antennas

Frequency band (GHz)	**epfd_{down} dB(W/m^2)**	**Percentage of time during which epfd_{down} level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern**[1]
11.7-12.5 GHz in Region 1 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3 12.2-12.7 GHz in Region 2	–160.400 –160.100 –158.600 –158.600 –158.330 –158.330	0.000 25.000 96.000 98.000 98.000 100.000	40	30 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]
	–170.000 –167.000 –164.000 –160.750 –160.000 –160.000	0.000 66.000 97.750 99.330 99.950 100.000	40	45 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]
	–171.000 –168.750 –167.750 –162.000 –161.000 –160.200 –160.000 –160.000	0.000 90.000 97.800 99.600 99.800 99.900 99.990 100.000	40	60 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz in Region 1 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3 12.2-12.7 GHz in Region 2	–173.75 –173 –171 –165.5 –163 –161 –160 –160.000	0.000 33.000 98.000 99.100 99.500 99.800 99.970 100.000	40	90 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]
	–177.000 –175.250 –173.750 –173.000 –169.500 –167.800 –164.000 –161.900 –161.000 –160.400 –160.000	0.000 90.000 98.900 98.900 99.500 99.700 99.820 99.900 99.965 99.993 100	40	120 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]
	–179.500 –178.660 –176.250 –163.250 –161.500 –160.350 –160.000 –160.000	0.000 33.000 98.500 99.810 99.910 99.975 99.995 100.000	40	180 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]

11.7-12.5 GHz in Region 1 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3 12.2-12.7 GHz in Region 2	–182.000 –180.900 –178.000 –164.400 –161.900 –160.500 –160.000 –160.000	0.000 33.000 99.250 99.850 99.940 99.980 99.995 100.000	40	240 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]
	–186.500 –184.000 –180.500 –173.000 –167.000 –162.000 –160.000 –160.000	0.000 33.000 99.500 99.700 99.830 99.940 99.970 100.000	40	300 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]

1 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO BSS systems.

2 For BSS antenna diameters 180 cm, 240 cm and 300 cm, in addition to the aggregate limit shown in Table **1D**, the following aggregate 100% of the time $epfd_{down}$ limit also applies:

TABLE **1D'**

Aggregate $epfd_{down}$ radiated by non-GSO FSS systems at certain latitudes

100% of the time $epfd_{down}$ dB(W/(m^2 · 40 kHz))	**Latitude (North or South) (°)**
–160.0	0 ≤ |latitude| ≤ 57.5
–160.0 + 3.4 * (57.5 – |latitude|)/4	57.5 ≤ |latitude| ≤ 63.75
–165.3	63.75 ≤ |latitude|

For BSS antenna diameter 240 cm, in addition to the above aggregate 100% of the time $epfd_{down}$ limit, a –167 dB(W/(m^2 · 40 kHz)) aggregate 100% of the time operational $epfd_{down}$ limit also applies to receive antennas located in Region 2, west of 140° W, north of 60° N, pointing toward GSO BSS satellites at 91° W, 101° W, 110° W, 119° W and 148° W with elevation angles greater than 5°. [This limit is implemented during a transition period of [15] years.][*]

* Comment: This transitional regime would be applicable only if the pfd limits in section 5c of Annex 1 to Appendix S30 are sufficiently relaxed.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 3D

Agenda item 1.13 - Proposed provisions for earth stations with very large antennas

This part contains proposals for regulatory and procedural text for coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antennas, including additions and/or modifications to Articles S9, S11 and S22 and Appendices S4 and S5.

ARTICLE S9

Sub-Section IIA – Requirement and request for coordination

ADD EUR/13/125

S9.7A *a1)*[12*bis*, 13*bis*] for a specific earth station within a geostationary-satellite network in the fixed-satellite service in certain frequency bands in respect of a non-geostationary-satellite system in the fixed-satellite service;

ADD EUR/13/126

S9.7B *a2)*[12*bis*, 13*bis*] for a non-geostationary-satellite system in the fixed-satellite service in certain frequency bands in respect of a specific earth station within a geostationary-satellite network in the fixed-satellite service;

ADD EUR/13/127

[12*bis*] **S9.7.A.1** and **S9.7.B.1** The coordination of a specific earth station under **S9.7A** or **S9.7B** shall remain within the authority of the administration having this station located on its territory.

ADD EUR/13/128

[13*bis*] **S9.7.A.2** and **S9.7.B.2** Coordination information relating to a specific earth station received by the Bureau prior to [date to be established by WRC-2000] is considered as complete **S9.7A** or **S9.7B** information from the date of receipt of complete information of the associated satellite network under **S9.7** provided that the characteristics of the specific earth stations are within the parameters of any typical earth station included in the GSO FSS network coordination request.

Reasons: GSO FSS earth stations with very large antennas may not be adequately protected by the $\mathrm{epfd}_{\mathrm{down}}$ limits contained in Table MOD S22-1 and case-by-case coordination of systems operating co-frequency, co-directional links in the space-to-Earth direction would then be required. The proposed ADD S9.7A and ADD S9.7B would require coordination between non-GSO FSS transmit satellites and GSO FSS receive earth stations with very large antennas. By referring to coordination provisions under S9.7A and S9.7B, the request for coordination would be sent by the requesting administration to the Bureau under S9.30. The Bureau would act under S9.34 to identify administrations with which coordination may need to be effected and publish the information in the Weekly Circular. Since coordination between a non-GSO FSS space station and very large GSO FSS earth stations is a new type of coordination that does not currently exist in Article S9, it is necessary to add two new entry points in Article S9:

1) One entry point to enable the non-GSO space station administration to request coordination with administrations having specific very large earth station antennas located on their territory.

2) Another entry point to enable the reciprocal coordination to take place, i.e. the possibility for an administration planning to implement a specific very large GSO earth station stations located on their territory to request coordination with administrations having non-GSO FSS transmit space.

ARTICLE S22

Space services[1]

Section II – Control of interference to geostationary-satellite systems

It is proposed that a footnote referring to S9.7A and S9.7B be inserted in the tables of Section II of Article S22 relating to the protection of GSO FSS earth stations. This proposal is made under Part 3B above.

ARTICLE S11

Notification and recording of frequency assignments[1, 2, 3]

Section II – Examination of notices and recording of frequency assignments in the Master Register

MOD EUR/13/129

S11.32A *c)* with respect to the probability of harmful interference that may be caused to or by assignments recorded with a favourable finding under Nos. **S11.36** and **S11.37** or **S11.38**, or recorded in application of No. **S11.41**, or published under Nos. **S9.38** or **S9.58** but not yet notified, as appropriate, for those cases for which the notifying administration states that the procedure for coordination under Nos. **S9.7**, **S9.7A** or **S9.7B** could not be successfully completed (see also No. **S9.65**);[10] or

MOD EUR/13/130

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[10] **S11.32A.1** The examination of such notices with respect to any other frequency assignment for which a request for coordination under Nos. **S9.7**, **S9.7A** or **S9.7B** has been published under No. **S9.38** but not yet notified shall be effected by the Bureau in the order of their publication under the same number using the most recent information available.

Reasons: The insertion of a coordination trigger related to $epfd_{down}$ level radiated by the non-GSO FSS system into the earth station employing the very large antenna considered when this earth station is pointed to the wanted GSO satellite provides a mechanism to examine the notice with respect to the probability of harmful interference that may be caused to or by the above-listed assignments, and therefore S11.38 and S11.41 are applicable.

APPENDIX S4

ANNEX 2B

Table of characteristics to be submitted for space and radio astronomy services

The required characteristics for coordinating specific very large GSO earth stations with non-GSO FSS transmit space stations could be items for "Notification or coordination of a GSO network (including Appendix S30B)" or "Notification or coordination of an earth station".

(The modifications in either column two or column three need to be incorporated into the full table.)

MOD EUR/13/131

C – Characteristics to be provided for each group of frequency assignments for a satellite antenna beam or an earth station antenna

Items in Appendix	**Notification or coordination of a geostationary-satellite network (including Appendix S30B)**	**Notification or coordination of an earth station**
C.1		
C.2.a	X	X
C.2.b		
C.3.a	X	X
C.3.b		
C.4	X	X
C.5a	X	
C.5.b		X
C.5.c		
C.6	X	X
C.7.a	X[9]	X[9]
C.7.b	C[9]	C[9]
C.7.c	C[9]	C[9]
C.7.d	C	C
C.8.a	X[7]	C[8]
C.8.b	X[7]	X[7]
C.8.c	X[6]	X[6]
C.8.d	X[2]	
C.8.e	X[6]	X[6]
C.8.f		
C.8.g	C[4]	C[4, 5]
C.8.h		
C.8.i		
C.8.j		
C.9.a	C	
C.9.b		
C.9.c		
C.10.a	X[9]	C[9]
C.10.b	X[9]	C[9]

C.10.c.1	X[9]	C[9]
C.10.c.2	X[9]	C[9]
C.10.c.3	X	
C.10.c.4	X	
C.10.c.5	X[9]	C[9]
C.10.c.6		
C.11.a	X	
C.11.b		
C.11.c		
C.11.d		
C.12		
C.13		
C.14		

X Mandatory information.

O Optional information.

C This information need only be furnished when it has been used as a basis to effect coordination with another administration.

[9] Information mandatory for coordination under No. ADD **S9.7A**.

NOTE - Additional characteristics to be provided may include A.4.c, A.1.e.1, A.1.e.2, C.4, B.5 and C.5.b. As a result of decisions that may be made at WRC-2000, these additional characteristics may replace C.10.a, C.10.b, C.10.c.1, C.10.c.2 and C.10.c.5 in the notification or coordination of an earth station column.

Reasons: This is consequential to ADD S9.7A and ADD S9.7B. Administrations will need to submit specific earth station information for earth stations associated with geostationary-satellite networks in the fixed-satellite service meeting the conditions in the proposed addition to Appendix S5.

MOD EUR/13/132

D – Overall link characteristics

Items in Appendix	Notification or coordination of a geostationary-satellite network (including Appendix S30B)	Notification or coordination of an earth station
D.1	X	
D.2.a	X[9]	C[9]
D.2.b	X	

X Mandatory information.

O Optional information.

C This information need only be furnished when it has been used as a basis to effect coordination with another administration.

[9] Information mandatory for coordination under No. ADD **S9.7A**.

Reasons: This is consequential to ADD S9.7A and ADD S9.7B and will be required when simple frequency-changing transponders are used on the space station.

APPENDIX S5

ADD EUR/13/133

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.7A** GSO earth station/ non-GSO system	A specific earth station in a geostationary-satellite network in the fixed-satellite service in respect of a non-geostationary-satellite system in the fixed-satellite service	The following frequency bands: 10.7-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 17.8-18.6 GHz (space-to-Earth), and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) the frequency bands overlap; and ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations and meets all of the following conditions: a) Earth station antenna maximum isotropic gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; b) G/T_1 of 44 dB/K or higher; c) space station emission bandwidth of 250 MHz or higher for the frequency bands 10.7-12.75 GHz or 800 MHz or higher for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; iii) the $epfd_{down}$ from the satellite system using the non-geostationary orbit exceeds:	i) compare frequency bands; ii) use the maximum antenna gain of the specific receive earth station (Appendix **S4** C.10 *c)* 2)), the lowest equivalent satellite link noise temperature (Appendix **S4** C.10 *c)* 5)), and the space station emission bandwidth (Appendix **S4** C.7 *a)*) in the geostationary-satellite network as given in Appendix **S4** data; and iii) use the $epfd_{down}$ radiated by the non-GSO FSS system into the earth station employing the very large antenna when this antenna is pointed towards the wanted GSO satellite	The threshold/ condition for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit

			a) either –174.5 dB(W/($m^2 \cdot$ 40 kHz)) for any percentage of time or [x] dB(W/($m^2 \cdot$ 40 kHz)) for [y]% of the time in the frequency band 10.7-12.75 GHz;(*) b) either –151 dB(W/($m^2 \cdot$ MHz)) for any percentage of time or [x'] dB(W/($m^2 \cdot$ MHz)) for [y']% of the time in the frequency bands 17.8-18.6 GHz or 19.7-20.2 GHz(*)		
No. **S9.7B** non-GSO system/ GSO earth station/	A non-geostationary-satellite system in the fixed-satellite service in respect of a specific earth station in a geostationary-satellite network in the fixed-satellite service.	The following frequency bands: 10.7-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 17.8-18.6 GHz (space-to-Earth), and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) the frequency bands overlap; and ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations and meets all of the following conditions: a) Earth station antenna maximum isotropic gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; b) G/T_1 of 44 dB/K or higher;	i) compare frequency bands; ii) use the maximum antenna gain of the specific receive earth station (Appendix **S4** C.10 *c)* 2)), the lowest equivalent satellite link noise temperature (Appendix **S4** C.10 *c)* 5)), and the space station emission bandwidth (Appendix **S4** C.7 *a)*) in the geostationary-satellite network as given in Appendix **S4** data; and	The threshold/ condition for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit.

			c) space station emission bandwidth of 250 MHz or higher for the frequency bands 10.7-12.75 GHz or 800 MHz or higher for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; iii) the $epfd_{down}$ from the satellite system using the non-geostationary orbit exceeds: a) either –174.5 dB(W/(m^2 · 40 kHz)) for any percentage of time or [x] dB(W/(m^2 · 40 kHz)) for [y]% of the time in the frequency band 10.7-12.75 GHz;(*) b) either –151 dB(W/(m^2 · MHz)) for any percentage of time or [x'] dB(W/(m^2 · MHz)) for [y']% of the time in the frequency bands 17.8-18.6 GHz or 19.7-20.2 GHz.(*)	iii) use the $epfd_{down}$ radiated by the non-GSO FSS system into the earth station employing the very large antenna when this antenna is pointed towards the wanted GSO satellite.	

Reasons: This is consequential to ADD S9.7A and S9.7B.

(*) NOTE - These epfd thresholds require further refinement. A corrigendum to this proposal will be submitted taking into account the results of the discussions which are expected to take place on this issue in ITU-R before WRC-2000.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Croatia, Denmark, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 3E

Agenda item 1.13 - Proposed modifications to Article S5

Introduction

It is proposed that the current four footnotes in Article S5 referring to non-GSO FSS operation under the provisions of Resolutions 130 (WRC-97) and 538 (WRC-97) be amended in order to include the relevant provisions currently included in these resolutions which do not contain transitional or superfluous measures. These proposals do not include any additional frequency bands in which WRC-2000 may decide to add limits to facilitate sharing between non-GSO FSS and GSO as a result of the studies carried out by ITU-R on this issue (e.g. the band 17.3-17.8 GHz (Earth-to-space) in Region 2). This issue is addressed in Part 3H under agenda item 1.13.2.

A Rule of Procedure was adopted by the RRB in April 1998, in relation to S5.488 and S5.491, which currently restrict the use of some of the 12 GHz FSS allocations in Regions 2 and 3 to national and subregional systems. The Board considered that these provisions should be waived in the case of non-GSO FSS systems in order to align them with the decisions of WRC-97 allowing the development of such systems in these bands. The discussions at the CPM also concluded that keeping these limitations would maintain significant burden to the administrations and the Bureau, and unnecessary constraints on the development of global, regional and subregional GSO and non-GSO FSS systems in Regions 2 and 3, without clear advantage. It is therefore proposed to amend S5.488 and S5.491 according to Option 2C of the CPM Report, i.e. to waive these constraints for both GSO and non-GSO systems.

Finally, proposals are made to modify footnotes S5.502 and S5.503 to reflect the conclusions of the CPM, while preserving the delicate balance currently existing between the services allocated in the 13.75-14 GHz band.

MOD EUR/13/134

S5.441 The use of the bands 4 500-4 800 MHz (space-to-Earth), 6 725-7 025 MHz (Earth-to-space) by the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by non-geostationary-satellite systems in the fixed-satellite service ~~shall be in accordance with the provisions of Resolution **130 (WRC-97)**~~is subject to the application of the provisions of No. **S9.12** for the coordination with other non-geostationary-satellite systems in the fixed-satellite service. The provisions of Resolution **130 (Rev.WRC-2000)** apply.

MOD EUR/13/135

S5.484A The use of the bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 13.75-14.5 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), 29.5-30 GHz (Earth-to-space) by non-geostationary~~- and geostationary-~~satellite systems in the fixed-satellite service is subject to application of the provisions of ~~Resolution **130 (WRC-97)**. The use of the band 17.8-18.1 GHz (space-to-Earth) by non-geostationary fixed-satellite service systems is also subject to the provisions of Resolution **538 (WRC-97)**~~No. **S9.12** for the coordination with other non-geostationary-satellite systems in the fixed-satellite service. The provisions of Resolutions **130 (Rev.WRC-2000)** and **538 (Rev.WRC-2000)** apply.

MOD EUR/13/136

S5.487A *Additional allocation:* in Region 1, the band 11.7-12.5 GHz, in Region 2, the band 12.2-12.7 GHz and, in Region 3, the band 11.7-12.2 GHz, are also allocated to the fixed-satellite service (space-to-Earth) on a primary basis, limited to non-geostationary systems and subject to the application of the provisions of ~~Resolution **538 (WRC-97)**~~No. **S9.12** for the coordination with other non-geostationary-satellite systems in the fixed-satellite service. The provisions of Resolution **538 (Rev.WRC-2000)** apply.

MOD EUR/13/137

S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2 by non-geostationary-satellite systems in the fixed-satellite service is subject to the application of the provisions of ~~Resolution **538 (WRC-97)**~~No. **S9.12** for the coordination with other non-geostationary-satellite systems in the fixed-satellite service. The provisions of Resolution **538 (Rev.WRC-2000)** apply.

MOD EUR/13/138

S5.488 The use of the band~~s 11.7-12.2 GHz by the fixed-satellite service~~ in ~~Region 2 and~~ 12.2-12.7 GHz by the broadcasting-satellite service in Region 2 is limited to national and subregional systems. The use of the band 11.7-12.2 GHz by geostationary-satellite systems in the fixed-satellite service in Region 2 is subject to previous agreement between the administrations concerned and those having services, operating or planned to operate in accordance with the Table, which may be affected (see Articles **S9** and **S11**). For the use of the band 12.2-12.7 GHz by the broadcasting-satellite service in Region 2, see Appendix **S30**.

MOD EUR/13/139

S5.491 *Additional allocation:* in Region 3, the band 12.2-12.5 GHz is also allocated to the fixed-satellite (space-to-Earth) service on a primary basis~~, limited to national and sub-regional systems~~. The power flux-density limits in Article **S21**, Table **S21-4** shall apply to this frequency band. The introduction of the service in relation to the broadcasting-satellite service in Region 1 shall follow the procedures specified in Article 7 of Appendix **S30**, with the applicable frequency band extended to cover 12.2-12.5 GHz.

Reasons: The RRB considered that the restrictions included in these provisions in relation to the national and subregional systems should be waived in the case of non-GSO FSS systems in order to align them with the decisions of WRC-97 allowing the development of such systems in these bands. The discussions at the CPM also concluded that keeping these limitations would maintain a significant burden on the administrations and the Bureau, and unnecessary constraints on the development of global, regional and subregional GSO and non-GSO FSS systems in Regions 2 and 3, without clear advantage. It is therefore proposed to amend S5.488 and S5.491 according to Option 2C of the CPM Report, i.e. to waive these constraints for both GSO and non-GSO systems.

MOD EUR/13/140

S5.502 In the band 13.75-14 GHz, the e.i.r.p. of any emission from an earth station in the fixed-satellite service~~ shall be at least 68 dBW, and~~ should not exceed 85 dBW, ~~with~~and a minimum antenna diameter of 4.5 m shall be used. In addition the e.i.r.p., averaged over one second, radiated by a station in the radiolocation or radionavigation services towards ~~the geostationary-satellite orbit~~any direction of space shall not exceed 59 dBW.

MOD EUR/13/141

S5.503 In the band 13.75-14 GHz, geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 shall operate on an equal basis with stations in the fixed-satellite service; after that date, new geostationary space stations in the space research service will operate on a secondary basis. The e.i.r.p. density of emissions from any earth station in the fixed-satellite service shall not exceed 71 dBW in any 6 MHz band for GSO networks and 51 dBW in any 6 MHz band for non-GSO networks, in the frequency range 13.772-13.778 GHz until those geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 cease to operate in this band. Automatic power control may be used to increase the e.i.r.p. density above ~~71 dBW in any 6 MHz band~~these limits in this frequency range to compensate for rain attenuation, to the extent that the power-flux density at the fixed-satellite service space station does not exceed the value resulting from use of ~~an~~these e.i.r.p. ~~of 71 dBW in any 6 MHz band~~density levels in clear sky conditions.

Reasons: Support is given to the CPM Report conclusion that the minimum e.i.r.p. of 68 dBW could be suppressed, and the apportionment of interference from GSO and non-GSO FSS systems into space research could be done in such a way as to maintain the current earth station e.i.r.p. density limit in S5.503 for GSO FSS (71 dBW/6 MHz) and include another, more stringent limit, for non-GSO FSS earth stations, so as to maintain the aggregate interference into space research at the appropriate level set forth in Recommendation ITU-R SA.1071. It is also proposed that, in line with the information provided in Recommendation ITU-R S.1068, the e.i.r.p. density limit specified in S5.502 be extended to all directions of space.

NOTE - It is recognized that the current limits in S5.502 or the proposed limits in MOD S5.502 constrain the operation of FSS in the 13.75-14 GHz band to larger earth stations. It is proposed, under WRC-2000 agenda item 7.2, that the WRC-03 agenda include the review of these limits and that this issue be studied by ITU-R.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 3F

Agenda item 1.13 - Proposed modifications to Articles S9 and S11

As indicated in the CPM Report, the ITU-R studies have concluded on the levels of epfd limits which are considered appropriate to protect the Appendices S30, S30A and S30B Plans and their future modifications. If these limits were included in Article S22, there would therefore be no need for non-GSO FSS systems to coordinate their use of frequencies with assignments/allotments in these Plans.

The following modifications are proposed to Articles S9 and S11 to clarify that the provisions of Appendices S30, S30A and S30B are not applicable to non-GSO FSS systems. In the absence of such modifications, the provisions of Appendices S30, S30A and S30B may be understood as applying to non-GSO FSS systems, which would be in contradiction with the above-mentioned conclusions.

It is also proposed to enable in Article S9 the application of S9.12 for the coordination between non-GSO FSS systems, when this coordination requirement is referred to in Article S5, as proposed in Part 3E of this document.

ARTICLE S9

Procedure for effecting coordination with or obtaining agreement of other administrations[1, 2, 3, 4, 5]

MOD EUR/13/142

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[5] **A.S9.5** See also Resolutions **51 (WRC-97)**, **130 (Rev.WRC-~~97~~2000)** and **538 (Rev.WRC-~~97~~2000)**. The provisions of Appendices **S30**, **S30A** and **S30B** do not apply to non-GSO FSS systems.

MOD EUR/13/143

S9.12 i) in a satellite network using a non-geostationary-satellite orbit, in respect of any other satellite network using a non-geostationary-satellite orbit, and in respect of any other satellite network using the geostationary-satellite orbit, with the exception of coordination between earth stations operating in the opposite direction of transmission[12*bis*];

ADD EUR/13/143*bis*

[12*bis*] **S9.12.1** This provision also applies for the coordination between non-GSO satellite systems when the requirement for such coordination is included in a footnote to the Table of Frequency Allocations referring to this provision.

ARTICLE S11

Notification and recording of frequency assignments[1, 2, 3]

MOD EUR/13/144

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[3] **A.S11.3** See also Resolutions **51 (WRC-97)**, **130 (Rev.WRC-~~97~~2000)** and **538 (Rev.WRC-~~97~~2000)**. The provisions of Appendices **S30**, **S30A** and **S30B** do not apply to non-GSO FSS systems.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 3G

Agenda item 1.13 - Proposed modifications to Appendix S4

Additional data items required in Appendix S4 for the epfd calculations

It is proposed to include the following additions to the current text of Appendix S4.

1 Section A.4 *b)*

ADD EUR/13/145

In addition, if the stations operate in a frequency band subject to the provisions of Resolution **130 (Rev.WRC-2000)** or Resolution **538 (Rev.WRC-2000)**:

6) new data elements required to characterize properly the orbital operation of the non-GSO satellite systems:

a) for each range of latitudes provide:

– the maximum number of non-GSO satellites operating their downlinks co-frequency to any location; and

– the associated latitude range;

b) the minimum height of the space station above the surface of the Earth at which any satellite will be used to provide a service;

c) where the space station uses station-keeping to maintain a repeating ground track, the time in seconds that it takes for the constellation to return to its starting position, i.e. such that all satellites are in the same location with respect to the Earth and each other;

d) an indicator identifying if the space station should be modelled with a specific precession rate of the ascending node of the orbit instead of the J_2 term;

e) for a space station that is to be modelled with a specific precession rate of the ascending node of the orbit instead of the J_2 term, the precession rate in degrees/day, measured counter-clockwise in the equatorial plane;

f) the longitude of the ascending node for the *j*-th orbital plane, measured counter-clockwise in the equatorial plane from Greenwich meridian to the point where the satellite makes its south-to-north crossing of the equatorial plane ($0° \leq \Omega_j < 360°$) (NOTE 1);

g) the time at which the satellite is at the location defined by Ω_j (NOTE 1);

h) the longitudinal tolerance of the longitude of the ascending node.

NOTE 1 - Currently non-GSO space stations are referenced by the "right ascension of ascending node" (A.4b5 Ω_j) to the first point of Aries. However, for the evaluation of epfd a reference to a point on the Earth is used and hence the "longitude of the ascending node" is required.

2 Section A.4 *b)*

ADD EUR/13/146

7) new data elements required to characterize properly the performance of the non-GSO satellite systems:

a) the maximum number of non-GSO satellites receiving simultaneously at the same frequency from the associated earth stations within a given cell;

b) the average number of associated earth stations operating co-frequency per square kilometre within a cell;

c) the average distance between co-frequency cells;

d) for the exclusion zone about the geostationary orbit provide:

– the type of zone;

– the width of the zone in degrees.

3 Section A.14

ADD EUR/13/147

A.14 Spectrum masks

For stations operating in a frequency band subject to the provisions of Resolution **130 (Rev.WRC-2000)** or Resolution **538 (Rev.WRC-2000)**:

a) for each e.i.r.p. mask used by the non-GSO space station provide:

– the type of mask;

– the mask identification code;

– the mask pattern defined in terms of the power in the reference bandwidth for a series of off-axis angles with respect to a specified reference point;

– the lowest frequency for which the mask is valid;

– the highest frequency for which the mask is valid;

b) for each earth station e.i.r.p. mask provide:

– the type of mask;

– the mask identification code;

– the mask pattern defined in terms of the power in the reference bandwidth for a series of off-axis angles with respect to a specified reference point;

– the lowest frequency for which the mask is valid;

– the highest frequency for which the mask is valid;

– the minimum elevation angle at which any earth station can transmit to a non-GSO satellite;

– the minimum separation angle between the GSO arc and the earth station beam-axis at which the earth station can transmit towards a non-GSO satellite;

c) for each pfd mask used by the non-GSO space station provide:

– the mask identification code;

– the mask pattern of the power flux-density defined in three dimensions;

– the lowest frequency for which the mask is valid;

– the highest frequency for which the mask is valid.

4 Section C.9

ADD EUR/13/148

d) For stations operating in a frequency band subject to the provisions of Resolution **130 (Rev.WRC-2000)** or Resolution **538 (Rev.WRC-2000)**, provide:

– the type of mask;

– the mask identification code.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 3H

Agenda item 1.13

Agenda item 1.13.2 - Proposed modifications to Articles S5 and S22 to include limits in other frequency bands

On the basis of the results of the studies undertaken by ITU-R and reported in the CPM Report, this section contains proposals for modifications to Articles S5 and S22 to facilitate sharing between non-GSO FSS (Earth-to-space) and BSS in Region 2 in the band 17.3-17.8 GHz.

To minimize the sharing constraints imposed by non-GSO FSS uplinks in Region 2, it is proposed that non-GSO FSS (Earth-to-space) use in Region 2 be limited to gateway operation, by introducing in S5.516 a minimum antenna size of 4.5 metres for such use.

Proposed modifications to Article S5

MOD EUR/13/149

S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1, 2 and 3 ~~and 17.8-18.1 GHz (Earth-to-space) in Region 2~~ by non-geostationary-satellite systems in the fixed-satellite service is subject to the application of the provisions of ~~Resolution **538 (WRC-97)**~~No. **S9.12** for the coordination with other non-geostationary-satellite systems in the fixed-satellite service. The use of the 17.3-17.8 GHz band by non-GSO FSS (Earth-to-space) in Region 2 is limited to a minimum earth station antenna diameter of 4.5 metres. The provisions of Resolution **538 (Rev.WRC-2000)** apply.

Proposed modifications to Article S22

MOD EUR/13/150

TABLE **S22-2**

~~**Frequency band (GHz)**~~	~~**Aggregate pfd dB(W/m^2/4 kHz)**~~	~~**Percentage of time during which aggregate pfd level may not be exceeded**~~
~~17.3-18.1 in Regions 1 and 3 and 17.8-18.1 in Region 2~~	~~–163~~	~~100%~~

Limits to the epfd$_{up}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**epfd$_{up}$ dB(W/m^2)**	**Percentage of time epfd$_{up}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna beamwidth and reference radiation pattern[2]**
12.50-12.75 12.75-13.25 13.75-14.5	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20[1]
17.3-18.1	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20[1]
27.5-28.6	–162	100	40	1.55 degrees Rec. ITU-R S.672, Ls = –10[1]
29.5-30.0	–162	100	40	1.55 degrees Rec. ITU-R S.672, Ls = –10[1]

1 For the case of Ls = –10, the values a = 1.83 and b = 6.32 should be used in the equations in Annex 1 of Recommendation ITU-R S.672 for single-feed circular beams. In all cases of Ls, the parabolic main beam equation should start at zero.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 3I

Agenda item 1.13 - Proposed updated Resolutions 130 (WRC-97), 131 (WRC-97) and 538 (WRC-97)

SUP EUR/13/151

RESOLUTION 131 (WRC-97)

Power flux-density limits applicable to non-geostationary fixed-satellite service systems for protection of terrestrial services in the bands 10.7-12.75 GHz and 17.7-19.3 GHz

Reasons: Support the conclusion of the CPM Report.

MOD EUR/13/152

RESOLUTION 130 (Rev.WRC-~~97~~2000)

Use of non-geostationary systems in the fixed-satellite service in certain frequency bands

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that the International Telecommunication Union has, among its purposes, “to promote the extension of the benefit of the new telecommunication technologies to all the world’s inhabitants” (No. 6 of the Constitution of the International Telecommunication Union (Geneva, 1992));

b) that it is desirable, in this respect, to promote systems capable of providing universal service;

c) that new telecommunication services need advanced and reliable networks permitting high-capacity communications;

d) the need to encourage the development and implementation of new technologies;

e) that systems based on the use of new technologies associated with both geostationary (GSO) and non-geostationary (non-GSO) satellite constellations are capable of providing the most isolated regions of the world with high-capacity and low-cost means of communication;

f) that there should be equitable access to the radio-frequency spectrum and orbital resources in a mutually acceptable manner that allows for new entrants in the provision of services;

g) that all Member States [‡] would benefit from the implementation of proposed systems in the allocated spectrum and from avoidance of monopolization or exclusive use of an allocation by a single system;

h) that the operation of such systems requires a suitable amount of spectrum in appropriate frequency bands;

i) that decisions on this matter should permit the operation of as many systems as possible;

j) that~~, in spite of the urgency attached to the development of such systems,~~ technical, operational and regulatory issues should be studied in order to achieve the most efficient use of the spectrum that may be available for these systems;

k) that there is a need for the provision of services on a competitive basis between GSO fixed-satellite service (FSS) and non-GSO FSS systems as well as between non-GSO FSS and non-GSO FSS systems;

l) that the Radio Regulations must be sufficiently flexible to accommodate the introduction and implementation of innovative technologies as they evolve, and allow the further development and implementation of any proposed system in conformity with their provisions,

considering further

a) that ~~further~~ITU-R has conducted technical, operational and regulatory studies~~ are required~~ in order to determine~~ further~~ the conditions under which sharing of the frequency bands 10-30 GHz which are allocated to the FSS and where ~~Resolution **46 (Rev.WRC-97)**~~No. **S9.11A** does not apply is feasible between GSO and non-GSO systems, between non-GSO systems and between non-GSO and terrestrial systems and other space systems;

~~*b)* that it is likely that non-GSO FSS systems communicated to the Radiocommunication Bureau will not be brought into use before the WRC-99;~~

~~c~~b) that the diverging interpretations arising from No. **S22.2** result in an ambiguous regulatory status for both existing and future GSO and non-GSO systems in the FSS in the bands where this provision applies, with consequential risks for both types of systems;

~~d~~c) that the harmonious development of non-GSO and GSO systems in the FSS requires that these ambiguities be resolved with no further delay in all bands subject to this provision;

~~e~~d) that in resolving these ambiguities in the bands referred to in *resolves* 1 below, the GSO arc must be protected to ensure continued use of existing FSS systems and the development of new GSO technologies and systems in both non-planned bands and bands where plans exist;

~~f~~e) that these ambiguities ~~may~~can be resolved in certain frequency bands by adopting power flux-density (pfd) limits which ~~would~~ apply to non-GSO FSS systems to protect GSO FSS systems, and by including in Article **S22** limits on the power radiated by non-GSO FSS systems in order adequately to protect GSO FSS systems in the frequency bands and sharing situations where ~~Resolution **46 (Rev.WRC-97)**~~No. **S9.11A** does not apply;

~~g~~f) that in certain frequency bands which are currently used or planned to be used extensively by GSO FSS systems, ~~provisional~~ power flux-density limits applicable to non-GSO FSS systems have been developed;

~~h~~g) that non-GSO FSS systems have been proposed in some of these bands which could meet these limits and would not require specific protection from existing and future GSO FSS systems, provided that minimum constraints are applied to GSO FSS systems, such as off-axis earth station e.i.r.p. limits;

~~i~~h) that in the bands where the limits referred to in *considering further ~~f~~e), ~~g~~f)* and *~~h~~g)* ~~would~~ apply, there ~~would be~~is no need for a coordination procedure between non-GSO FSS and GSO systems, with the exception of coordination between earth stations operating in opposite directions of transmission and coordination with earth stations using very large antennas;

~~j~~i) that there ~~would be~~is a need for a coordination procedure between non-GSO systems in the FSS and between non-GSO FSS systems and non-GSO systems in other services and for specific sharing criteria associated with this procedure, taking into consideration various types of non-GSO systems, including those in highly elliptical orbits;

~~k~~j) the need to protect other co-primary services having allocations in the frequency bands referred to in *considering further a)* above and the need to assess further the sharing conditions between non-GSO FSS systems and these services;

~~l~~k) that there is a need for further studies on sharing conditions in frequency bands other than the 10-30 GHz frequency bands, where ~~Resolution **46 (Rev.WRC-97)**~~No. **S9.11A** does not apply and Article **S22** does not include limits for non-GSO FSS systems, ~~may also be necessary~~ on the basis of the requirements that may emerge,

noting

1 that information relating to GSO and non-GSO systems in the FSS in the 10-30 GHz bands has been communicated to the Bureau;

2 that some of these systems are in operation and others will be operated in the near future and, consequently, difficulties may be experienced in modifying their characteristics;

3 the need to protect existing and future terrestrial and space services and systems;

4 that No. **S22.2** is an operational provision which is to be applied between administrations, and does not require any specific action or finding by the Bureau,

recognizing

that the geostationary-satellite orbit and its associated spectrum are a uniquely valuable resource and that equitable access to this resource needs to be protected for all countries in the world,

resolves

~~1~~ that, as of 22 November 1997, in the frequency bands specified in Tables ~~**S22-3** and **S22-4**~~**S22-1A**, **S22-1B**, **S22-1C** and **S22-2** of Article **S22**~~, and in Tables 1 and 2 in Annex 1 to this Resolution,~~ non-GSO FSS systems ~~shall apply the procedures of Section I of Article **S9**, Nos. **S9.17** and **S9.17A**/Sections I and III of Article **11** and the procedures of Article **S11**/**13**, and the non-GSO FSS systems~~ for which complete notification or coordination information, as appropriate, has been received by the Bureau after 21 November 1997 shall be subject to the ~~provisional~~ power limits in Article **S22** ~~and in Annex 1 to this Resolution~~, as revised by this Conference;

Reasons:

1 Articles 11 and 13 have been suppressed.

2 Sections I and II of S9, S9.17 and S9.17A apply to all non-GSO FSS not subject to S9.11A.

3 The limits in Article S22 are enabled by the fact they appear in Article S22 itself.

~~2 that these limits shall be applied provisionally until the end of WRC-99, and that non-GSO FSS systems for which complete notification information has been received by the Bureau after 21 November 1997 shall be subject to the power limits in Article **S22**, as revised, if appropriate, by WRC-99;~~

Reasons: *Resolves* 2 appears to be a transitional measure until WRC-2000 and is therefore no longer required after WRC-2000.

~~3 that, as of 22 November 1997, in applying No. **S22.2,** administrations may consider these provisional power limits as corresponding to permissible levels of interference from a non-GSO system into a GSO system, irrespective of the dates of receipt by the Bureau of the complete notification information relating for the non-GSO system and of the complete coordination information for the GSO network;~~

Reasons: *Resolves* 3 appears to be a transitional measure until WRC-2000 and is therefore no longer required after WRC-2000.

~~4 that, as of the end of WRC-99, an administration operating a non-GSO FSS system which is in compliance with the limits in Article **S22**, as revised, if appropriate, by WRC-99, shall be considered as having fulfilled its obligations under No. **S22.2** with respect to any GSO network, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO system and of the complete coordination information for the GSO network;~~

Reasons: This fundamental provision is proposed to be moved to Article S22, hence *resolves* 4 is proposed to be suppressed.

~~5 that, as of the end of WRC-99, in the frequency bands specified in No. **S22.29** and § 2.4 of Annex 1 to this Resolution, GSO FSS systems for which complete coordination information has been received by the Bureau after the end of WRC-99 shall be subject to the limits in Article **S22** and in § 2.1, 2.2 and 2.3 of Annex 1 to this Resolution, as revised, if appropriate, by WRC-99;~~

Reasons: *Resolves* 5 is no longer required after WRC-2000 because the limits in Article S22 are enabled by the fact they appear in Article S22 itself.

~~6 that, as of 22 November 1997, in the frequency bands specified in No. **S22.29** and Tables 1 and 2 of Annex 1 to this Resolution, non-GSO systems shall not claim protection from GSO networks in the FSS operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO FSS systems and of the complete coordination information for the GSO networks;~~

Reasons: *Resolves* 6 may be suppressed, with the establishment of minimum constraints on GSO FSS systems (such as earth station off-axis power limits) to protect non-GSO FSS systems. The fact that non-GSO systems cannot claim protection from GSO systems is inherent in the concept of limits as enabled by Article S22.

~~6.1 that, between 22 November 1997 and the end of WRC-99, if an administration operating or bringing into use a GSO FSS system before the end of WRC-99 considers that a non-GSO FSS system proposed by another administration might cause unacceptable interference into its GSO system, then:~~

~~6.1.1 the administration operating the GSO system shall send to the administration operating the non-GSO FSS system the technical details upon which its disagreement is based,~~

~~6.1.2 in the bands from 10.7 GHz to 14.5 GHz, the administration operating the non-GSO FSS system shall resolve the difficulties,~~

~~6.1.3 in the bands 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space) and 29.5-30.0 GHz (Earth-to-space), the administrations concerned shall make every possible effort to resolve the difficulties by means of mutually acceptable adjustments to their networks;~~

Reasons: *Resolves* 6.1, 6.1.1, 6.1.2, and 6.1.3 are transitional measures until WRC-2000, and are therefore not required after WRC-2000.

~~7 that, if an administration bringing into use a GSO FSS system after the end of WRC-99 considers that a non-GSO FSS system proposed by another administration and which complies with the limits in Article **S22**, as revised, if appropriate, by WRC-99, might cause unacceptable interference into its GSO system, the administrations concerned shall make every possible effort to resolve the difficulties by means of mutually acceptable adjustments to their networks;~~

Reasons: *Resolves* 7 is adequately covered by RR No. S9.4.

~~8 that, as of 22 November 1997, non-GSO systems in the FSS in the frequency bands referred to in *resolves* 1 above, shall, for coordination with other non-GSO FSS systems, be subject to application of the provisions of § 2.1 of Section II of Resolution **46 (Rev.WRC-97)**/No. **S9.12**,~~

Reasons: This fundamental provision is proposed to be moved to Article S5, hence *resolves* 8 may be suppressed.

requests ITU-R

1~~[1]~~ taking into account *considering further a)*, to conduct, as a matter of urgency, and complete, in time for consideration by WRC-~~99~~02/03~~:~~, the studies relating to the sharing criteria to be applied during the coordination between non-GSO FSS systems, with a view to promoting efficient use of spectrum/orbit resources and equitable access to these resources by all countries;

~~[1] See Annex 2 for further details concerning specific aspects of these studies in relation to frequency sharing between systems in the non-GSO FSS and the GSO FSS.~~

~~1.1 the appropriate technical, operational and regulatory studies to review the regulatory conditions relating to the coexistence of non-GSO and GSO systems in the FSS, in order to ensure that they do not impose undue constraints on the development of non-GSO and GSO FSS systems;~~

~~1.2 the development of a methodology for calculating the power levels produced by non-GSO FSS systems and the compliance of these levels with the limits referred to in *resolves* 1 and 2 above;~~

~~1.3 the studies relating to the sharing criteria to be applied for determining the need for coordination between non-GSO FSS systems and the need for coordination between terrestrial services and non-GSO systems in the FSS and in other space services, with a view to promoting efficient use of spectrum/orbit resources and equitable access to these resources by all countries;~~

Reasons: Following completion of the studies requested by WRC-97 in the frequency bands where WRC-97 established provisional limits, it is proposed to reduce the scope of the studies to be carried out by ITU-R under this "*requests ITU-R* 1" to the criteria for sharing between non-GSO systems. It is recognized that studies are continuing within ITU-R on this subject and that they might be completed before WRC-2000. In this case, this provision might be suppressed.

2~~1~~ taking into account *considering further* ~~*l*~~*k)*, to ~~undertake the development~~conduct the appropriate technical, operational and regulatory studies towards the possible adoption of power limits or other frequency sharing mechanisms among GSO, non-GSO and terrestrial systems in the frequency bands other than those referred to in *resolves* 1 above and where non-GSO FSS systems are likely to be implemented and GSO systems are used or expected to be used extensively~~,~~.

Reasons: Following completion of the studies requested by WRC-97 in the frequency bands where WRC-97 established provisional limits, it is proposed to reduce the scope of the studies to be carried out by the ITU-R to bands where such limits do not exist.

~~*instructs the Radiocommunication Bureau*~~

~~as of the end of WRC-99, to review and, if appropriate, revise, any finding previously made on the compliance with the limits contained in Article **S22** of a non-GSO FSS system for which notification information has been received between 22 November 1997 and the end of WRC-99. This review shall be based on the values in Article **S22**, as revised, if appropriate, by WRC-99.~~

Reasons: Review the findings previously made with respect to the compliance with the provisional limits is not required since, in the absence of a verification tool, the BR could not have been in a position to make such a finding.

~~ANNEX 1 TO RESOLUTION 130 (WRC-97)~~

~~**Provisional limits**~~

~~ANNEX 2 TO RESOLUTION 130 (WRC-97)~~

~~**ITU-R studies on frequency sharing between non-GSO FSS and GSO FSS**~~

MOD EUR/13/153

RESOLUTION 538 (Rev.WRC-~~97~~2000)

Use of the frequency bands covered by Appendices S30/30 and S30A/30A by non-geostationary-satellite systems in the fixed-satellite service

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that provisional limits have been ~~established~~revised and included in Article **S22** ~~and in the Annex to this Resolution~~ to ensure that the interference caused by non-geostationary-satellite (non-GSO) systems in the fixed-satellite service (FSS) into assignments operated in conformity with the Appendices **S30** and **S30A** Plans is maintained within negligible levels;

b) that the integrity of the above-mentioned Plans and their future modifications is to be ensured;

c) that non-GSO systems should not be entered into those Plans and therefore should not apply the procedures associated with the Plans and should not be protected by those procedures;

d) that ~~this Conference~~WRC-97 has decided to introduce in Article **S5** a new allocation to the FSS in the frequency bands 11.7-12.5 GHz in Region 1, 12.2-12.7 GHz in Region 2 and 11.7-12.2 GHz in Region 3, limited to non-GSO FSS systems,

resolves

~~1~~

~~1.1~~ that, as of 22 November 1997, a non-GSO FSS system operating in the frequency bands covered by Appendices **S30** and **S30A** shall comply with the ~~provisional limits specified in Article **S22** and in the Annex to this Resolution;~~

~~1.2 that such a system shall, as of the end WRC-99, comply with the~~ limits specified in Article **S22**, as revised~~, if appropriate,~~ by WRC-~~99~~2000, irrespective of the date of receipt of the complete notification information relating to the non-GSO FSS system~~;~~.

~~1.3 that as of 22 November 1997, in applying No. **S22.2**, administrations may consider these provisional power limits as corresponding to permissible levels of interference from a non-GSO system into a GSO system, irrespective of the dates of receipt by the Radiocommunication Bureau of the complete notification information for the non-GSO system and for the GSO network;~~

Reasons: *Resolves* 1.3 is a transitional measure until WRC-2000, and is therefore no longer required after WRC-2000.

~~1.4 that as of the end of WRC-99, an administration operating a non-GSO FSS system in the band 17.8-18.1 GHz (space-to-Earth) which is in compliance with the limits appearing in Article **S22** as revised, if appropriate, by WRC-99, shall be considered as having fulfilled its obligations under No. **S22.2** with respect to any GSO network operating in the Earth-to-space direction, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO system and of the complete coordination or notification information, as appropriate, for the GSO network;~~

Reasons: This fundamental provision is proposed to be moved to Article S22, hence *resolves* 1.4 may be suppressed. It is also proposed to extend this provision to all the bands subject to Resolution 538 (WRC-97), since RR No. S22.2 now applies to both GSO FSS and GSO BSS protection from non-GSO systems.

~~1.5 that between 22 November 1997 and the end of WRC-99, if an administration operating or bringing into use a GSO system before the end of WRC-99 considers that a non-GSO FSS system proposed by another administration might cause unacceptable interference into its GSO system, then:~~

- ~~the administration operating the GSO system shall send to the administration operating the non-GSO FSS system the technical details upon which its disagreement is based;~~
- ~~the administration operating the non-GSO FSS system shall resolve the difficulties, taking into account especially degradation of picture and sound quality or signal availability with regard to GSO systems in operation;~~

Reasons: *Resolves* 1.5 is a transitional measure until WRC-2000, hence may be suppressed.

~~1.6 that, as of 22 November 1997, a non-GSO FSS system operating in the frequency bands covered by Appendices **S30** and **S30A** shall apply the procedures of Section I of Article **S9**, and Nos. **S9.17** and **S9.17A** Sections I and III of Article **11,** and the procedures of Article **S11/13**;~~

Reasons: *Resolves* 1.6 is no longer required after WRC-2000 because:

1 Articles 11 and 13 have been suppressed; and

2 Sections I and III of S9, S9.17 and S9.17A apply to all non-GSO FSS not subject to S9.11A.

~~1.7 that, as of 22 November 1997, such a system shall be subject, for the coordination with non-GSO systems, to the application of the provisions of § 2.1 of Section II of Resolution **46 (Rev.WRC-97)**/No. **S9.12**;~~

Reasons: This fundamental provision is proposed to be moved to footnotes of Article S5, hence it may be suppressed.

~~1.8 that, as of 22 November 1997, such a system shall apply, using an equivalent power flux-density threshold of –185.3 dB(W/m²/4 kHz) for 99.7% of the time, calculated with the reference 90 cm diameter antenna pattern provided in Annex 5 of Appendix **S30** for Regions 1 and 3, the provisions of No. **S9.8**/Article 7 of Appendix **S30** with respect to assignments which appear in Article 11 of Appendix **S30** with the symbols AE or PE;~~

Reasons: *Resolves* 1.8 is no longer required after WRC-2000 because this provision was intended to provide the protection of 90 cm antennas corresponding to the "old" assignments in the pre-1997 Appendix S30 Plan in Regions 1 and 3. Since the antenna diagram used to protect BSS antennas is now expected to be the same for all Regions and diameters, this specific provision is no longer required.

~~2 that non-GSO FSS systems in the frequency bands referred to in *resolves* 1 above shall not be operated before the end of WRC-99,~~

Reasons: *Resolves* 2 is a transitional measure until WRC-2000, hence is no longer required after WRC-2000.

~~*requests ITU-R*~~

~~*a)* to conduct, as a matter of urgency and in time for consideration by WRC-99, the appropriate technical, operational and regulatory studies to review the regulatory provisions concerning the operation of non-GSO FSS systems in the frequency bands referred to in *resolves* 1.1 above in order to ensure that these provisions ensure appropriate protection of the Plans and their future modifications and do not place unreasonable constraints on the development of non-GSO systems in these bands;~~

~~*b)* to undertake and complete the development of a methodology for calculating the power levels produced by non-GSO FSS systems and the compliance of these levels with the limits referred to in *resolves* 1.1 and 1.2 above;~~

~~*c)* to complete the studies relating to the sharing criteria to be applied for determining the need for coordination between non-GSO FSS systems, with a view to promoting efficient use of spectrum/orbit resources and equitable access to these resources by all countries;~~

~~*d)* to report to the 1999 Conference Preparatory Meeting (CPM-99) on the conclusion of these studies,~~

Reasons: The studies requested by WRC-97 under this resolution have been completed.

~~*instructs the Radiocommunication Bureau*~~

~~as of the end of WRC-99, to review and, if appropriate, revise, any finding previously made on the compliance with the limits contained in Article **S22** of a non-GSO FSS system for which notification information has been received between 22 November 1997 and the end of WRC-99. This review shall be based on the values in Article **S22**, as revised, if appropriate, by WRC-99.~~

Reasons: Review the findings previously made with respect to the compliance with the provisional limits is not required since, in the absence of a verification tool, the BR could not have been in a position to make such a finding.

~~ANNEX TO RESOLUTION 538 (WRC-97)~~

~~**Provisional limits**~~

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000

WORLD
RADIOCOMMUNICATION
CONFERENCE

Addendum 1 to
Addendum 2 to
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE
WORK OF THE CONFERENCE

PART 2

MOBILE-SATELLITE AND RADIONAVIGATION-SATELLITE SERVICES

CONTENTS

Proposals submitted by the following administrations

Denmark, Spain, Estonia, Finland, France, Ireland, Italy, Liechtenstein, Norway, Netherlands, San Marino, Slovenia, Sweden, Turkey

PART 2A

Agenda item 1.9 - Feasibility of an MSS (space-to-Earth) allocation at 1 559-1 567 MHz (Resolutions 213 (Rev.WRC-95) and 220 (WRC-97))

Please add the following at the end of Part 2A of the European common proposals.

Additional proposals relating to MSS allocations in the 1.5-1.7 GHz range

1 Introduction

a) In the introduction to Chapter 2 of the CPM Report to WRC-2000 the issue of MSS spectrum shortage is reported. This draws on conclusions about congestion in the MSS reached by ITU-R in preparation for WARC-92, WRC-95 and WRC-97.

b) Studies in ITU-R have demonstrated that sharing between the MSS (Earth-to-space) and Met-Sat is considered feasible in the band 1 675-1 690 MHz if an appropriate separation distance is kept between Met-Sat receivers and MSS mobile earth stations. ITU-R studies, reported by the CPM state that sharing in the band 1 690-1 698 MHz is not feasible and sharing should not be considered in the band 1 698-1 710 MHz owing to the expected growth in Met-Sat services and unpractical coordination burden.

c) The CPM Report concludes that segmentation of the band 1 675-1 690 MHz on a national or regional basis, may be a method of providing MSS spectrum. Based on current and expected future use of the band 1 675-1 690 MHz, the sub-band 1 683-1 690 MHz is considered most suitable for MSS operation since future METAIDS operations are planned to be limited to the band 1 675-1 683 MHz in many countries. In Regions 2 and 3 meteorological GVAR/S-VISSR satellite earth stations operate in many countries in the band 1 683-1 690 MHz.

d) ITU-R studies reported by the CPM also state that sharing in the sub-band 1 683-1 690 MHz may not be possible in those countries in Regions 2 and 3 where there are large numbers of meteorological GVAR/S-VISSR satellite earth stations. However, the number of countries with large numbers of GVAR/S-VISSR stations is small.

e) To respond to the intention of agenda item 1.9 of WRC-2000, Europe proposes that the sub-band 1 683-1 690 MHz be allocated to the MSS (Earth-to-space) in Regions 1 and 3. Subsequently, Europe also proposes the deletion of the MSS allocation in Region 2 in the bands 1 675-1 683 MHz and 1 690-1 710 MHz.

f) A matching downlink for MSS is proposed in the band 1 518-1 525 MHz. This proposal is intended to give the mobile-satellite service access to the spectrum where possible and harmonize allocations between ITU Regions taking into account relevant sharing conclusions as discussed in the CPM Report. Subsequently, the above-mentioned countries also propose deletion of the MSS allocation in Region 2 in the band 1 492-1 518 MHz.

g) A number of ITU-R Recommendations are available to facilitate the coordination between MSS (space-to-Earth) and the FS in the frequency range 1-3 GHz. Guidance for the use of these Recommendations is given in Recommendation ITU-R M.[8/43].

2 Proposals

MOD EUR/13/323

1 660-1 710 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 675-~~1 690~~1 683 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile S5.341	**1 675-~~1 690~~1 683** METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile ~~MOBILE-SATELLITE (Earth-to-space)~~ S5.341 ~~S5.377~~	**1 675-~~1 690~~1 683** METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile S5.341
~~1 675~~1 683-1 690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) S5.341 ADD S5.XXX ADD S5.YYY	**~~1 675~~1 683-1 690** METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) S5.341 ~~S5.377~~ADD S5.YYY	**~~1 675~~1 683-1 690** METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) S5.341 ADD S5.XXX ADD S5.YYY
1 690-1 700 METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) Fixed Mobile except aeronautical mobile S5.289 S5.341 S5.382	**1 690-1 700** METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) ~~MOBILE-SATELLITE (Earth-to-space)~~ S5.289 S5.341 ~~S5.377~~ S5.381	**1 690-1 700** METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) S5.289 S5.341 S5.381

1 700-1 710	**1 700-1 710**	**1 700-1 710**
FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile ~~MOBILE-SATELLITE (Earth-to-space)~~	FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile
S5.289 S5.341	S5.289 S5.341 ~~S5.377~~	S5.289 S5.341 S5.384

ADD EUR/13/324

S5.XXX In the band 1 683-1 690 MHz in Regions 1 and 3, stations in the mobile-satellite service shall not cause harmful interference to stations in the fixed or mobile service.

ADD EUR/13/325

S5.YYY Mobile-satellite systems using the band 1 683-1 690 MHz shall not cause harmful interference to nor constrain the development of the meteorological-satellite service. To avoid causing harmful interference, mobile earth stations shall not operate, except in a non-interfering signalling channel, within the exclusion zones around the meteorological earth stations defined in Recommendation ITU-R SA.1158-1. The mobile-satellite system shall have position determination capabilities to ensure compliance with this provision and the use of this band is subject to coordination under No. **S9.11A**.

SUP EUR/13/326

S5.377

Reasons:

1 Sharing between meteorological aids, fixed service and the mobile-satellite service (uplink) is considered not practicable. It is expected that meteorological aids use can be concentrated in the frequency band 1 675-1 683 MHz in many countries.

2 Recommendation ITU-R SA.1158 concludes that sharing between the meteorological-satellite service and the mobile-satellite service is feasible in the band 1 675-1 690 MHz if protection of the earth stations is guaranteed.

3 ITU-R studies have shown that MSS would not be able to share with meteorological aids in the band 1 683-1 690 MHz and with the meteorological-satellite service in the band 1 690-1 710 MHz.

4 The proposed uplink allocation in 1 683-1 690 MHz also takes into account:

- the need for some administrations to continue to operate terrestrial systems in the band 1 683-1 690 MHz and the need to protect these systems;
- the need for additional MSS allocations.

MOD EUR/13/327

1 350-1 525 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 492-~~1 525~~1 518 FIXED MOBILE except aeronautical mobile S5.341 S5.342	**1 492-~~1 525~~1 518** FIXED MOBILE S5.343 ~~MOBILE-SATELLITE (space-to-Earth) S5.348A~~ S5.341 S5.344 ~~S5.348~~	**1 492-~~1 525~~1 518** FIXED MOBILE S5.341 ~~S5.348A~~
~~1 492~~1 518-1 525 FIXED MOBILE except aeronautical mobile MOBILE-SATELLITE (space-to-Earth) S5.341 S5.342 ADD S5.ZZZ	**~~1 492~~1 518-1 525** FIXED MOBILE S5.343 MOBILE-SATELLITE (space-to-Earth) MOD S5.348A S5.341 S5.344 ~~S5.348~~ ADD S5.ZZZ	**~~1 492~~1 518-1 525** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) S5.341 S5.348A ADD S5.ZZZ

ADD EUR/13/328

S5.ZZZ In the band 1 518**-**1 525 MHz, stations in the mobile**-**satellite service shall not cause harmful interference to, or claim protection from, stations of the fixed or mobile service. The use of the band 1 518-1 525 MHz by the mobile**-**satellite service is subject to coordination under No. **S9.11A**. However, no coordination threshold in Article **S21** for space stations of the mobile-satellite service with respect to terrestrial services shall apply to the situation referred to in No. **S5.343**. With respect to the situation referred to in No. **S5.343**, the requirement for coordination in the band 1 518-1 525 MHz will be determined by band overlap.

Reasons:

1 **Other services, including analogue and digital fixed services, in the band 1 518-1 525 MHz are protected from the MSS (including both GSO and non-GSO services) by pfd thresholds as prescribed in Table S5-2 of Appendix S5.**

2 **High-density mobile applications for one country in Region 3 are protected from MSS transmissions as prescribed in Table S5-2 of Appendix S5 as referenced in footnote S5.348A.**

3 Material from S5.348 concerning the applicability of coordination thresholds has been included in this footnote.

4 These proposals contribute to alleviate the spectrum shortage for MSS and also to harmonize allocations between ITU Regions.

SUP EUR/13/329

S5.348

MOD EUR/13/330

S5.348A In the band ~~1 492~~1 518**-**1 525 MHz, the coordination threshold in terms of the power flux-density levels at the surface of the Earth in application of No. **S9.11A** for space stations in the mobile-satellite (space-to-Earth) service, with respect to the land mobile service use for specialized mobile radios or used in conjunction with public switched telecommunication networks (PSTN) operating within the territory of Japan, shall be –150 dB(W/m^2) in any 4 kHz band for all angles of arrival, instead of those given in Table S5-2 of Appendix **S5**. The above threshold level of the power flux-density shall apply until it is changed by a competent world radiocommunication conference.

SUP EUR/13/331

RESOLUTION 220 (WRC-97)

Studies to consider the feasibility of use of a portion of the band 1 559-1 610 MHz by the mobile-satellite service (space-to-Earth)

Reasons: A new MSS downlink allocation in the band 1 518-1 525 MHz is providing an alternative to the band 1 559-1 567 MHz. It is therefore unnecessary to continue the studies in this band.

SUP EUR/13/332

RESOLUTION 213 (Rev.WRC-95)

Sharing studies concerning possible use of the band 1 675-1 710 MHz by the mobile-satellite service

Reasons:

1 Studies in the band 1 675-1 710 MHz have been concluded and lead to the proposed new uplink MSS allocation in the band 1 683-1 690 MHz.

2 A suitable downlink band for MSS (1 518-1 525 MHz) is proposed.

MOD EUR/13/333

TABLE S5-1A

Applicability of No. S9.11A for space services

Frequency band	**RR foot-note/Res.**	**Space services[1] in the footnote to which No. S9.11A applies**		**Other space services[1] to which No. S9.11A applies equally**	**Date of provisional application of allocation if later than 22.11.1997**
~~1 492~~1 518-1 525 MHz	**S5.~~348~~ ZZZ**	MSS ~~(R2, except USA)~~(S-E)	↓	---	
~~1 675-1 700~~ 1 683-1 690 MHz	**S5.~~377~~ YYY**	MSS ~~(R2)~~(E-S)	↑	--- (see **S5.377**)	
~~1 700-1 710 MHz~~	~~**S5.377**~~	~~MSS (R2)~~	↑	SPACE RESEARCH (**S5.384**)	

APPENDIX S5

ANNEX 1

MOD EUR/13/334

1.2.3.1 Method for the determination of the need for coordination between MSS space stations (space-to-Earth) and other terrestrial services sharing the same frequency band in the 1 to 3 GHz range

Coordination of assignments for transmitting space stations of the MSS with respect to terrestrial services is not required if the pfd produced at the Earth's surface or the FDP of a station in the fixed service does not exceed the threshold values shown in the following table.

TABLE S5-2

Frequency band (MHz)	**Terrestrial service to be protected**	**Coordination threshold values**				
		GSO space stations		**Non-GSO space stations**		
		pfd (per space station) calculation factors (NOTE 2)		**pfd (per space station) calculation factors (NOTE 2)**		**% FDP (in 1 MHz) (NOTE 1)**
		P	***r* dB/ degrees**	***P***	***r* dB/ degrees**	
~~1 492~~1 518~~-~~ 1 525	Analogue FS telephony (NOTE 5)	–146 dB(W/m^2) in 4 kHz and –128 dB(W/m^2) in 1 MHz	0.5	–146 dB(W/m^2) in 4 kHz and –128 dB(W/m^2) in 1 MHz	0.5	
	All other cases (NOTE 4)	–128 dB(W/m^2) in 1 MHz	0.5	–128 dB(W/m^2) in 1 MHz	0.5	25

NOTE 4 – Exceptions for the band ~~1 492~~1 518-1 525 MHz are as follows:
4.1 For the land mobile service on the territory of Japan (No. **S5.348A**): –150 dB(W/m^2) in 4 kHz at all angles of arrival is applicable to all satellite space-to-Earth emissions.
4.2 For the aeronautical mobile service for telemetry (No. **S5.343**), the requirement for coordination is determined by frequency overlap (No. **S5.~~348~~ZZZ**).

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Reasons: The proposed modifications to Appendix S5 are consequences of the deletion of MSS from the band 1 492-1 518 MHz, 1 675-1 683 MHz and 1 690-1 710 MHz in Region 2.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

PART 2

MOBILE-SATELLITE AND RADIONAVIGATION-SATELLITE SERVICES

CONTENTS

Proposals submitted by the following administrations

[Albania, Germany, Andorra, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Cyprus, Vatican, Croatia, Denmark, Spain, Estonia, Finland, France, Greece, Hungary, Ireland, Iceland, Italy, Latvia, The Former Yugoslav Republic of Macedonia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Monaco, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, San Marino, Slovenia, Sweden, Switzerland, Turkey, Ukraine]

PART 2D

Agenda item 1.15.1 - Addition of RNSS (space-to-space) to RNSS (space-to-Earth)

Please add the following in the introduction and in the corresponding sub-parts of Part 2D of the European common proposals.

Introduction

Under agenda item 1.15.2, the compatibility of RNSS (space-to-space) use of radionavigation-satellite systems with other services in the bands 1 215-1 260 MHz and 1 559-1 610 MHz has been demonstrated, primarily on the basis that space reception of RNSS signals will be less susceptible to interference than terrestrial reception of these same signals.

It is considered that this conclusion may be extended to the bands for which new RNSS allocations are proposed.

The above-mentioned administrations therefore propose the following additions to the European common proposals in Parts 2D1, 2D2, 2D3 and 2D4 contained in Addendum 2 to Document CMR2000/13.

These additions have no impact on the original proposals.

PART 2D1

RNSS (space-to-Earth) (space-to-space) 960-1 215 MHz

In proposal EUR/13/63

In **S5.328A**, line 2, add the words “(space-to-space)” after the words “(space-to-Earth)”.

PART 2D2

RNSS (space-to-Earth) (space-to-space) 1 260-1 300 MHz

In proposal EUR/13/65

In the Table of Frequency Allocations, add “(space-to-space)” after “(space-to-Earth) ”, as follows:

MOD

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 260-1 300	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) MOD S5.329 Amateur S5.282 S5.330 S5.331 S5.332 S5.334 S5.335	

PART 2D3

Proposal for a new resolution - Use of RNSS in the bands 1 151-1 300 MHz

In proposal EUR/13/67

1) In the title of Resolution YYY [EUR/13/5] (WRC 2000), add “(space-to-space)” after “(space-to-Earth)”.

2) In *considering d)*, in line 2 and again in line 4, add “and (space-to-space)” after “(space-to-Earth)”.

3) In *resolves* 1 line 1 and in *resolves* 2 line 3, add “or (space-to-space)” after “RNSS (space-to-Earth)”.

4) In *resolves* 2 line 1 and line 6, add “and/or (space-to-space)” after “RNSS (space-to-Earth)”.

5) In *requests ITU-R* 1, in line 3 and again in line 4, add “and (space-to-space)” after “RNSS (space-to-Earth)”.

In *instructs the Radiocommunication Bureau*, line 2, add “and/or (space-to-space)” after “RNSS (space-to-Earth)”.

PART 2D4

RNSS (space-to-Earth) (space-to-space) and RNSS (Earth-to-space) in the band 5 000-5 030 MHz

In proposal EUR/13/70

In **S5.444B**, line 2, add “(space-to-space)” after “radionavigation-satellite service (space-to-Earth)” and in line 6 add “or (space-to-space)” after “RNSS (space-to-Earth)”.

Reasons: To propose primary allocations to RNSS (space-to-space) in the bands 1 151-1 215 MHz, 1 260-1 300 MHz and 5 010-5 030 MHz.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

PART 2

Mobile-satellite and radionavigation-satellite services

CONTENTS

Proposals submitted by the following administrations

Germany, Austria, Belgium, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 2A

Agenda item 1.9 - Feasibility of an MSS (space-to-Earth) allocation at 1 559-1 567 MHz (Resolutions 213 (Rev.WRC-95) and 220 (WRC-97))

Introduction

Studies in ITU-R have demonstrated that the frequency band 1 559-1 567 MHz can not be shared co-frequency with radionavigation-satellite service (RNSS) systems. On the other hand, as reported in the CPM text, some studies have shown that the existing RNSS systems would be protected against interference. Considering the development of new RNSS systems which are planned to be introduced in this band, Europe proposes no change in the frequency band 1 559-1 567 MHz at this WRC.

In order to answer to Resolution 213, consideration is being given to a European common proposal proposing an alternative downlink allocation for MSS.

It should be noted that the frequency band 1 559-1 567 MHz is also dealt with under agenda items 1.15.2 and 1.15.3.

ARTICLE S5

NOC EUR/13/37

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 559-1 610	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) S5.341 S5.355 S5.359 S5.363	

Reasons: There should be no new allocation to MSS in this band at this WRC since new RNSS/ARNS systems are planned to be introduced in the near future in the band 1 559-1 567 MHz.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 2B

Agenda item 1.10 - Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service

Introduction

In its agenda item 1.10, WRC-2000 is invited to consider the results of ITU-R studies carried out in accordance with Resolution 218 (WRC-97), "Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service", and take appropriate action on this subject.

The main objective of Resolution 218 (WRC-97) is to achieve the most flexible and practical use of the generic allocations in 1.5/1.6 GHz, while satisfying the requirements of distress, urgency and safety communications. Although Resolution 218 (WRC-97) has specifically requested studies on spectrum requirements and inter-system pre-emption, all alternatives which may satisfy this main objective were explored.

ITU-R WP 8D studies could not conclude on future spectrum requirements for GMDSS distress, urgency and safety communications and for AMS(R)S communications. Furthermore, no study has been carried out regarding the feasibility of prioritizing and pre-empting between different MSS networks. However, the coordination process satisfactorily provides spectrum for GMDSS and AMS(R)S today. In the future, to ensure that spectrum will be made available, as required, to satisfy the spectrum requirements of AMS(R)S communications with priority 1 to 6 of Article S44 and of distress, urgency and safety GMDSS communications, Europe proposes that a new resolution (Resolution [EUR/13/4]) be incorporated by reference to the present footnotes. Europe also proposes the suppression of Resolution 218 (WRC-97). In addition, Europe proposes to extend the frequency range of S5.357A to the bands 1 555-1 559 MHz and 1 656.5-1 660.5 MHz.

Modifications to Article S5

MOD EUR/13/38

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 530-1 535 SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) MOD S5.353A Earth exploration-satellite Fixed Mobile except aeronautical mobile S5.341 S5.342 S5.351 S5.354	**1 530-1 535** SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) MOD S5.353A Earth exploration-satellite Fixed Mobile S5.343 S5.341 S5.351 S5.354	
1 535-1 559	MOBILE-SATELLITE (space-to-Earth) S5.341 S5.351 MOD S5.353A S5.354 S5.355 S5.356 S5.357 MOD S5.357A S5.359 S5.362A	

MOD EUR/13/39

1 610-1 660 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 626.5-1 660	MOBILE-SATELLITE (Earth-to-space) S5.341 S5.351 MOD S5.353A S5.354 S5.355 MOD S5.357A S5.359 S5.362A S5.374 S5.375 S5.376	

MOD EUR/13/40

1 660-1 710 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 660-1 660.5	MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY S5.149 S5.341 S5.351 S5.354 MOD S5.357A S5.362A S5.376A	

MOD EUR/13/41

S5.353A In applying the procedures of ~~No. **S9.11A**~~Section II of Article **S9** to the mobile-satellite service in the bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz, priority shall be given to accommodating the spectrum requirements for distress, urgency and safety communications of the Global Maritime Distress and Safety System (GMDSS). Maritime mobile-satellite distress, urgency and safety communications shall have priority access and immediate availability over all other mobile satellite communications operating within a network. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, distress, urgency and safety communications of the GMDSS. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (~~See~~The provisions of Resolution ~~**218**~~**[EUR/13/4] (WRC-~~97~~2000)** shall apply.)

MOD EUR/13/42

S5.357A In applying the procedures of ~~No.~~ ~~**S9.11A**~~Section II of Article **S9** to the mobile-satellite service in the bands 1 545-~~1 555~~1 559 MHz and 1 646.5-~~1 656.5~~1 660.5 MHz, priority shall be given to accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service providing transmission of messages with priority 1 to 6 in Article **S44**. Aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **S44** shall have priority access and immediate availability, by pre-emption if necessary, over all other mobile-satellite communications operating within a network. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **S44**. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (~~See~~The provisions of Resolution ~~**218**~~**[EUR/13/4]** **(WRC-~~97~~2000)** shall apply.)

Resolutions

SUP EUR/13/43

RESOLUTION 218 (WRC-97)

Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service

ADD EUR/13/44

RESOLUTION [EUR/13/4] (WRC-2000)

Assignment of frequencies for maritime distress, urgency and safety communications of the GMDSS and communications of priority 1 to 6 of the AMS(R)S services in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the World Radiocommunication Conference 1997 allocated the bands 1 525-1 559 MHz (space-to-Earth) and 1 626.5-1 660.5 MHz (Earth-to-space) to the mobile-satellite service (MSS);

b) that prior to WRC-97 these bands were segmented between the maritime, aeronautical and land mobile-satellite service;

c) that the World Radiocommunication Conference 1997 adopted footnotes **S5.353A** and **S5.357A** giving priority in the application of the procedure of **S9.11A** to accommodating the spectrum requirements for distress, urgency and safety communications of the global maritime distress and safety system (GMDSS) and the aeronautical mobile-satellite (R) service communications with priority 1 to 6 of Article **S44**,

considering also

a) that global and regional mobile-satellite systems are being coordinated in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz and that Article **S9** provides the international framework for coordination agreements;

b) that such coordination agreements are currently based on the capacity planning approach, under which several administrations periodically coordinate access to the amount of spectrum needed to accommodate their validated requirements;

c) that the GMDSS and AMS(R)S spectrum requirements are currently satisfied through the capacity planning approach;

d) that in the long term, to ensure that the spectrum requirements of GMDSS and AMS(R)S are met, it might become necessary to enforce the coordination priority provided to distress, urgency and safety communications under footnotes **S5.353A** and **S5.357A**;

e) that the GMDSS distress, urgency and safety communications traffic and the AMS(R)S communications traffic with priority 1 to 6 of Article **S44** in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz is expected to increase over time,

recognizing

a) that Table **S15-2** of Appendix **S15** to the Radio Regulations identifies the bands 1 530-1 544 MHz (space-to-Earth) and 1 626.5-1 645.5 MHz (Earth-to-space) for distress and safety purposes in the maritime mobile-satellite service as well as for routine non-safety purposes;

b) that priority access and immediate availability of spectrum for maritime distress, urgency and safety communications of the GMDSS and AMS(R)S communications with priority 1 to 6 of Article **S44** is of vital importance for the safety of life,

recognizing also

a) that maritime general communications is defined under the International Convention for the Safety of Life at Sea (SOLAS) as operational and public correspondence, other than distress, urgency and safety, conducted by radio;

b) that some parts of maritime general communications, such as communications on medical advice, maritime assistance, navigational and meteorological message are related to safety at sea;

c) that maritime distress, urgency and safety communications of the GMDSS in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz include communications with priority 1 to 3 and safety related communications carried under priority 4 of Article **S53**;

d) that the ICAO has adopted standards and recommended practices (SARPs) addressing satellite communications equipment in aircraft in accordance with the Convention on International Civil Aviation;

e) that all air traffic communications as defined in the ICAO Annex 10 fall within categories 1 to 6 of Article **S44**;

f) that aircraft flying along international air routes must maintain watch and carry out continuous safety communications as required by the appropriate authority,

resolves

that in frequency coordination agreements for the mobile-satellite services in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz, administrations shall ensure accommodation of the spectrum requirements for all distress, urgency and safety communications of the global maritime distress and safety system (GMDSS) as defined in Articles **S32** and **S33** in the bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz and the aeronautical mobile-satellite (R) service communications with priority 1 to 6 of Article **S44** in the bands 1 545-1 559 MHz and 1 646.5-1 660.5 MHz.

Reasons: The coordination process satisfactorily provides spectrum for GMDSS and AMS(R)S today and is expected to continue to do so in the future. Strengthening of current provisions would ensure that spectrum will be made available in the future, as required, to satisfy the spectrum requirements of AMS(R)S communications with priority 1 to 6 of Article S44 and of distress, urgency and safety GMDSS communications. The best way to strengthen the provisions and achieving the most flexible and practical use of the generic allocations in 1.5/1.6 GHz would be in the form of a resolution (Resolution [EUR/13/4]) to be incorporated by reference to the present footnotes. This would avoid the need to modify the footnotes and allows all the relevant background information to be explained.

As a result, Resolution 218 is no longer required since the effectiveness of the coordination process, appropriately reinforced by the proposed Resolution [EUR/13/4], eliminates the need to determine the future spectrum requirements of GMDSS and AMS(R)S or to further study the feasibility of inter-system prioritization and pre-emption.

Extension of S5.357A is expected to improve the long-term assurance that spectrum will be available for the AMS(R)S and may enable the suppression of S5.362A.

The protection of the radio astronomy service in ensured by S5.376A.

The applicable procedures to be referenced in the two footnotes are those of Section II of Article S9 instead of S9.11A to take into account the coordination of GSO systems vis-à-vis other GSO systems.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 2C

Agenda item 1.11

PART 2C1

Non-GSO MSS under 1 GHz - Resolution 214 (Rev.WRC-97)

1 Introduction

Resolution 214 (Rev.WRC-97) “Sharing studies relating to consideration of the allocation of bands below 1 GHz to the non-geostationary mobile-satellite service”.

Calls for studies on operational and technical means to facilitate sharing between non-GSO MSS and other radiocommunication services having allocations below 1 GHz.

WRC-2000 is invited to consider additional allocations on a worldwide basis for the non-GSO below 1 GHz and to review the constraints on non-GSO MSS allocations in the bands below 1 GHz.

ITU-R is requested to review the operating constraints on the mobile earth stations (MES) necessary to protect the existing and planned terrestrial services, as well as any mitigation technique which can improve compatibility and permit the continued development of all of the services to which the bands are allocated.

2 Proposals

Europe proposes no changes to the existing provisions in the Radio Regulations regarding the allocations to the MSS in the bands 137-138 MHz, 148-149.9 MHz, 149.9-150.05 MHz, 312-315 MHz, 387-390 MHz, 399.9-400.05 MHz and 400.15-401 MHz.

ARTICLE S5

Frequency allocations

NOC EUR/13/45

75.2-137.175 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
137-137.025	SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) S5.208A S5.209 SPACE RESEARCH (space-to-Earth) Fixed Mobile except aeronautical mobile (R) S5.204 S5.205 S5.206 S5.207 S5.208	
137.025-137.175	SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Fixed Mobile-satellite (space-to-Earth) S5.208A S5.209 Mobile except aeronautical mobile (R) S5.204 S5.205 S5.206 S5.207 S5.208	

NOC EUR/13/46

137.175-148 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
137.175-137.825	SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) S5.208A S5.209 SPACE RESEARCH (space-to-Earth) Fixed Mobile except aeronautical mobile (R) S5.204 S5.205 S5.206 S5.207 S5.208	
137.825-138	SPACE OPERATION (space-to-Earth) METEOROLOGICAL-SATELLITE (space-to-Earth) SPACE RESEARCH (space-to-Earth) Fixed Mobile-satellite (space-to-Earth) S5.208A S5.209 Mobile except aeronautical mobile (R) S5.204 S5.205 S5.206 S5.207 S5.208	

NOC EUR/13/47

S5.208 The use of the band 137-138 MHz by the mobile-satellite service is subject to coordination under No. **S9.11A**.

NOC EUR/13/48

S5.208A In making assignments to space stations in the mobile-satellite service in the bands 137-138 MHz, 387-390 MHz and 400.15-401 MHz, administrations shall take all practicable steps to protect the radio astronomy service in the bands 150.05-153 MHz, 322-328.6 MHz, 406.1-410 MHz and 608-614 MHz from harmful interference from unwanted emissions. The threshold levels of interference detrimental to the radio astronomy service are shown in Table 1 of Recommendation ITU-R RA.769-1.

NOC EUR/13/49

S5.209 The use of the bands 137-138 MHz, 148-150.05 MHz, 399.9-400.05 MHz, 400.15-401 MHz, 454-456 MHz and 459-460 MHz by the mobile-satellite service is limited to non-geostationary-satellite systems.

NOC EUR/13/50

148-223 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
148-149.9 FIXED MOBILE except aeronautical mobile (R) MOBILE-SATELLITE (Earth-to-space) S5.209 S5.218 S5.219 S5.221	**148-149.9** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.209 S5.218 S5.219 S5.221	
149.9-150.05	MOBILE-SATELLITE (Earth-to-space) S5.209 S5.224A RADIONAVIGATION-SATELLITE S5.224B S5.220 S5.222 S5.223	

NOC EUR/13/51

S5.219 The use of the band 148-149.9 MHz by the mobile-satellite service is subject to coordination under No. **S9.11A**. The mobile-satellite service shall not constrain the development and use of the fixed, mobile and space operation services in the band 148-149.9 MHz.

NOC EUR/13/52

S5.220 The use of the bands 149.9-150.05 MHz and 399.9-400.05 MHz by the mobile-satellite service is subject to coordination under No. **S9.11A**. The mobile-satellite service shall not constrain the development and use of the radionavigation-satellite service in the bands 149.9-150.05 MHz and 399.9-400.05 MHz.

NOC EUR/13/53

S5.221 Stations of the mobile-satellite service in the band 148-149.9 MHz shall not cause harmful interference to, or claim protection from, stations of the fixed or mobile services operating in accordance with the Table of Frequency Allocations in the following countries: Albania, Algeria, Germany, Saudi Arabia, Australia, Austria, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Benin, Bosnia and Herzegovina, Brunei Darussalam, Bulgaria, Cameroon, China, Cyprus, Congo, the Republic of Korea, Croatia, Cuba, Denmark, Egypt, the United Arab Emirates, Eritrea, Spain, Estonia, Ethiopia, Finland, France, Gabon, Ghana, Greece, Guinea, Guinea Bissau, Hungary, India, the Islamic Republic of Iran, Ireland, Iceland, Israel, Italy, Jamaica, Japan, Jordan, Kazakstan, Kenya, Kuwait, Latvia, The Former Yugoslav Republic of Macedonia, Lebanon, Libya, Liechtenstein, Luxembourg, Malaysia, Mali, Malta, Mauritania, Moldova, Mongolia, Mozambique, Namibia, Norway, New Zealand, Oman, Uganda, Uzbekistan, Pakistan, Panama, Papua New Guinea, Paraguay, the Netherlands, Philippines, Poland, Portugal, Qatar, Syria, Kyrgyzstan, Slovakia, Romania, the United Kingdom, Russian Federation, Senegal, Sierra Leone, Singapore, Slovenia, Sri Lanka, South Africa, Sweden, Switzerland, Swaziland, Tanzania, Chad, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Ukraine, Viet Nam, Yemen, Yugoslavia, Zambia, and Zimbabwe.

NOC EUR/13/54

S5.224A The use of the bands 149.9-150.05 MHz and 399.9-400.05 MHz by the mobile-satellite service (Earth-to-space) is limited to the land mobile-satellite service (Earth-to-space) until 1 January 2015.

NOC EUR/13/55

S5.224B The allocation of the bands 149.9-150.05 MHz and 399.9-400.05 MHz to the radionavigation-satellite service shall be effective until 1 January 2015.

NOC EUR/13/56

220-335.4 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
235-267	FIXED MOBILE S5.111 S5.199 S5.252 S5.254 S5.256	
267-272	FIXED MOBILE Space operation (space-to-Earth) S5.254 S5.257	
272-273	SPACE OPERATION (space-to-Earth) FIXED MOBILE S5.254	
273-312	FIXED MOBILE S5.254	
312-315	FIXED MOBILE Mobile-satellite (Earth-to-space) S5.254 S5.255	
315-322	FIXED MOBILE S5.254	

NOC EUR/13/57

335.4-410 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
335.4-387	FIXED MOBILE S5.254	
387-390	FIXED MOBILE Mobile-satellite (space-to-Earth) S5.208A S5.254 S5.255	
390-399.9	FIXED MOBILE S5.254	
399.9-400.05	MOBILE-SATELLITE (Earth-to-space) S5.209 S5.224A RADIONAVIGATION-SATELLITE S5.222 S5.224B S5.260 S5.220	
400.05-400.15	STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE (400.1 MHz) S5.261 S5.262	
400.15-401	METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) S5.208A S5.209 SPACE RESEARCH (space-to-Earth) S5.263 Space operation (space-to-Earth) S5.262 S5.264	

NOC EUR/13/58

S5.255 The bands 312-315 MHz (Earth-to-space) and 387-390 MHz (space-to-Earth) in the mobile-satellite service may also be used by non-geostationary-satellite systems. Such use is subject to coordination under No. **S9.11A**.

APPENDIX S5

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article S9

ANNEX 1

NOC EUR/13/59

1 Coordination thresholds for sharing between MSS (space-to-Earth) and terrestrial services in the same frequency bands and between non-GSO MSS feeder links (space-to-Earth) and terrestrial services in the same frequency bands

1.1 Below 1 GHz*

1.1.1 In the bands 137-138 MHz and 400.15-401 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to terrestrial services (except aeronautical mobile (OR) service networks operated by the administrations listed in Nos. **S5.204** and **S5.206** as of 1 November 1996) is required only if the pfd produced by this space station exceeds –125 dB (W/m^2/4 kHz) at the Earth's surface.

1.1.2 In the band 137-138 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to the aeronautical mobile (OR) service is required only if the pfd produced by this space station at the Earth's surface exceeds:

– –125 dB (W/m^2/4 kHz) for networks for which complete Appendix **3** coordination information has been received by the Bureau prior to 1 November 1996;

– –140 dB (W/m^2/4 kHz) for networks for which complete Appendix **S4**/**3** coordination information has been received by the Bureau after 1 November 1996 for the administrations referred to in § 1.1.1 above.

1.1.3 In the band 137-138 MHz, coordination is also required for a space station on a replacement satellite of a MSS network for which complete Appendix **3** coordination information has been received by the Bureau prior to 1 November 1996 and the pfd exceeds −125 dB(W/m^2/4 kHz) at the Earth's surface for the administrations referred to in § 1.1.1 above.

NOTE - Section 3.2 and Table 1 of Appendix S5 contain provisions regarding coordination distances for earth stations operating at frequencies below 1 GHz.

Europe proposes to NOC such provisions but, under agenda item 1.3, to move them in Appendix S7, in order to have in one place in the Radio Regulations all the provisions related to the coordination distance.

* These provisions apply only to the MSS.

Reasons: The bands below 1 GHz are heavily used by many different systems of various services, and therefore the protection of the existing and planned systems from MSS interference, as afforded by the existing provisions in the Radio Regulations, shall continue to be ensured.

Europe has reviewed the constraints in the bands already allocated to MSS and has agreed to propose no changes in the bands 137-138 MHz, 148-149.9 MHz, 149.9-150.05 MHz, 312-315 MHz, 387-390 MHz, 399.9-400.05 MHz, 400.15-401 MHz, as the existing regulatory constraints allow the use of these bands by MSS, while fully protecting the existing and planned systems and services.

This has been demonstrated by MSS systems already in operation.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 2C2

Non-GSO/MSS below 1 GHz - Resolution 219 (WRC-97)

1 Introduction

WRC-2000 agenda item 1.11 invites the Conference "to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions 214 (Rev.WRC-97) and Resolution 219 (WRC-97)".

Resolution 219 "Studies relating to consideration of the allocation to the non-geostationary mobile-satellite service in the meteorological aids band 405-406 MHz and the impact on primary services allocated in the adjacent bands"

invites ITU-R, in cooperation with WMO, to study for WRC-2000 the current and future requirement of the meteorological aids service (MetAids) and a possible transition plan of the same service out of the bands 405-406 MHz in order to introduce MSS, since sharing between the two services is considered not feasible.

Based on the assessment invoked by Resolution 219 (WRC-97), Europe considers that the band 405-406 MHz is needed in future for MetAids. Consequently, transition plans are not appropriate and the suppression of Resolution 219 is proposed.

2 Proposals

NOC EUR/13/60

335.4-410 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
403-406	METEOROLOGICAL AIDS Fixed Mobile except aeronautical mobile	

SUP EUR/13/61

RESOLUTION 219 (WRC-97)

Studies relating to consideration of the allocation to the non-geostationary mobile-satellite service in the meteorological aids band 405-406 MHz and the impact on primary services allocated in the adjacent bands

Reasons: MetAids, allocated in the frequency band 400.15-406 MHz, are essential for making upper air measurements for weather forecasting and other applications: environmental monitoring, protection of life and property, space operations, research, and industry. There has been increasing usage of MetAids in the past decade.

MetAids now has only 3 MHz primary usable spectrum at 400 MHz since WARC-92 allocated the 400.15-401 MHz portion of band to MSS and WRC-97 upgraded the MetSat service and EESS in the band 401-403 MHz to primary status.

MetAid industry and users continuously apply new technology to improve the characteristics of the consumable radiosondes which enables new users to find more free channels in the band 401-406 MHz in order to respond to the increased demand.

The use of new crystal-controlled radiosondes reduces the frequency drift and increases the number of available channels in the band. This facilitates the increasing usage of the MetAids service in those countries which can bear the additional annual cost of new radiosondes, but has a negative impact on the service expansion in other countries with a very limited budget.

Furthermore, all the receivers from all manufacturers have been designed for the current electromagnetic environment. If MSS were be allocated in the band 405-406 MHz most of the existing MetAids receivers would need to be replaced in order to ensure continuation of the operations. The cost of this change would be high compared to the funds available and beyond the service financial resources.

Because all of the band 403-406 MHz is needed to secure the existing and future radiosondes operations, allocation of band 405-406 MHz to MSS is not advisable.

As a reply to the assessment invoked by Resolution 219 (WRC-97), Europe considers that the band 405-406 MHz is needed in the foreseeable future for MetAids. Consequently, transition plans are not appropriate and suppression of Resolution 219 is proposed.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Denmark, Spain, Estonia, Finland, France, Hungary, Iceland, Italy, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Turkey, Ukraine

PART 2D

Agenda item 1.15

PART 2D1

Agenda item 1.15.1 - RNSS (space-to-Earth) 960-1 215 MHz

Introduction

1 In accordance with the Radio Regulations the band 960-1 215 MHz is allocated on a primary basis to the aeronautical radionavigation service in all ITU regions.

2 In accordance to footnote S5.328 the band 960-1 215 MHz is reserved on a worldwide basis for the use and development of airborne electronic aids to air navigation and any directly associated ground-based facilities. The 1 151-1 215 MHz portion of that band is used by ground DME and TACAN transponders.

3 New allocations for the radionavigation-satellite service (RNSS) are required to support developments of systems with higher reliability and accuracy, because the already allocated bands are not wide enough to accommodate the larger bandwidth. In addition the new allocation should be wide enough to accommodate multiple systems without operational constraints.

4 Results of ITU-R studies show that additional radionavigation-satellite service signals in the band 1 151-1 215 MHz can be designed that do not cause harmful interference to existing aeronautical radionavigation service systems (SSR, ACAS, DME, TACAN). In order to ensure protection of the aeronautical radionavigation service systems a provisional pfd limit for the radionavigation-satellite service is proposed subject to revision by WRC-03 in accordance with Resolution YYY [EUR/13/5].

5 Results of ITU-R studies show that radionavigation-satellite service receivers onboard aircraft could be affected by emissions of aeronautical radionavigation service systems on board. ICAO considers any onboard compatibility problems with other aeronautical systems an internal aviation and industry matter.

6 Results of ITU-R studies show that airborne RNSS receivers are not compatible with the existing environment, in which the DME/TACAN constitutes the primary source of interference, in wide geographical areas (e.g., western Europe, parts of the United States, Japan), where a dense DME/TACAN environment is encountered. This is especially true at high altitude, but the problem may also appear at altitudes lower than 10 000 ft in certain areas.

Frequency reassignment of a significant number of ground DME/TACAN transponders would be required if high altitude use of the RNSS signal is desired in those areas and if the RNSS signal is not adapted to cope with this situation. Taking into account the congestion in the European high density areas, studies by European aviation have demonstrated that such reassignment is not feasible for the current and future use of DME/TACAN in Europe.

The incompatibility could be resolved by introduction of operational restrictions on the use of RNSS.

The feasibility of airborne reception of RNSS signal in the current RF environment can also be improved through careful RNSS design, such as the use of an additional narrow-band signal, and is under investigation.

No recoordination or decommissioning of existing aeronautical radionavigation service systems is acceptable for civil aviation authorities and the use of radionavigation-satellite service for civil aviation purposes is depending on system verification and validation. Anyhow a backup system is required for cases of radionavigation-satellite service breakdown. Europe intends to use DME.

Ground-based RNSS receivers will suffer interference only in very small areas because of their limited line-of-sight to existing ARNS transmitters.

7 Sharing of the same spectrum by two or three different RNSS networks would require compatible power levels and signal types in the design and operation of the different networks. Use of independent spectrum by each RNSS network would decrease the chance of a single interference incident affecting more than one network.

MOD EUR/13/62

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
960-1 215	AERONAUTICAL RADIONAVIGATION S5.328 ADD S5.328A	

ADD EUR/13/63

S5.328A *Additional allocation:* the band 1 151-1 215 MHz is also allocated to the radionavigation-satellite service (space-to-Earth) on a primary basis. The aggregate power flux-density produced by all the space stations within any radionavigation-satellite system at the Earth's surface shall not exceed –111 dBW/m^2/MHz for all angles of arrival. The provisions of Resolution **YYY** [EUR/13/5] apply. Stations in the radionavigation-satellite service shall not claim protection from stations of the aeronautical-radionavigation service.

Reasons: Radionavigation-satellite service systems will be provided with adequate spectrum while giving priority to the aeronautical-radionavigation service.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Slovenia, Sweden, Switzerland, Turkey

PART 2D2

Agenda item 1.15.1 - RNSS (space-to-Earth) 1 260-1 300 MHz

Introduction

1 In accordance with the Radio Regulations the band 1 260-1 300 MHz is allocated on a primary basis to the Earth exploration-satellite service (active), radiolocation service and the space research service (active) and on a secondary basis to the amateur service in all ITU regions. In addition the band is primary allocated by footnote S5.331 to the radionavigation service in several countries. According to S5.282 the amateur-satellite service (Earth-to-space) may operate in the band 1 260-1 270 MHz subject to not causing interference to other services operating in accordance with the table (see S5.43). The primary allocations are the same as in the band 1 215-1 260 MHz which is already additionally allocated to the radionavigation-satellite service (space-to-Earth) on a primary basis.

2 New allocations for the radionavigation-satellite service (RNSS) are required to support developments of systems with higher reliability and accuracy, because the already allocated bands are not wide enough to accommodate the larger bandwidth. In addition the new allocation should be wide enough to accommodate multiple systems.

3 The sharing scenario in the band 1 260-1 300 MHz is considered to be similar to the band 1 215-1 260 MHz where RNSS systems have been in operation successfully for several years for non-safety of life applications. The use of the band by high powered radars does not allow safety of life applications due to the risk of a RNSS receiver burnout at a distance up to 700 m if mainbeam coupling is assumed. For the protection of the radiolocation and radionavigation systems in the whole of the band 1 215-1 300 MHz a provisional pfd limit of -133 dBW/m^2/MHz per each single satellite for the RNSS is proposed subject to revision by WRC-03 in accordance with Resolution YYY [EUR/13/5].

4 Ground-based radionavigation-satellite service receivers of a suitable design will suffer interference only in small areas around the location of the radars.

ARTICLE S5

MOD EUR/13/64

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 215-1 240	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) MOD S5.329 SPACE RESEARCH (active) S5.330 S5.331 S5.332	
1 240-1 260	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) MOD S5.329 SPACE RESEARCH (active) Amateur S5.330 S5.331 S5.332 S5.334 S5.335	

MOD EUR/13/65

1 260-1 300	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) RADIONAVIGATION-SATELLITE (space-to-Earth) MOD S5.329 Amateur S5.282 S5.330 S5.331 S5.332 S5.334 S5.335	

MOD EUR/13/66

S5.329 Use of the radionavigation-satellite service in the band 1 215-~~1 260~~1 300 MHz shall be subject to the condition that ~~no harmful interference is caused to~~no protection is claimed from the radionavigation service authorized under No. **S5.331** and the radiolocation service. The power flux-density produced by any space station in the radionavigation-satellite service at the Earth's surface shall not exceed –133 dBW/m^2/MHz for all angles of arrival. The provisions of Resolution **YYY** [EUR/13/5] apply.

Reasons: Radionavigation-satellite service systems will be provided with adequate spectrum for non-safety of life applications while safeguarding the development and protection of the radiolocation and radionavigation services. Adding a pfd limit to RNSS ensures that no harmful interference is caused to the radionavigation service, and provides a clearer regulatory status to RNSS.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 2D3

Agenda item 1.15.1 - Proposal for a new resolution - Use of RNSS in the bands 1 151-1 300 MHz

ADD EUR/13/67

RESOLUTION YYY [EUR/13/5] (WRC-2000)

Use of the frequency bands between 1 151-1 300 MHz by systems of the radionavigation-satellite service (space-to-Earth)

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that in accordance with the Radio Regulations the band 960-1 215 MHz is allocated on a primary basis to the aeronautical-radionavigation service in all ITU regions;

b) that in accordance to footnote **S5.328** the band 960-1 215 MHz is reserved on a worldwide basis for the use and development of airborne electronic aids to air navigation and any directly associated ground-based facilities.

c) that in accordance with the Radio Regulations the bands between 1 215-1 300 MHz are allocated on a primary basis to the Earth exploration-satellite service (active), radiolocation service and the space research service (active) and the bands between 1 240-1 300 MHz additionally on a secondary basis to the amateur service in all ITU regions. In addition the bands are primary allocated by footnote **S5.331** to the radionavigation service in several countries. According to **S5.282** the amateur-satellite service (Earth-to-space) may operate in the band 1 260-1 270 MHz subject to not causing interference to other services operating in accordance with the table (see **S5.43**);

d) that this Conference has decided to introduce in Article **S5** of the Radio Regulations a new allocation for the radionavigation-satellite service (space-to-Earth) in the frequency bands 1 151-1 215 MHz and 1 260-1 300 MHz with provisional pfd limits and to introduce a provisional pfd limit also for the RNSS (space-to-Earth) allocation in the band 1 215-1 260 MHz;

e) that a provisional value of limiting pfds for the RNSS service in the new footnotes have been agreed which require verification and possible amendment,

resolves

1 that as of 2 June 2000 a RNSS (space-to-Earth) system operating in the frequency bands 1 151-1 300 MHz shall comply with the provisional limits specified in the relevant sub-band;

2 that such a system shall, as of the end of WRC-03, comply with the limits specified in the relevant sub-band, as revised, if appropriate, by WRC-03, irrespective of the date of receipt of the complete notification information relating to the RNSS (space-to-Earth) system;

3 that as of the end of WRC-03, an administration operating a RNSS (space-to-Earth) system in the relevant sub-band which is in compliance with the limits appearing in the relevant sub-band as revised, if appropriate, by WRC-03, shall be considered as ensuring the protection of the aeronautical radionavigation, the radionavigation and the radiolocation services from harmful interference irrespective of the dates of receipt by the Bureau of the complete notification information for the RNSS (space-to-Earth) system,

requests ITU-R

1 to conduct, as a matter of urgency and in time for consideration by WRC-03, the appropriate technical, operational and regulatory studies to review the provisional pfd limits concerning the operation of RNSS (space-to-Earth) systems in the frequency bands 1 151-1 300 MHz in order to ensure that the RNSS (space-to-Earth) will not cause harmful interference to the aeronautical radionavigation, the radionavigation and the radiolocation services;

2 to conduct, as a matter of urgency and in time for consideration by WRC-03, the appropriate technical, operational and regulatory studies on the overall compatibility between RNSS and ARNS in the band 960-1 215 MHz;

3 to report to CPM-03 on the conclusions of these studies,

instructs the Radiocommunication Bureau

as of the end of WRC-03, to review and, if appropriate, revise, any finding previously made on the compliance with the limits contained in relevant sub-bands of a RNSS (space-to-Earth) system for which notification information has been received before the end of WRC-03. This review shall be based on the values in the relevant sub-bands, as revised, if appropriate, by WRC-03,

requests the Secretary-General

to communicate the contents of this Resolution to the ICAO for such actions as they may consider appropriate.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey

PART 2D4

Agenda item 1.15.1 - RNSS (space-to-Earth) and RNSS (Earth-to-space) in the band 5 000-5 030 MHz

Introduction

1 In accordance with the Radio Regulations the band 5 000-5 150 MHz is allocated on a primary basis to the aeronautical-radionavigation service in all ITU regions.

2 In accordance to footnote S5.444 the band 5 000-5 150 MHz is to be used for the operation of the international standard system (microwave landing system, MLS) for precision approach and landing. The requirements of this system shall take precedence over other uses of this band. For the use of the band 5 091-5 150 MHz, No. S5.444A and Resolution 114 (WRC-95) apply. In the first phase MLS will only be introduced in the band 5 030-5 091 MHz. Due to the development and utilization of the radionavigation-satellite service in the longer term MLS might not be introduced to the extent originally planned. However in the short to medium term the use of MLS could increase due to constraints on other landing aids.

3 In accordance to footnote S5.444A the band 5 091-5 150 MHz is also allocated to the FSS (Earth-to-space) for use by MSS feeder links under certain conditions, which are related to the optional MLS extension above 5 091 MHz.

4 The band 5 000-5 030 MHz is not used for nor intended to be used for the international standard MLS system. It is used very lightly for a ship borne landing system (~ 5 systems worldwide).

5 New allocations for the radionavigation-satellite service are required to support developments of systems with higher reliability and accuracy, because the already allocated bands are not wide enough to accommodate the larger bandwidth. Proposals for radionavigation-satellite service systems have been made in which the satellites are need to be synchronized to terrestrial radio beacons (~ 50 beacons worldwide). For these systems radionavigation-satellite service (Earth-to-space) allocations are needed.

6 Results of ITU-R studies show that additional radionavigation-satellite service (space-to-Earth) signals in the band 5 000-5 150 MHz:

a) need a guardband of at least 10 MHz to protect the RAS band immediately below 5 000 MHz;

b) can accommodate the protection requirements of the RAS contained in Recommendation ITU-R RA.769-1 within the RAS allocated bands. In order not to cause harmful interference to the radio astronomy service in the band 4 990-5 000 MHz, the aggregate power flux-density radiated in the 4 990-5 000 MHz band by all the space stations within any RNSS (space-to-Earth) system operating in the 5 010-5 030 MHz band shall not exceed the level of –171 dB(W/m^2) in a 10 MHz bandwidth into any radio astronomy observatory site for more than 2% of the time;

c) are compatible with MLS operations in the band 5 030-5 150 MHz if its power flux-density at the surface of the Earth does not exceed the level of –124.5 dB(W/m^2) in a 150 kHz band, as specified by ICAO;

d) can not share co-frequency with MLS in the band 5 030-5 150 MHz due to unacceptable interference from MLS into airborne radionavigation-satellite service receivers up to the radio horizon; and

e) can not share co-frequency with MSS feeder links in the band 5 091-5 150 MHz due to unacceptable interference from feeder links into radionavigation-satellite service receivers up to the radio horizon.

7 The results of the ITU-R studies show that additional radionavigation-satellite service (Earth-to-space) signals in the band 5 000-5 030 MHz can protect the RAS allocation immediately below 5 000 MHz and the MLS usage above 5 030 MHz by careful location of the beacons.

8 It should be noted that use of the band 5 000-5 030 MHz for terrestrial beacons would preclude the worldwide use of the band for a radionavigation-satellite service (space-to-Earth) application.

9 If the allocation to the RNSS (space-to-Earth) in the band 5 010-5 030 MHz is not done, the allocation to the RNSS (Earth-to-space) could be extended to the band 5 000-5 030 MHz.

MOD EUR/13/68

4 800-5 830 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 000-5 150	AERONAUTICAL RADIONAVIGATION S5.367 MOD S5.444 S5.444A ADD S5.444B	

MOD EUR/13/69

S5.444 The band ~~5 000~~5 030-5 150 MHz is to be used for the operation of the international standard system (microwave landing system) for precision approach and landing. The requirements of this system shall take precedence over other uses of this band. For the use of this band, No. **S5.444A** and Resolution **114 (WRC-95)** apply.

ADD EUR/13/70

S5.444B *Additional allocation:* The band 5 010-5 030 MHz is also allocated to the radionavigation-satellite service (space-to-Earth) on a primary basis. The band 5 000-5 010 MHz is also allocated to the radionavigation-satellite service (Earth-to-space) on a primary basis. In order not to cause harmful interference to the radio astronomy service in the band 4 990-5 000 MHz, the aggregate power flux-density radiated in the 4 990-5 000 MHz band by all the space stations within any RNSS (space-to-Earth) system operating in the 5 010-5 030 MHz band shall not exceed the level of –171 dB(W/m^2) in a 10 MHz bandwidth into any radio astronomy observatory site for more than 2% of the time.

Reasons: The radionavigation-satellite service would be provided with only 20 MHz which may not be wide enough to accommodate the RNSS requirement but would not constrain the use of the bands above 5 030 MHz by other services. The possibility of an adjacent upper extension of this allocation could be considered when the outcome of the studies required by Resolution 114 is made available.

This also provides additional spectrum for the RNSS (Earth-to-space).

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey

PART 2D5

Agenda item 1.15.1 - RNSS (Earth-to-space) 1 300-1 350 MHz

Introduction

1 In accordance with the Radio Regulations the band 1 300-1 350 MHz is allocated on a primary basis to the aeronautical radionavigation service and on a secondary basis to the radiolocation service in all ITU regions.

2 New allocations to the radionavigation-satellite service are required to support developments of systems with higher reliability and accuracy, because the already allocated bands are not wide enough to accommodate the larger bandwidth. Proposals for radionavigation-satellite service systems have been made in which the satellites are need to be synchronized to terrestrial radio beacons (~ 50 beacons worldwide). For these systems radionavigation-satellite service (Earth-to-space) allocations are needed.

3 Results of ITU-R studies show that additional radionavigation-satellite service (Earth-to-space) signals in the band 1 300-1 350 MHz:

a) can protect the aeronautical radionavigation service and radiolocation service between 1 300-1 350 MHz by careful location of the beacons. The required separation distance between the radar and the beacon is less then 60 km;

b) are compatible with the emissions of the radars between 1 300-1 350 MHz with an adequate tuning of the AGC loop in the receiver.

MOD EUR/13/71

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 300-1 350	AERONAUTICAL RADIONAVIGATION S5.337 RADIONAVIGATION SATELLITE (Earth-to-space) ~~Radiolocation~~RADIOLOCATION S5.149 ADD S5.337A	

ADD EUR/13/72

S5.337A The use of the band 1 300-1 350 MHz by earth stations in the radionavigation-satellite service and by stations in the radiolocation service shall not cause harmful interference to nor constrain the development of the aeronautical-radionavigation service.

Reasons: This provides additional spectrum for the RNSS (Earth-to-space). The unconstrained use of the band by the aeronautical radionavigation service is secured by the additional footnote. Upgrading the radiolocation service is necessary to give the same status to this service vis-à-vis the RNSS (Earth-to-space) service.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 2D6

Agenda item 1.15.2 - RNSS (space-to-Earth) at 1 215-1 260 MHz and 1 559-1 610 MHz

Introduction

Two radionavigation-satellite systems, GPS and GLONASS, currently use the bands 1 215-1 260 MHz and 1 559-1 610 MHz. GPS signals are already being received by orbiting satellites (e.g. TOPEX/Poseidon, AMSAT-3D, Orbcomm, Globalstar and IKONOS-1) and both GPS and GLONASS are planned to be used for a range of space applications of navigation, localization and timing.

The use of RNSS signals is presently protected only through a space-to-Earth allocation in these bands. The addition of the space-to-space direction, which is proposed in this ECP, would give protection to navigation systems on board scientific satellites, Earth-observation satellites, communications satellites and manned spacecraft.

However, provisions should be taken to ensure that this new allocation will not put burden on the operating and notified systems, which have been proved to create only limited and short-term interference to spaceborne RNSS receivers.

Also, interference protection of new RNSS (space-to-space) services should not be allowed to place new constraints on other existing services (e.g. MSS in adjacent bands). In particular, studies have demonstrated that constraint might exceed those defined in Recommendation ITU-R M.1343 for MSS uplink transmission in case where protection would be required for an RNSS carrier above 1 607 MHz.

ARTICLE S5

MOD EUR/13/73

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 215-1 240	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) S5.329 ADD S5.329A SPACE RESEARCH (active) S5.330 S5.331 S5.332	
1 240-1 260	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) S5.329 ADD S5.329A SPACE RESEARCH (active) Amateur S5.330 S5.331 S5.332 S5.334 S5.335	

MOD EUR/13/74

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 559-1 610	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) ADD S5.329A S5.341 S5.355 S5.359 S5.363	

ADD EUR/13/75

S5.329A Radionavigation-satellite service (space-to-space) operating in the bands 1 215-1 260 MHz and 1 559-1 610 MHz shall not request protection from radionavigation-satellite systems operating in these bands or advanced published, as to the end of WRC-2000.

Reasons:

1 To propose a primary allocation to RNSS (space-to-Earth) (space-to-space) in the bands 1 215-1 260 MHz and 1 559-1 610 MHz

2 To ensure through a new footnote that no constraint will be put on planned RNSS systems which will be advance published before the end of the WRC-2000.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 2D7

Agenda item 1.15.3 - Status of allocations to services other than RNSS at 1 559-1 610 MHz

Introduction

1 In accordance with the Radio Regulations the band 1 559-1 610 MHz is allocated on a primary basis to the aeronautical radionavigation and the radionavigation-satellite service in all ITU regions.

2 In accordance with footnotes RR S5.355 and S5.359 some administrations additionally allocate the band 1 559-1 610 MHz on the primary and secondary basis to the fixed service.

3 RR provision No. S4.10 recognized that radionavigation services require special measures to ensure freedom from harmful interference and provision No. S4.5 states that the frequency assignment to a station of a given service shall be separated from the limits of the band allocated to this service in such a way, taking account of the frequency band assigned to a station, no harmful interference is caused to services to which frequency bands immediately adjoining are allocated.

4 The results of the ITU-R studies have shown that sharing between RNSS and FS the frequency band 1 559-1 610 MHz is not recommended.

5 It is expected, that in most cases lifetime end of existing fixed systems will be 1 January 2005.

ARTICLE S5

MOD EUR/13/76

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 559-1 610	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) S5.341 S5.355 MOD S5.359 ADD S5.359A S5.363	

MOD EUR/13/77

S5.359 *Additional allocation:* in Germany, Saudi Arabia, Armenia, Austria, Azerbaijan, Belarus, Benin, Bulgaria, Cameroon, Spain, France, Gabon, Georgia, Greece, Guinea, Guinea-Bissau, Hungary, Jordan, Kazakstan, Kuwait, Latvia, Libya, Mali, Mauritania, Moldova, Mongolia, Nigeria, Uganda, Uzbekistan, Pakistan, Poland, Syria, Kyrgyzstan, the Democratic People's Republic of Korea, Romania, Russian Federation, Senegal, Swaziland, Tajikistan, Tanzania, Turkmenistan, Ukraine, Zambia and Zimbabwe the bands 1 550-1 559 MHz, 1 610-1 645.5 MHz and 1 646.5-1 660 MHz are also allocated to the fixed service on a primary basis. Administrations are urged to make all practicable efforts to avoid the implementation of new fixed-service stations in these bands ~~1 550-1 555 MHz, 1 610-1 645.5 MHz and 1 646.5-1 660 MHz~~.

ADD EUR/13/78

S5.359A *Additional allocation*: in Germany, Saudi Arabia, Armenia, Azerbaijan, Belarus, Benin, Bulgaria, Cameroon, Spain, Gabon, Georgia, Greece, Guinea, Guinea-Bissau, Hungary, Jordan, Kazakstan, Kuwait, Libya, Mali, Mauritania, Moldova, Mongolia, Nigeria, Uganda, Uzbekistan, Pakistan, Poland, Syria, Kyrgyzstan, the Democratic People's Republic of Korea, Romania, Russian Federation, Senegal, Swaziland, Tajikistan, Tanzania, Turkmenistan, Ukraine, Zambia and Zimbabwe the band 1 559-1 610 MHz is also allocated to the fixed service on a primary basis until 1 January 2005. After this date, the fixed service may continue to operate on a secondary basis until 1 January 2015. Administrations are urged to take all practicable steps to protect the radionavigation-satellite service and the aeronautical-radionavigation service and not authorize new frequency assignments to fixed service systems in this band.

Reasons: Global navigation-satellite service (GNSS) should be provided adequate protection as global safety regularity of flight service, taking into account existing fixed service.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 1 to
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21 January 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

PART 1

IMT-2000, maritime and aeronautical issues

CONTENTS

PART 1A

Agenda item 1.6 - IMT-2000

Issues

The need to identify global additional frequency bands for the terrestrial component of IMT-2000, beyond those identified in S5.388, to satisfy future spectrum requirements which have been based on projected market demand.

The need to identify additional frequency bands for the satellite component of IMT-2000 beyond those identified in S5.388.

Introduction

1 WARC-92 identified, in footnote S5.388, the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz for IMT-2000, including 1 980-2 010 MHz (uplink) and 2 170-2 200 MHz (downlink) for the satellite component. This is reflected in Resolution 212, which was drafted at WARC-92 and amended at WRC-95 and WRC-97. Further developments at WRC-95 led to the allocation in Region 2 of the frequency bands 2 010-2 025 MHz (uplink) and 2 160-2 170 MHz (downlink), from within the IMT-2000 range, for MSS.

2 The CPM Report concludes on total spectrum requirements for the terrestrial element of IMT-2000 for the three Regions[1], which are based on the sum of the spectrum currently identified for IMT-2000 in S5.388, the spectrum currently identified in the three Regions for existing second generation systems and an additional spectrum requirement to meet the forecasted traffic volume in geographic areas where the traffic is the highest. This additional spectrum is estimated to be 160 MHz in all three Regions by 2010. Europe fully supports these conclusions.

3 With respect to satisfying the future spectrum requirements for IMT-2000, WRC-2000 agenda item 1.6.1 addresses the need to consider “spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component…”.

In line with the wording of the agenda item, Europe places priority on the spectrum requirements of the terrestrial component of IMT-2000 over those of the satellite component.

4 The CPM text concludes on the spectrum requirements given in Table 1 for the MSS, including the satellite component of IMT-2000. These figures are the forecast requirements in geographical areas where the traffic is the highest. Presently, approximately 2×115 MHz are allocated to the MSS worldwide and is assumed to be made available in those geographical areas where the traffic is the highest. Thus, the additional global MSS spectrum requirements are 2×8 MHz by 2005 and 2×30 MHz by 2010.

TABLE 1

Global mobile-satellite spectrum requirements, including the IMT-2000 satellite component (MHz)

	Year 2005	**Year 2010**
IMT-2000 satellite component	2×31.5	2×67
MSS (including IMT-2000 satellite component)	2×123	2×145

[1] 555 MHz in Region 1, 390 MHz in Region 2 and 480 MHz in Region 3.

Europe does not however, consider it necessary to propose additional spectrum to satisfy MSS requirements under agenda item 1.6, but seeks identification of the existing MSS bands below 3 GHz for possible IMT-2000 applications. The proposed method of identification is one element of a proposed new resolution.

5 For the terrestrial component, the purpose of the WRC-2000 Conference should be to find global bands for all three Regions to meet the requirement of 160 MHz of additional spectrum. Globally harmonized spectrum will facilitate worldwide roaming and reduce cost and complexity of IMT-2000 implementation. To this end, Europe is proposing to identify the band 2 500-2 690 MHz as the new global additional band for IMT-2000, with the band 2 520-2 670 MHz specifically for the terrestrial component.

6 The bands 2 500-2 520 MHz and 2 670-2 690 MHz are used today by a number of non-MSS services, thereby making these bands unavailable for MSS use in most parts of the world. Transitional arrangements in these bands, similar to those introduced in the 2 GHz MSS allocations would enhance the usability of these MSS spectrum allocations. Also, the CPM Report to WRC-2000 identifies all existing MSS allocations in the 1 to 3 GHz range as possible candidate bands for identification for the satellite component of IMT-2000. These bands are not providing additional MSS spectrum. The requirements for additional MSS allocation at WRC-2000 is addressed *inter alia* by agenda item 1.9.

7 For the terrestrial component, the identification of the additional bands should be done through (a) new footnote(s) in Article S5, referring to a supporting resolution. It is believed that this approach, whereby the identification of spectrum is made by a footnote in association with a RR Resolution, rather than the use of a RR Resolution alone which is generally considered to apply to transitional matters, gives the most stable identification of spectrum for IMT-2000. This is important to facilitate global roaming and global economies of scale in the manufacture of equipment, and is particularly important for developing countries to gain the greatest benefit from IMT-2000. This approach also underlines the importance of the IMT-2000 project within ITU, and the significant efforts both within ITU and external standardization bodies in the development of harmonized radio standards for IMT-2000.

8 The CPM text states that at least a portion of the global band satisfying the 160 MHz additional spectrum for the terrestrial component could be used in a harmonized way to facilitate global roaming.

9 Europe also proposes that WRC-2000 should also identify for IMT-2000 spectrum that is currently used on a large scale in the various Regions for existing (second generation) cellular/mobile systems within which IMT-2000 may be implemented in the longer term. Because the location of existing second generation spectrum is not common to the three Regions, the location of additional spectrum for IMT-2000 may similarly vary. As a result, some flexibility in the identification of additional spectrum for IMT-2000 may be needed.

10 Second generation mobile systems will continue to operate in the short and medium term so that their bands could be available for IMT-2000 only in the longer term. Also as the second generation spectrum was already taken into account and it cannot be part of the 160 MHz additional spectrum requirement, that means that the global additional spectrum satisfying the additional 160 MHz spectrum requirement is to be identified outside the second generation mobile band.

11 In relation to frequency bands currently used for second generation mobile systems, future frequency arrangements should aim to achieve compatibility with the existing frequency arrangements in operation, including the current duplex spacing and direction employed (for instance, in the GSM1800 band, 1 710-1 785 MHz paired with 1 805-1 880 MHz).

12 Europe recognizes that high altitude platform stations (HAPS) could provide a platform to support base stations for the terrestrial component of IMT-2000 in appropriate situations. Regulatory action is required to enable HAPS to fulfil this role.

13 This proposal is divided into five parts:

– the first part addresses that no change is needed for the current footnote S5.388;

– the second part addresses spectrum which is proposed to satisfy the additional global requirement and particularly the regulatory provisions relating to the band 2 500-2 690 MHz;

– the third part addresses spectrum which is currently identified for second generation mobile systems and which is proposed, under certain conditions, to be identified globally for IMT-2000. In Europe, it is worth noting that second generation systems (GSM900 and GSM1800) are widely deployed and hence refarming of this spectrum is envisaged only in the longer term;

– the fourth part introduces new resolutions to be introduced at WRC-2000;

– Resolution ZZZ [EUR/13/1] concerning the extension bands for the implementation of IMT-2000;

– Resolution TTT [EUR/13/2] dealing with frequency bands for the satellite component of IMT-2000 and appropriate transitional arrangements;

– the fifth part addresses the possible implementation of high altitude platform stations (HAPS) in an IMT-2000 system.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 1A1

Agenda item 1.6 - Proposals on initial IMT-2000 spectrum identified in S5.388

NOC EUR/13/1

For allocations at 1 885-2 200 MHz

NOC EUR/13/2

S5.388 The bands 1 885-2 025 MHz and 2 110-2 200 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of these bands by other services to which they are allocated. The bands should be made available for IMT-2000 in accordance with Resolution **212 (Rev.WRC-97)**.

Reasons: Implementation of IMT-2000 in the bands identified in the Radio Regulations at WARC-92 is already planned in many countries, including the transitional arrangement of existing services. It is therefore essential to maintain the existing provisions within the Radio Regulations relating to these frequency bands.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Liechtenstein, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., United Kingdom, Slovenia, Sweden, Switzerland, Turkey

PART 1A2

Agenda item 1.6 - Proposals for bands to meet additional spectrum requirement for IMT-2000

The following bands are proposed to be identified for IMT-2000 with the primary objective, to satisfy the requirement for additional terrestrial IMT-2000 spectrum referred to in the CPM Report. Some additional regulatory provisions for the satellite component are proposed.

MOD EUR/13/3

For allocations at 2 500-2 690 MHz

2 170-2 520 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 500-2 520 FIXED S5.409 S5.410 S5.411 MOBILE except aeronautical mobile MOBILE-SATELLITE (space-to-Earth) S5.403 S5.405 S5.407 S5.408 S5.412 S5.414 ADD S5.AAA	**2 500-2 520** FIXED S5.409 S5.411 FIXED-SATELLITE (space-to-Earth) S5.415 MOBILE except aeronautical mobile MOBILE-SATELLITE (space-to-Earth) S5.403 S5.404 S5.407 S5.414 S5.415A ADD S5.AAA	

2 520-2 700 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 520-2 655 FIXED S5.409 S5.410 S5.411 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 S5.339 S5.403 S5.405 S5.408 S5.412 S5.417 S5.418 ADD S5.AAA	**2 520-2 655** FIXED S5.409 S5.411 FIXED-SATELLITE (space-to-Earth) S5.415 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 S5.339 S5.403 ADD S5.AAA	**2 520-2 535** FIXED S5.409 S5.411 FIXED-SATELLITE (space-to-Earth) S5.415 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 S5.403 S5.415A ADD S5.AAA **2 535-2 655** FIXED S5.409 S5.411 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 S5.339 S5.418 ADD S5.AAA
2 655-2 670 FIXED S5.409 S5.410 S5.411 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.412 S5.417 S5.420 ADD S5.AAA	**2 655-2 670** FIXED S5.409 S5.411 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) S5.415 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.420 ADD S5.AAA	**2 655-2 670** FIXED S5.409 S5.411 FIXED-SATELLITE (Earth-to-space) S5.415 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.420 ADD S5.AAA
2 670-2 690 FIXED S5.409 S5.410 S5.411 MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.419 S5.420 ADD S5.AAA	**2 670-2 690** FIXED S5.409 S5.411 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) S5.415 MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.419 S5.420 ADD S5.AAA	**2 670-2 690** FIXED S5.409 S5.411 FIXED-SATELLITE (Earth-to-space) S5.415 MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.419 S5.420 S5.420A ADD S5.AAA

ADD EUR/13/4

S5.AAA The band 2 500-2 690 MHz is intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of this band for other services to which the band is allocated. This band should be made available for IMT-2000 in accordance with Resolution **ZZZ** [EUR/13/1]. Transitional arrangements between existing services and the mobile-satellite service (including satellite component of IMT-2000) in the bands 2 500-2 520 MHz and 2 670-2 690 MHz shall be in accordance with Resolution **TTT** [EUR/13/2].

Reasons:

1 The CPM Report concludes that there is a requirement for 160 MHz of additional spectrum for the terrestrial component of IMT-2000, beyond the spectrum already identified in RR No. S5.388 and beyond the spectrum used in the three Regions for second generation mobile systems.

2 This band offers the potential to contribute a significant portion of the additional spectrum requirement for IMT-2000. Geographical sharing (urban/rural) might facilitate the transition or possibly enable, in the longer term, the remaining operation of other services.

NOTE 1 - As stated in Resolution TTT [EUR/13/2], the bands 2 500-2 520 MHz and 2 670-2 690 MHz are intended to be used for the satellite component of IMT-2000. However, depending on market developments it may be possible in the longer term for these bands to be used by the terrestrial component.

NOTE 2 - The need to make available a total of 160 MHz globally for the terrestrial component may reveal the necessity to identify frequencies in addition to the 2 500-2 690 MHz band. Europe is investigating the best possibilities to comply with the primary objective of meeting the 160 MHz spectrum requirement for the terrestrial component on a global basis by the year 2010. In this context the current and future usage of the band 2 700-2 900 MHz is being considered, and studies are being carried out to assess the feasibility of sharing between radars and IMT-2000 applications.

Europe is requesting ITU-R in the proposed Resolution ZZZ [EUR/13/1] to study the feasibility of sharing in the band 2 700-2 900 MHz between the aeronautical radionavigation service and the mobile services (for example, for the identification of additional spectrum for IMT-2000), and to report to WRC-03 on the results of these studies.

The discussions on 2 700-2 900 MHz do not affect the need to identify the band 2 500-2 690 MHz at WRC-2000.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Iceland, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., United Kingdom, Slovenia, Sweden, Switzerland, Turkey

PART 1A3

Agenda item 1.6 - Proposals for identification of bands already used for second generation systems for terrestrial IMT-2000

The following bands are already used extensively for second generation mobile systems in Europe and elsewhere. They do not therefore provide additional spectrum in these areas, and hence the 160 MHz requirement must be found from other bands. Nevertheless, they are proposed to be identified on a global basis for IMT-2000 to facilitate transition in the longer term, based on market demand.

MOD EUR/13/5

For allocations at 862-960 MHz and 1 710-1 885 MHz

470-890 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
		610-890 FIXED MOBILE BROADCASTING
	806-890 FIXED MOBILE BROADCASTING	
862-890 FIXED MOBILE except aeronautical mobile BROADCASTING S5.322		
S5.319 S5.323 ADD S5.DDD	S5.317 S5.318 ADD S5.DDD	S5.149 S5.305 S5.306 S5.307 S5.311 S5.320 ADD S5.DDD

890-1 350 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="3">890-942
FIXED
MOBILE except aeronautical mobile
BROADCASTING S5.322
Radiolocation

S5.323 ADD S5.DDD</td><td>890-902
FIXED
MOBILE except aeronautical mobile
Radiolocation
S5.318 S5.325 ADD S5.DDD</td><td rowspan="3">890-942
FIXED
MOBILE
BROADCASTING
Radiolocation

S5.327 ADD S5.DDD</td></tr>
<tr><td>902-928
FIXED
Amateur
Mobile except aeronautical mobile
Radiolocation
S5.150 S5.325 S5.326
ADD S5.DDD</td></tr>
<tr><td>928-942
FIXED
MOBILE except aeronautical mobile
Radiolocation
S5.325 ADD S5.DDD</td></tr>
<tr><td>942-960
FIXED
MOBILE except aeronautical mobile
BROADCASTING S5.322
S5.323 ADD S5.DDD</td><td>942-960
FIXED
MOBILE

ADD S5.DDD</td><td>942-960
FIXED
MOBILE
BROADCASTING
S5.320 ADD S5.DDD</td></tr>
</table>

1 710-2 170 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td>1 710-1 930</td><td colspan="2">FIXED
MOBILE S5.380
S5.149 S5.341 S5.385 S5.386 S5.387 S5.388 ADD S5.DDD</td></tr>
</table>

ADD EUR/13/6

S5.DDD Sub-bands used for second generation mobile systems as identified in Resolution **ZZZ** [EUR/13/1] are intended for use by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of these sub-bands for other services to which they are allocated. The sub-bands should be made available for IMT-2000 in accordance with Resolution **ZZZ** [EUR/13/1].

Reasons:

1 The band 862-960 MHz in Region 1, 806-902 MHz in Region 2 and 806-960 MHz in Region 3 is allocated on a primary basis to the mobile service, and is currently already used for second generation mobile systems in many countries according to national frequency plans. The band 862-960 MHz is therefore an obvious candidate for terrestrial IMT-2000 extension, based on market demand, for use in the longer term where and when the use by existing systems is decreasing.

2 As indicated in the CPM Report, the band 1 710-1 885 MHz is allocated worldwide to the fixed and mobile services on a primary basis and large parts of this band are used in many countries for second generation mobile systems. This band is therefore an obvious candidate for identification for terrestrial IMT-2000 extension, based on market demand, for use in the longer term when and where the use by existing systems is decreasing.

3 Second generation mobile systems are only implemented in portions of these bands.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Estonia, Finland, France, Hungary, Liechtenstein, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey

PART 1A4

Agenda item 1.6 - Proposal for a resolution regarding the implementation of IMT-2000

Introduction

The CPM text states that at least a large portion of the additional spectrum could be used in a harmonized way to facilitate global roaming. It is therefore proposed that a new Resolution ZZZ [EUR/13/1] should be developed to implement the additional IMT-2000 spectrum identified at WRC-2000, and that this Resolution should ensure that harmonized frequency arrangements are developed to facilitate coordinated global deployment of IMT-2000. Where necessary, consideration should be given to compatibility with current usage and transition of existing services.

In relation to frequency bands currently used for second generation mobile systems, future frequency arrangements should aim to achieve compatibility with the existing frequency arrangements in operation, including the current duplex spacing and direction employed (for instance, 1 710-1 785 MHz paired with 1 805-1 880 MHz).

For the 900 MHz frequency band, where a variety of existing second generation arrangements are currently in operation, the studies undertaken should consider the possibility to limit the number of future frequency plans used in the longer term for IMT-2000 deployment in these bands.

In relation to the frequency bands for the satellite component of IMT-2000, it is proposed that a new Resolution TTT [EUR/13/2] be developed.

ADD EUR/13/7

RESOLUTION ZZZ (WRC-2000) [EUR/13/1]

Extension bands for implementation of International Mobile Telecommunications-2000 (IMT-2000)

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that ITU-R has recommended the 1-3 GHz range as the most suitable for IMT-2000;

b) that WARC-92 identified the bands 1 885-2 025 MHz and 2 110-2 200 MHz, intended for use on a worldwide basis for IMT-2000, including the bands 1 980-2 010 MHz and 2 170-2 200 MHz for the satellite component of IMT-2000 in RR **S5.388** and under the provisions of Resolution **212**;

c) that ITU-R studies concluded that global additional spectrum of 160 MHz for the terrestrial component, in addition to the initial IMT-2000 bands in **S5.388** and in addition to bands used for second generation mobile systems in the various Regions, is required for identification to provide IMT-2000 in those areas where the traffic is the highest;

d) that ITU-R studies concluded that the bands used by second generation mobile systems in the various regions are required for identification for IMT-2000, to be implemented when the use of these bands by second generation terrestrial systems has decreased;

e) that, in **S5.AAA** of the Radio Regulations, this Conference has identified additional spectrum for IMT-2000, in order to meet the additional spectrum requirement;

f) that, in **S5.DDD** of the Radio Regulations, this Conference has identified further spectrum for the terrestrial component of IMT-2000 which is currently used for second generation mobile systems, to meet the total spectrum requirement;

g) that existing band plans for second generation mobile systems in the range 806-960 MHz are:

810-828 MHz and 860-885 MHz	paired with	915-958 MHz;
838-840 MHz	paired with	893-895 MHz;
843-846 MHz	paired with	898-901 MHz;
824-849 MHz	paired with	869-894 MHz
880-915 MHz	paired with	925-960 MHz

with mobile transmitting in the lower band;

h) that existing band plans for second generation mobile systems in the band 1 710-1 885 MHz are:

- 1 710-1 785 MHz paired with 1 805-1 880 MHz;
- 1 850-1 885 MHz: portion of the band 1 850-1 910 MHz paired with 1 930-1 990 MHz;
- 1 880-1 885 MHz: portion of the band 1 880-1 900 MHz;

i) that based on Resolution **722 (WRC-97)** the preliminary agenda for WRC-03 under agenda item 2.6 will consider the status of allocations to radiolocation service in the bands around 3 GHz and around 5 GHz,

noting

a) that harmonized use of the additional global bands identified in **S5.AAA** will facilitate, by offering possibilities of global roaming, the worldwide success of IMT-2000 to the benefit of consumers, manufacturers and operators;

b) that, in the frequency bands identified in **S5.DDD**, harmonization to the greatest extent practicable should be aimed for, noting however that frequency arrangements should be compatible with existing band plans for second generation mobile systems;

c) that not all administrations may need, or be able to implement, all of the IMT-2000 extension bands identified at this Conference due to the existing services,

d) that, in addition to the bands identified for the satellite component of IMT-2000 in Resolution **212**, the bands 2 500-2 520 MHz and 2 670-2 690 MHz, identified in **S5.AAA** for IMT-2000, allocated to MSS and addressed in Resolution **TTT** [EUR/13/2], are intended to be used for the satellite component of IMT-2000;

e) that, depending on market developments it may be possible in the longer term for the bands 2 500-2 520 MHz and 2 670-2 690 MHz to be used by the terrestrial component of IMT-2000,

recognizing

a) that the frequency band 880-915/925-960 MHz will be available only in the long term in countries having implemented second generation mobile systems in this band, when and where the use by existing systems has decreased, based on market demand for IMT-2000;

b) that the frequency band 1 710-1 785/1 805-1 880 MHz will be available only in the long term in countries having implemented second generation mobile systems in this band, when and where the use by existing systems has decreased, based on market demand for IMT-2000;

c) that the frequency band 1 880-1 885 MHz will be available only in the long term in countries having implemented second generation mobile systems in this band, when and where the use by existing systems has decreased, based on market demand for IMT-2000,

resolves to invite administrations

to make available, based on market demand, extension bands identified in **S5.AAA** for the terrestrial component of IMT-2000 to meet the forecasted growth of these systems. Due consideration should be given to the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT-2000 as indicated in *noting a)* and *b)* above, taking into account the use of these bands by other existing radio services,

requests ITU-R

1 to develop harmonized frequency arrangements for operation of the terrestrial component of IMT-2000 in the expansion spectrum identified in **S5.AAA** of this Conference, taking account as necessary of the current usage and/or transition of existing services currently operating in this band, and identification of the band 2 500-2 520 MHz/2 670-2 690 MHz for both components of IMT-2000;

2 to develop frequency arrangements for operation of IMT-2000 in the spectrum identified in *considering g)* and *h),* aiming to achieve compatibility with existing frequency arrangements in use by second generation mobile systems;

3 to continue to study the feasibility of sharing in the band 2 700-2 900 MHz between the aeronautical radionavigation service and the mobile service (for example, for the identification of additional spectrum for IMT-2000), taking into account the technical, operational and regulatory aspects of sharing, and to report to WRC-03 on the results of this study,

further resolves

1 that studies should be commenced forthwith;

2 that these frequency arrangements should be published by ITU-R in one or more recommendations.

ADD EUR/13/8

RESOLUTION TTT (WRC-2000) [EUR/13/2]

Frequency bands for the satellite component of IMT-2000 and appropriate transitional arrangements

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the bands 1 980-2 010 MHz and 2 170-2 200 MHz are identified for use by the satellite component of IMT-2000 through RR **S5.388** and Resolution **212**;

b) that the band 2 500-2 690 MHz is identified for use by IMT-2000 through RR **S5.AAA**;

c) that the bands 1 525-1 544 MHz, 1 545-1 559 MHz, 1 610-1 626.5 MHz, 1 626.5-1 645.5 MHz, 1 646.5-1 660.5 MHz and 2 483.5-2 500 MHz are allocated on a primary basis to the mobile-satellite service;

d) that the bands 2 500-2 520 MHz and 2 670-2 690 MHz are allocated to the mobile-satellite service, these allocations being co-primary with fixed and mobile service allocations in all three Regions and with the fixed-satellite service in Regions 2 and 3,

resolves

1 that the bands 2 500-2 520 MHz and 2 670-2 690 MHz, identified in **S5.AAA** for IMT-2000 and allocated to the mobile-satellite service, are intended to be used for the satellite component of IMT-2000, however, depending on market developments it may be possible in the longer term for these bands to be used by the terrestrial component of IMT-2000;

2 that, in addition to the frequency bands indicated in *considering a)* and *resolves* 1, the frequency bands 1 525-1 544 MHz, 1 545-1 559 MHz, 1 610-1 626.5 MHz, 1 626.5-1 645.5 MHz, 1 646.5-1 660.5 MHz and 2 483.5-2 500 MHz may be used by the satellite component of IMT-2000, subject to the provisions related to the mobile-satellite service in these frequency bands,

further resolves

1 that taking into account **S5.AAA**, to facilitate the introduction and future use of the frequency bands 2 500-2 520 MHz and 2 670-2 690 MHz by the satellite component of IMT-2000, (not precluding the use of these bands for other MSS applications):

a) administrations are urged to ensure that frequency assignments to new fixed service systems, to be brought into operation after [1 January 2002], do not overlap with the frequency bands 2 500-2 520 MHz and 2 670-2 690 MHz;

b) administrations are encouraged, where practicable, to draw up plans for the gradual transfer of the frequency assignments to their fixed service stations in the frequency bands 2 500-2 520 MHz and 2 670-2 690 MHz to non-overlapping bands, giving priority to the transfer of their frequency assignments from the MSS uplink band 2 670-2 690 MHz, considering the technical, operational and economic aspects.

Reasons:

1 The bands 1 525-1 544 MHz, 1 545-1 559 MHz, 1 610-1 626.5 MHz, 1 626.5-1 645.5 MHz, 1 646.5-1 660.5 MHz, 2 483.5-2 500 MHz, 2 500-2 520 MHz and 2 670-2 690 MHz are already allocated globally on a primary basis to the mobile-satellite service.

2 The bands 2 500-2 520 MHz and 2 670-2 690 MHz are currently used by other services, making the bands in practice effectively unavailable for MSS use.

3 The difficulty of finding new MSS allocations increases the importance of facilitating the effective usage by MSS of the existing MSS allocations.

4 By encouraging administrations not to implement new FS systems in the bands 2 500-2 520 MHz and 2 670-2 690 MHz, the bands will over time become easier to use for the satellite component of IMT-2000.

5 The use of the bands 1 544-1 545 MHz and 1 645.5-1 646.5 MHz is limited to distress and safety communications (see Article S31) and therefore not suitable for IMT-2000.

6 These bands are used and will continue to be used also by non-IMT-2000 MSS systems. By identifying all these bands for the satellite component of IMT-2000, administrations are given maximum flexibility for accommodating the deployment of satellite IMT-2000 systems.

7 Since existing deployment of non-IMT-2000 MSS systems in some or all parts of these bands is extensive, availability of these bands for the satellite component may only be possible in the longer term.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 1A5

Agenda item 1.6 - Use of high altitude platform stations in IMT-2000 systems

Issue

This part addresses the option to use the high altitude platform stations (HAPS) for the delivery of terrestrial IMT-2000, within the bands identified for terrestrial IMT-2000 in S5.388 subject to licensing, coordination and sharing requirements of administrations.

This part deals with regulatory issues relating to HAPS in the context of IMT-2000, and is not related to the issue of providing more spectrum for the terrestrial component of IMT-2000.

The use of HAPS for this purpose does not deal with the issues involved in the consideration of the use of HAPS in the fixed service in the 47.2-47.5 GHz and 47.9-48.2 GHz bands, nor do they affect the European proposals on other proposals for the use of HAPS at frequencies above 3 GHz which may be considered under agenda item 1.5.

Introduction

1 A high altitude platform station (HAPS) is defined in S1.66A as “a station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth”. Each HAPS deploys a multibeam antenna capable of projecting numerous spot beams within its coverage area. The role of HAPS is equivalent to the terrestrial IMT-2000 base station.

Each HAPS will be positioned above commercial airspace at an altitude that is high enough to provide service to a large footprint but that is low enough to provide dense coverage. HAPS can offer a new means of providing IMT-2000 with minimal ground network build out.

2 The Radio Regulations, under S4.15A, state that “transmissions to or from high altitude platform stations shall be limited to bands specifically identified in RR S5”. The only identification currently in Article S5 is the footnote S5.552A which states that “the allocation to the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz is designated for use by high altitude platform stations. The use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz is subject to the provisions on Resolution 122 (WRC-97)”.

The use of HAPS as an option to provide IMT-2000 in the frequency bands identified for terrestrial IMT-2000 in RR S5.388 is proposed to be enabled via a new footnote in RR S5 with a reference to a new resolution in the Radio Regulations.

3 Draft new Recommendation ITU-R M.[8/115], as agreed by ITU-R Study Group 8 for adoption by correspondence, considers the sharing and coordination requirements associated with the use of HAPS as part of a terrestrial IMT-2000 system.

It would seem appropriate that, if HAPS operation within a terrestrial IMT-2000 is to be permitted, some consideration will be needed as to how to ensure the minimum performance characteristics of the HAPS in Recommendation ITU-R M.[8/115] and in particular the antenna patterns and operational spfd limits for coordination purposes and to ensure protection of adjacent band operations.

4 The use of HAPS in the terrestrial IMT-2000 frequency bands shall be optional for administrations. Each administration shall retain its individual authority over technical and regulatory matters pertaining to the sharing, coordination and implementation of HAPS in these bands.

5 RR S11.26 states that notification for HAPS in the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz shall not reach the Bureau earlier than five years before the assignments are brought into use. No. S11.26 is not relevant for the IMT-2000 situation. The requirement for notification in case of IMT-2000 is considered necessary in order to inform all administrations about assignments potential to cause interference and an additional provision S11.8A may be required.

Proposals

Concerning the possible implementation of HAPS in an IMT-2000 system, the following regulatory changes are proposed:

MOD EUR/13/9

For allocations at 1 885-2 170 MHz

1 710-2 170 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 710-1 930	FIXED MOBILE S5.380 S5.149 S5.341 S5.385 S5.386 S5.387 S5.388 ADD S5.BBB	
1 930-1 970 FIXED MOBILE S5.388 ADD S5.BBB	**1 930-1 970** FIXED MOBILE Mobile-satellite (Earth-to-space) S5.388 ADD S5.BBB	**1 930-1 970** FIXED MOBILE S5.388 ADD S5.BBB
1 970-1 980	FIXED MOBILE S5.388 ADD S5.BBB	
1 980-2 010	FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.388 S5.389A S5.389B S5.389F	
2 010-2 025 FIXED MOBILE S5.388 ADD S5.BBB	**2 010-2 025** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.388 S5.389C S5.389D S5.389E S5.390	**2 010-2 025** FIXED MOBILE S5.388 ADD S5.BBB

2 025-2 110	SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE S5.391 SPACE RESEARCH (Earth-to-space) (space-to-space) S5.392	
2 110-2 120	FIXED MOBILE SPACE RESEARCH (deep space) (Earth-to-space) S5.388 ADD S5.BBB	
2 120-2 160 FIXED MOBILE S5.388 ADD S5.BBB	**2 120-2 160** FIXED MOBILE Mobile-satellite (space-to-Earth) S5.388 ADD S5.BBB	**2 120-2 160** FIXED MOBILE S5.388 ADD S5.BBB
2 160-2 170 FIXED MOBILE S5.388 ADD S5.BBB S5.392A	**2 160-2 170** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) S5.388 S5.389C S5.389D S5.389E S5.390	**2 160-2 170** FIXED MOBILE S5.388 ADD S5.BBB

ADD EUR/13/10

S5.BBB In Regions 1 and 3, the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, and in Region 2, the bands 1 885-1 980 MHz and 2 110-2 160 MHz, may be used by high altitude platform stations as base stations to provide IMT-2000, in accordance with Resolution **HAPS** [EUR/13/3].

ADD EUR/13/11

RESOLUTION HAPS (WRC-2000) [EUR/13/3]

Use of high altitude platform stations providing IMT-2000 in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WARC-92 identified the bands 1 885-2 025 MHz and 2 110-2 200 MHz, intended for use on a worldwide basis for IMT-2000, including the bands 1 980-2 010 MHz and 2 170-2 200 MHz for the satellite component of IMT-2000, in RR **S5.388**;

b) that a high altitude platform station (HAPS) is defined in **S1.66A** as "a station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth";

c) that HAPS may offer a new means of providing IMT-2000 services with minimal network build out as it is capable to provide service to a large footprint together with a dense coverage;

d) that HAPS is proposed to be used as a base station of terrestrial IMT-2000 and should not have any priority over other terrestrial IMT-2000 use,

resolves

that HAPS implemented within a terrestrial IMT-2000 system shall conform to the minimum performance characteristics and operational conditions given in Recommendation ITU-R M.[8/115], in particular:

a) that for the purpose of protecting stations operated in neighbouring countries from co-channel interference countries, where HAPS is used for base stations to provide IMT-2000 shall use antennas that comply with the following antenna pattern:

$$G(\psi) = G_m - 3(\psi/\psi_b)^2 \quad \text{dBi} \quad \text{for} \quad 0 \le \psi \le \psi_1$$

$$G(\psi) = G_m + L_N \quad \text{dBi} \quad \text{for} \quad \psi_1 < \psi \le \psi_2$$

$$G(\psi) = X - 60\log(\psi) \quad \text{dBi} \quad \text{for} \quad \psi_2 < \psi \le \psi_3$$

$$G(\psi) = L_F \quad \text{dBi} \quad \text{for} \quad \psi_3 < \psi \le 90^\circ$$

where:

$G(\psi)$ gain at the angle ψ from the main beam direction (dBi)

G_m maximum gain in the main lobe (dBi)

ψ_b one-half the 3 dB beamwidth in the plane of interest (3 dB below G_m) (degrees)

L_N near-in-side-lobe level in dB relative to the peak gain required by the system design, and has a maximum value of –25 dB

L_F = G_m – 73 dBi far side-lobe level (dBi)

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The 3 dB beamwidth ($2\psi_b$) is again estimated by:

$$(\psi_b)^2 = 7442/(10^{0.1G_m}) \text{ (in degrees}^2)$$

where G_m is the peak aperture gain (dBi);

b) that a HAPS operated as a base station to provide IMT-2000 shall not exceed a co-channel spectral power flux-density (spfd) level of –121.5 dB(W/(m^2 · MHz)) on the Earth's surface outside country borders unless agreed otherwise with the affected neighbouring administration;

c) that a HAPS operated as a base station to provide IMT-2000, in order to protect mobile earth stations of the satellite component of IMT-2000 from interference, shall not exceed an out-of-band spfd level of –165 dB(W/(m^2 · 4 kHz)) on the Earth's surface in the bands 2 160-2 200 MHz in Region 2 and 2 170-2 200 MHz in Regions 1 and 3;

d) that a HAPS operated as a base station to provide IMT-2000, in order to protect fixed stations from interference, shall not exceed an out-of-band spfd level on the Earth's surface in the band 2 025-2 110 MHz of:

1) –165 dB(W/(m^2 · MHz)) for angles of arrival (θ) less than 5° above the horizontal plane;

2) –165 + 1.75 (θ – 5) dB(W/(m^2 · MHz)) for angles of arrival between 5° and 25° above the horizontal plane; and

3) –130 dB(W/(m^2 · MHz)) for angles of arrival between 25° and 90° above the horizontal plane

Reasons:

1 RR S4.15A (WRC-97) limits transmission to and from HAPS to bands specifically identified in the Table of Frequency Allocations. So far, the only bands which are identified as such by RR S5.552A are 47.2-47.5 GHz and 47.9-48.2 GHz. The option to use HAPS to provide IMT-2000 is proposed to be enabled via a new footnote in Article S5 with a reference to a new resolution referring to the terrestrial IMT-2000 bands identified in S5.388.

2 ITU-R Study Group 8 has agreed the draft new Recommendation M.[8/115] on "minimum performance characteristics and operational conditions for HAPS providing IMT-2000 in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2" for adoption by correspondence.

3 However, the option to use HAPS in IMT-2000 should be limited to those bands currently identified for terrestrial IMT-2000 in RR S5, since new frequency bands to be identified for IMT-2000 under agenda item 1.6.1 may have to share with various co-primary and secondary services, and sharing has been investigated only in the existing bands identified in S5.388 so far.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 1B

Agenda item 1.7 - Use of HF bands by AM(R)S and MMS

Introduction

These proposals contain the minimum modifications required in the Radio Regulations and its Appendices in order to convert the HF radiotelephony distress and safety frequencies to exclusive.

The method chosen has been to divide the existing distress and calling channels in two separate frequencies, one exclusive distress and safety frequency and one international radiotelephony calling frequency.

With a view to consistency, also those calling channels that are not used for distress and safety, have been converted into simplex frequencies.

Instead of voice calling, ships and coast stations should use digital selective calling. If voice calling is required, it should in the first instance be done on the coast station working channel and only secondarily on the international radiotelephony calling frequency.

Proposals

Entry into force of these modifications should be 30 June 2005 in order to allow sufficient time for ship stations to implement the necessary technical changes. Article S52, Appendix S13 and Appendix S17 should be modified as shown below.

NOC

S52.216 to S52.218

MOD EUR/13/12

S52.219 3) Coast stations employing class J3E or J2D emissions in accordance with No. **S52.217** in the bands between 4 000 kHz and 27 500 kHz shall use the minimum power necessary to cover their service area and shall at no time use a peak envelope power in excess of 10 kW per channel. <u>On the radiotelephony calling frequencies 4 417 kHz and 6 516 kHz coast stations should limit their peak envelope power to 1.5 kW.</u>

NOC

S52.220

NOC

C2 – Call and reply

ADD EUR/13/13

S52.220A Administrations should encourage the coast stations and ships under their jurisdiction to utilize the digital selective calling techniques for call and reply.

ADD EUR/13/14

S52.220B When calling by radiotelephony is necessary, it should be done (in the order of preference):

ADD EUR/13/15

S52.220C 1) on the working frequencies assigned to the coast station in question; or

ADD EUR/13/16

S52.220D 2) when this is not possible, on the international calling frequencies listed under **S5.221** below.

MOD EUR/13/17

S52.221 § 97 1) Coast and ~~S~~ship stations may use the following carrier frequencies for calling in radiotelephony[1A]:

~~4 125~~4 417 kHz~~[3, 4, 5]~~
~~6 215~~6 516 kHz~~[4, 5]~~
~~8 255~~8 779 kHz
~~12 290~~13 137 kHz~~[5]~~
~~16 420~~17 302 kHz~~[5]~~
~~18 795~~19 770 kHz
~~22 060~~22 756 kHz
~~25 097~~26 172 kHz

ADD EUR/13/17*bis*

[1A] **S52.221.1A** These frequencies may also be used by coast stations with class H2B emission, when using the selective calling system defined in Recommendation ITU-R M.257-3.

SUP EUR/13/18

[3] **S52.221.1**

SUP EUR/13/19

[4] **S52.221.2**

SUP EUR/13/20

[5] **S52.221.3**

SUP EUR/13/21

S52.222

SUP EUR/13/22

[6] **S52.222.1**

SUP EUR/13/23

[7] **S52.222.2**

NOC

S52.223

MOD EUR/13/24

S52.224 § 99 1) Before transmitting on the exclusive distress and safety carrier frequencies 4 125 kHz, 6 215 kHz, 8 291 kHz, 12 290 kHz or 16 420 kHz a station shall listen on the frequency for a reasonable period to make sure that no distress traffic is being sent (see Recommendation ITU-R M.1171).

NOC

S52.225 to S52.229

APPENDIX S13*

Distress and safety communications (non-GMDSS)

Part A2 – Frequencies for distress and safety

Section I – Availability of frequencies

E – 4 125 kHz

MOD EUR/13/25

§ 4 1) The carrier frequency 4 125 kHz is used to supplement the carrier frequency 2 182 kHz for distress and safety purposes ~~and for call and reply~~ (see also No. **S5.130**). This frequency is also used for distress and safety traffic by radiotelephony (see also Appendix **S15** and Resolution **331 (Rev.WRC-97)**).

2) The carrier frequency 4 125 kHz may be used by aircraft stations to communicate with stations of the maritime mobile service for distress and safety purposes, including search and rescue (see Part A1 § 9, 9 *a)* and 9 *b)*).

G – 6 215 kHz

MOD EUR/13/26

§ 6 The carrier frequency 6 215 kHz is used to supplement the carrier frequency 2 182 kHz for distress and safety purposes ~~and for call and reply~~ (see also No. **S5.130**). This frequency is also used for distress and safety traffic by radiotelephony (see also Appendix **S15** and Resolution **331 (Rev.WRC-97)**).

APPENDIX S17

Frequencies and channelling arrangements in the high-frequency bands for the maritime mobile service

(See Article **S52**)

PART A – Table of subdivided bands

In the table, where appropriate[1], the assignable frequencies in a given band for each usage are:

– indicated by the lowest and highest frequency, in heavy type, assigned in that band;

– regularly spaced, the number of assignable frequencies (*f.*) and the spacing in kHz being indicated in italics.

MOD EUR/13/27

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz allocated exclusively to the maritime mobile service

Band (MHz)	**4**	**6**	**8**	**12**	**16**	**18/19**	**22**	**25/26**
Limits (kHz)	4 063	6 200	8 195	12 230	16 360	18 780	22 000	25 070
Frequencies assignable to ship stations for oceanographic data transmission *c)*	**4 063.3** to **4 064.8** *6 f.* *0.3 kHz*							
Limits (kHz)	4 065	6 200	8 195	12 230	16 360	18 780	22 000	25 070
Frequencies assignable to ship stations for telephony, duplex (see footnote *p))* operation *a) i)*	**4 066.4** to **4 144.4** *27 f.* *3 kHz*	**6 201.4** to **6 222.4** *8 f.* *3 kHz*	**8 196.4** to **8 292.4** *33 f.* *3 kHz*	**12 231.4** to **12 351.4** *41 f.* *3 kHz*	**16 361.4** to **16 526.4** *56 f.* *3 kHz*	**18 781.4** to **18 823.4** *15 f.* *3 kHz*	**22 001.4** to **22 157.4** *53 f.* *3 kHz*	**25 071.4** to **25 098.4** *10 f.* *3 kHz*
Limits (kHz)	4 146	6 224	8 294	12 353	16 528	18 825	22 159	25 100

[1] Within the non-shaded boxes.

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz allocated exclusively to the maritime mobile service
(continued)

Band (MHz)	**4**	**6**	**8**	**12**	**16**	**18/19**	**22**	**25/26**
Limits (kHz)	4 146	6 224	8 294	12 353	16 528	18 825	22 159	25 100
Frequencies assignable to ship stations and coast stations for telephony, simplex operation *a)*	**4 147.4** to **4 150.4** *2 f. 3 kHz*	**6 225.4** to **6 231.4** *3 f. 3 kHz*	**8 295.4** to **8 298.4** *2 f. 3 kHz*	**12 354.4** to **12 366.4** *5 f. 3 kHz*	**16 529.4** to **16 547.4** *7 f. 3 kHz*	**18 826.4** to **18 844.4** *7 f. 3 kHz*	**22 160.4** to **22 178.4** *7 f. 3 kHz*	**25 101.4** to **25 119.4** *7 f. 3 kHz*
Limits (kHz)	4 152	6 233	8 300	12 368	16 549	18 846	22 180	25 121
Frequencies assignable to ship stations for wide-band telegraphy, facsimile and special transmission systems	**4 154** to **4 170** *5 f. 4 kHz*	**6 235** to **6 259** *7 f. 4 kHz*	**8 302** to **8 338** *10 f. 4 kHz*	**12 370** to **12 418** *13 f. 4 kHz*	**16 551** to **16 615** *17 f. 4 kHz*	**18 848** to **18 868** *6 f. 4 kHz*	**22 182** to **22 238** *15 f. 4 kHz*	**25 123** to **25 159** *10 f. 4 kHz*
Limits (kHz)	4 172	6 261	8 340	12 420	16 617	18 870	22 240	25 161.25
Frequencies assignable to ship stations for oceanographic data transmission *c)*		**6 261.3** to **6 262.5** *5 f. 0.3 kHz*	**8 340.3** to **8 341.5** *5 f. 0.3 kHz*	**12 420.3** to **12 421.5** *5 f. 0.3 kHz*	**16 617.3** to **16 618.5** *5 f. 0.3 kHz*		**22 240.3** to **22 241.5** *5 f. 0.3 kHz*	
Limits (kHz)	4 172	6 262.75	8 341.75	12 421.75	16 618.75	18 870	22 241.75	25 161.25
Frequencies (paired) assignable to ship stations for narrow-band direct-printing (NBDP) telegraphy and data transmission systems at speeds not exceeding 100 Bd for FSK and 200 Bd for PSK *d) j) m)*	**4 172.5** to **4 181.5** *18 f. 0.5 kHz*	**6 263** to **6 275.5** *25 f. 0.5 kHz*						
Limits (kHz)	4 181.75	6 275.75	8 341.75	12 421.75	16 618.75	18 870	22 241.75	25 161.25
Calling frequencies assignable to ship stations for A1A or A1B Morse telegraphy *g)*								
Limits (kHz)	4 186.75	6 280.75	8 341.75	12 421.75	16 618.75	18 870	22 241.75	25 161.25
Frequencies (paired) assignable to ship stations for NBDP telegraphy and data transmission systems at speeds not exceeding 100 Bd for FSK and 200 Bd for PSK *d) m)*		**6 281** to **6 284.5** *8 f. 0.5 kHz*						
Limits (kHz)	4 186.75	6 284.75	8 341.75	12 421.75	16 618.75	18 870	22 241.75	25 161.25

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz allocated exclusively to the maritime mobile service
(continued)

Band (MHz)	**4**	**6**	**8**	**12**	**16**	**18/19**	**22**	**25/26**
Limits (kHz)	4 186.75	6 284.75	8 341.75	12 421.75	16 618.75	18 870	22 241.75	25 161.25
Working frequencies assignable to ship stations for A1A or A1B Morse telegraphy *e) f) h)*	**4 187** to **4 202** *31 f. 0.5 kHz*	**6 285** to **6 300** *31 f. 0.5 kHz*	**8 342** to **8 365.5** *48 f. 0.5 kHz*	**12 422** to **12 476.5** *110 f. 0.5 kHz*	**16 619** to **16 683** *129 f. 0.5 kHz*		**22 242** to **22 279** *75 f. 0.5 kHz*	**25 161.5** to **25 171** *20 f. 0.5 kHz*
Limits (kHz)	4 202.25	6 300.25	8 365.75	12 476.75	16 683.25	18 870	22 279.25	25 171.25
Calling frequencies assignable to ship stations for A1A or A1B Morse telegraphy *g)*								
Limits (kHz)	4 202.25	6 300.25	8 370.75	12 476.75	16 683.25	18 870	22 284.25	25 172.75
Working frequencies assignable to ship stations for A1A or A1B Morse telegraphy *e) f)*			**8 371** to **8 376** *11 f. 0.5 kHz*					
Limits (kHz)	4 202.25	6 300.25	8 376.25	12 476.75	16 683.25	18 870	22 284.25	25 172.75
Frequencies (paired) assignable to ship stations for NBDP telegraphy and data transmission systems at speeds not exceeding 100 bauds for FSK and 200 bauds for PSK *d) j) m)*			**8 376.5** to **8 396** *40 f. 0.5 kHz*	**12 477** to **12 549.5** *146 f. 0.5 kHz*	**16 683.5** to **16 733.5** *101 f. 0.5 kHz*	**18 870.5** to **18 892.5** *45 f. 0.5 kHz*	**22 284.5** to **22 351.5** *135 f. 0.5 kHz*	**25 173** to **25 192.5** *40 f. 0.5 kHz*
Limits (kHz)	4 202.25	6 300.25	8 396.25	12 549.75	16 733.75	18 892.75	22 351.75	25 192.75
Calling frequencies assignable to ship stations for A1A or A1B Morse telegraphy *g)*								
Limits (kHz)	4 202.25	6 300.25	8 396.25	12 554.75	16 738.75	18 892.75	22 351.75	25 192.75
Frequencies (paired) assignable to ship stations for NBDP telegraphy and data transmission systems at speeds not exceeding 100 bauds for FSK and 200 bauds for PSK *d) m)*				**12 555** to **12 559.5** *10 f. 0.5 kHz*	**16 739** to **16 784.5** *92 f. 0.5 kHz*			
Limits (kHz)	4 202.25	6 300.25	8 396.25	12 559.75	16 784.75	18 892.75	22 351.75	25 192.75

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz allocated exclusively to the maritime mobile service
(continued)

Band (MHz)	**4**	**6**	**8**	**12**	**16**	**18/19**	**22**	**25/26**
Limits (kHz)	4 202.25	6 300.25	8 396.25	12 559.75	16 784.75	18 892.75	22 351.75	25 192.75
Frequencies (non paired) assignable to ship stations for NBDP telegraphy and data transmission systems at speeds not exceeding 100 Bd for FSK and 200 Bd for PSK and for A1A or A1B Morse telegraphy (working) *b)*	**4 202.5** to **4 207** *10 f. 0.5 kHz*	**6 300.5** to **6 311.5** *23 f. 0.5 kHz*	**8 396.5** to **8 414** *36 f. 0.5 kHz*	**12 560** to **12 576.5** *34 f. 0.5 kHz*	**16 785** to **16 804** *39 f. 0.5 kHz*	**18 893** to **18 898** *11 f. 0.5 kHz*	**22 352** to **22 374** *45 f. 0.5 kHz*	**25 193** to **25 208** *31 f. 0.5 kHz*
Limits (kHz)	4 207.25	6 311.75	8 414.25	12 576.75	16 804.25	18 898.25	22 374.25	25 208.25
Frequencies assignable to ship stations for digital selective calling *k) l)*	**4 207.5** to **4 209** *4 f. 0.5 kHz*	**6 312** to **6 313.5** *4 f. 0.5 kHz*	**8 414.5** to **8 416** *4 f. 0.5 kHz*	**12 577** to **12 578.5** *4 f. 0.5 kHz*	**16 804.5** to **16 806** *4 f. 0.5 kHz*	**18 898.5** to **18 899.5** *3 f. 0.5 kHz*	**22 374.5** to **22 375.5** *3 f. 0.5 kHz*	**25 208.5** to **25 209.5** *3 f. 0.5 kHz*
Limits (kHz)	4 209.25	6 313.75	8 416.25	12 578.75	16 806.25	18 899.75	22 375.75	25 210
Limits (kHz)	4 209.25	6 313.75	8 416.25	12 578.75	16 806.25	19 680.25	22 375.75	26 100.25
Frequencies (paired) assignable to coast stations for NBDP and data transmission systems, at speeds not exceeding 100 Bd for FSK and 200 Bd for PSK *d) n) o)*	**4 209.5** to **4 219** *20 f. 0.5 kHz*	**6 314** to **6 330.5** *34 f. 0.5 kHz*	**8 416.5** to **8 436** *40 f. 0.5 kHz*	**12 579** to **12 656.5** *156 f. 0.5 kHz*	**16 806.5** to **16 902.5** *193 f. 0.5 kHz*	**19 680.5** to **19 703** *46 f. 0.5 kHz*	**22 376** to **22 443.5** *136 f. 0.5 kHz*	**26 100.5** to **26 120.5** *41 f. 0.5 kHz*
Limits (kHz)	4 219.25	6 330.75	8 436.25	12 656.75	16 902.75	19 703.25	22 443.75	26 120.75
Frequencies assignable to coast stations for digital selective calling *l)*	**4 219.5** to **4 220.5** *3 f. 0.5 kHz*	**6 331** to **6 332** *3 f. 0.5 kHz*	**8 436.5** to **8 437.5** *3 f. 0.5 kHz*	**12 657** to **12 658** *3 f. 0.5 kHz*	**16 903** to **16 904** *3 f. 0.5 kHz*	**19 703.5** to **19 704.5** *3 f. 0.5 kHz*	**22 444** to **22 445** *3 f. 0.5 kHz*	**26 121** to **26 122** *3 f. 0.5 kHz*
Limits (kHz)	4 221	6 332.5	8 438	12 658.5	16 904.5	19 705	22 445.5	26 122.5

Table of frequencies (kHz) to be used in the band between 4 000 kHz and 27 500 kHz allocated exclusively to the maritime mobile service
(end)

Band (MHz)	**4**	**6**	**8**	**12**	**16**	**18/19**	**22**	**25/26**
Limits (kHz)	4 221	6 332.5	8 438	12 658.5	16 904.5	19 705	22 445.5	26 122.5
Frequencies assignable to coast stations for wide-band and A1A or A1B Morse telegraphy, facsimile, special and data transmission systems and direct-printing telegraphy systems								
Limits (kHz)	4 351	6 501	8 707	13 077	17 242	19 755	22 696	26 145
Frequencies assignable to coast stations for telephony, duplex (see footnote *p)*) operation *a)*	**4 352.4** to **4 436.4** *29 f. 3 kHz*	**6 502.4** to **6 523.4** *8 f. 3 kHz*	**8 708.4** to **8 813.4** *36 f. 3 kHz*	**13 078.4** to **13 198.4** *41 f. 3 kHz*	**17 243.4** to **17 408.4** *56 f. 3 kHz*	**19 756.4** to **19 798.4** *15 f. 3 kHz*	**22 697.4** to **22 853.4** *53 f. 3 kHz*	**26 146.4** to **26 173.4** *10 f. 3 kHz*
Limits (kHz)	4 438	6 525	8 815	13 200	17 410	19 800	22 855	26 175

NOC

a) to *h)*

MOD EUR/13/28

i) Until 30 June 2005, ~~F~~for the use of the carrier frequencies 4 125 kHz, 6 215 kHz, 8 291 kHz, 12 290 kHz and 16 420 kHz in these sub-bands by ship and coast stations for distress and safety purposes, by single-sideband radiotelephony, see Article **S31** and Appendix **S13**.

NOC

j) to *o)*

ADD EUR/13/29

p) After 30 June 2005, the carrier frequencies 4 125 kHz, 6 215 kHz, 8 291 kHz, 12 290 kHz and 16 420 kHz shall be used solely for distress and safety purposes by ship and coast stations, by single-sideband radiotelephony. The carrier frequencies 4 417 kHz, 6 516 kHz, 8 779 kHz, 13 137 kHz, 17 302 kHz, 19 770 kHz, 22 756 kHz and 26 172 kHz shall be used for calling purposes by single-sideband radiotelephony in the ship-to-shore and shore-to-ship directions.

PART B – Channelling arrangements

Section I – Radiotelephony

NOC

Subsections 1 to 4

MOD EUR/13/30

5 The following frequencies in Sub-Section A are allocated for calling purposes in the ship-to-shore and shore-to-ship directions:

– 4 417 kHz (Channel No. 421 in the 4 MHz band~~;~~)

– 6 516 kHz (Channel No. 606 in the 6 MHz band~~;~~)

– 8 779 kHz (Channel No. 821 in the 8 MHz band~~;~~)

– 13 137 kHz (Channel No. 1221 in the 12 MHz band~~;~~)

– 17 302 kHz (Channel No. 1621 in the 16 MHz band~~;~~)

– 19 770 kHz (Channel No. 1806 in the 18 MHz band~~;~~)

– 22 756 kHz (Channel No. 2221 in the 22 MHz band~~;~~)

– 26 172 kHz (Channel No. 2510 in the 25 MHz band)~~.~~

The remaining frequencies in Sub-Sections A, B, C-1 and C-2 are working frequencies.

MOD EUR/13/31

5A For the use of the carrier frequencies:

4 125 kHz (Channel No. ~~421~~400)

6 215 kHz (Channel No. ~~606~~600)

8 291 kHz (Channel No. ~~833~~800)

12 290 kHz (Channel No. ~~1221~~1200)

16 420 kHz (Channel No. ~~1621~~1600)

in Sub-Section A, by coast and ship stations for distress and safety purposes, see Article **S31** and Appendix **S13**.

NOC

Notes 7 and 8

Sub-Section A

MOD EUR/13/32

Table of single-sideband transmitting frequencies (kHz) for duplex (two-frequency) operation

Channel No.	4 MHz band			
	Coast stations		Ship stations	
	Carrier frequency	Assigned frequency	Carrier frequency	Assigned frequency
400	4 125 [4]	4 126.4 [4]	4 125 [4]	4 126.4 [4]
401	4 357	4 358.4	4 065	4 066.4
402	4 360	4 361.4	4 068	4 069.4
403	4 363	4 364.4	4 071	4 072.4
404	4 366	4 367.4	4 074	4 075.4
405	4 369	4 370.4	4 077	4 078.4
406	4 372	4 373.4	4 080	4 081.4
407	4 375	4 376.4	4 083	4 084.4
408	4 378	4 379.4	4 086	4 087.4
409	4 381	4 382.4	4 089	4 090.4
410	4 384	4 385.4	4 092	4 093.4
411	4 387	4 388.4	4 095	4 096.4
412	4 390	4 391.4	4 098	4 099.4
413	4 393	4 394.4	4 101	4 102.4
414	4 396	4 397.4	4 104	4 105.4
415	4 399	4 400.4	4 107	4 108.4
416	4 402	4 403.4	4 110	4 111.4
417	4 405	4 406.4	4 113	4 114.4
418	4 408	4 409.4	4 116	4 117.4
419	4 411	4 412.4	4 119	4 120.4
420	4 414	4 415.4	4 122	4 123.4
421	4 417 *	4 418.4 *	~~4 125 *~~[4] 4 417	~~4 126.4 *~~ 4 418.4
422	4 420	4 421.4	4 128	4 129.4
423	4 423	4 424.4	4 131	4 132.4
424	4 426	4 427.4	4 134	4 135.4
425	4 429	4 430.4	4 137	4 138.4
426	4 432	4 433.4	4 140	4 141.4
427 [2]	4 435	4 436.4	4 143	4 144.4
428 [1, 2, 3]	4 351	4 352.4	–	–
429 [1, 2, 3]	4 354	4 355.4	–	–

Channel No.	6 MHz band			
	Coast stations		Ship stations	
	Carrier frequency	Assigned frequency	Carrier frequency	Assigned frequency
600	6 215 [5]	6 216.4 [5]	6 215 [5]	6 216.4 [5]
601	6 501	6 502.4	6 200	6 201.4
602	6 504	6 505.4	6 203	6 204.4
603	6 507	6 508.4	6 206	6 207.4
604	6 510	6 511.4	6 209	6 210.4
605	6 513	6 514.4	6 212	6 213.4
606	6 516 *	6 517.4 *	~~6 215* 5~~ 6 516	~~6 216.4*~~ 6 517.4
607 [2]	6 519	6 520.4	6 218	6 219.4
608 [2]	6 522	6 523.4	6 221	6 222.4

Channel No.	8 MHz band			
	Coast stations		Ship stations	
	Carrier frequency	Assigned frequency	Carrier frequency	Assigned frequency
800	8 291 [7]	8 292.4 [7]	8 291 [7]	8 292.4 [7]
801	8 719	8 720.4	8 195	8 196.4
802	8 722	8 723.4	8 198	8 199.4
803	8 725	8 726.4	8 201	8 202.4
804	8 728	8 729.4	8 204	8 205.4
805	8 731	8 732.4	8 207	8 208.4
806	8 734	8 735.4	8 210	8 211.4
807	8 737	8 738.4	8 213	8 214.4
808	8 740	8 741.4	8 216	8 217.4
809	8 743	8 744.4	8 219	8 220.4
810	8 746	8 747.4	8 222	8 223.4
811	8 749	8 750.4	8 225	8 226.4
812	8 752	8 753.4	8 228	8 229.4
813	8 755	8 756.4	8 231	8 232.4
814	8 758	8 759.4	8 234	8 235.4
815	8 761	8 762.4	8 237	8 238.4
816	8 764	8 765.4	8 240	8 241.4
817	8 767	8 768.4	8 243	8 244.4
818	8 770	8 771.4	8 246	8 247.4
819	8 773	8 774.4	8 249	8 250.4
820	8 776	8 777.4	8 252	8 253.4
821	8 779 *	8 780.4 *	~~8 255 *~~ 8 779	~~8 256.4*~~ 8 780.4
822	8 782	8 783.4	8 258	8 259.4
823	8 785	8 786.4	8 261	8 262.4
824	8 788	8 789.4	8 264	8 265.4
825	8 791	8 792.4	8 267	8 268.4
826	8 794	8 795.4	8 270	8 271.4
827	8 797	8 798.4	8 273	8 274.4

(continued)

Channel No.	8 MHz band *(end)*			
	Coast stations		Ship stations	
	Carrier frequency	Assigned frequency	Carrier frequency	Assigned frequency
828	8 800	8 801.4	8 276	8 277.4
829	8 803	8 804.4	8 279	8 280.4
830	8 806	8 807.4	8 282	8 283.4
831	8 809	8 810.4	8 285	8 286.4
832 [2]	8 812	8 813.4	8 288	8 289.4
~~833~~	~~8 291~~[7]	~~8 292.4~~	~~8 291~~ [7]	~~8 292.4~~
834 [2, 3, 6]	8 707	8 708.4	–	–
835 [2, 3, 6]	8 710	8 711.4	–	–
836 [2, 3, 6]	8 713	8 714.4	–	–
837 [2, 3, 6]	8 716	8 717.4	–	–

Channel No.	12 MHz band			
	Coast stations		Ship stations	
	Carrier frequency	Assigned frequency	Carrier frequency	Assigned frequency
1200	12 290 [8]	12 291.4 [8]	12 290 [8]	12 291.4 [8]
1201	13 077	13 078.4	12 230	12 231.4
1202	13 080	13 081.4	12 233	12 234.4
1203	13 083	13 084.4	12 236	12 237.4
1204	13 086	13 087.4	12 239	12 240.4
1205	13 089	13 090.4	12 242	12 243.4
1206	13 092	13 093.4	12 245	12 246.4
1207	13 095	13 096.4	12 248	12 249.4
1208	13 098	13 099.4	12 251	12 252.4
1209	13 101	13 102.4	12 254	12 255.4
1210	13 104	13 105.4	12 257	12 258.4
1211	13 107	13 108.4	12 260	12 261.4
1212	13 110	13 111.4	12 263	12 264.4
1213	13 113	13 114.4	12 266	12 267.4
1214	13 116	13 117.4	12 269	12 270.4
1215	13 119	13 120.4	12 272	12 273.4
1216	13 122	13 123.4	12 275	12 276.4
1217	13 125	13 126.4	12 278	12 279.4
1218	13 128	13 129.4	12 281	12 282.4
1219	13 131	13 132.4	12 284	12 285.4
1220	13 134	13 135.4	12 287	12 288.4
1221	13 137 *	13 138.4 *	~~12 290 *8~~ 13 137 *	~~12 291.4~~ 13 138.4 *
1222	13 140	13 141.4	12 293	12 294.4
1223	13 143	13 144.4	12 296	12 297.4
1224	13 146	13 147.4	12 299	12 300.4
1225	13 149	13 150.4	12 302	12 303.4
1226	13 152	13 153.4	12 305	12 306.4
1227	13 155	13 156.4	12 308	12 309.4
1228	13 158	13 159.4	12 311	12 312.4
1229	13 161	13 162.4	12 314	12 315.4

(continued)

Channel No.	12 MHz band *(end)*			
	Coast stations		Ship stations	
	Carrier frequency	Assigned frequency	Carrier frequency	Assigned frequency
1230	13 164	13 165.4	12 317	12 318.4
1231	13 167	13 168.4	12 320	12 321.4
1232	13 170	13 171.4	12 323	12 324.4
1233 [2]	13 173	13 174.4	12 326	12 327.4
1234 [2]	13 176	13 177.4	12 329	12 330.4
1235 [2]	13 179	13 180.4	12 332	12 333.4
1236 [2]	13 182	13 183.4	12 335	12 336.4
1237 [2]	13 185	13 186.4	12 338	12 339.4
1238 [2]	13 188	13 189.4	12 341	12 342.4
1239 [2]	13 191	13 192.4	12 344	12 345.4
1240 [2]	13 194	13 195.4	12 347	12 348.4
1241 [2]	13 197	13 198.4	12 350	12 351.4

Channel No.	16 MHz band			
	Coast stations		Ship stations	
	Carrier frequency	Assigned frequency	Carrier frequency	Assigned frequency
1600	16 420 [9]	16 421.4 [9]	16 420 [9]	16 421.4 [9]
1601	17 242	17 243.4	16 360	16 361.4
1602	17 245	17 246.4	16 363	16 364.4
1603	17 248	17 249.4	16 366	16 367.4
1604	17 251	17 252.4	16 369	16 370.4
1605	17 254	17 255.4	16 372	16 373.4
1606	17 257	17 258.4	16 375	16 376.4
1607	17 260	17 261.4	16 378	16 379.4
1608	17 263	17 264.4	16 381	16 382.4
1609	17 266	17 267.4	16 384	16 385.4
1610	17 269	17 270.4	16 387	16 388.4
1611	17 272	17 273.4	16 390	16 391.4
1612	17 275	17 276.4	16 393	16 394.4
1613	17 278	17 279.4	16 396	16 397.4
1614	17 281	17 282.4	16 399	16 400.4
1615	17 284	17 285.4	16 402	16 403.4
1616	17 287	17 288.4	16 405	16 406.4
1617	17 290	17 291.4	16 408	16 409.4
1618	17 293	17 294.4	16 411	16 412.4
1619	17 296	17 297.4	16 414	16 415.4
1620	17 299	17 300.4	16 417	16 418.4
1621	17 302 *	17 303.4 *	~~16 420 *9~~ 17 302 *	~~16 421.4~~ 17 303.4 *
1622	17 305	17 306.4	16 423	16 424.4
1623	17 308	17 309.4	16 426	16 427.4
1624	17 311	17 312.4	16 429	16 430.4
1625	17 314	17 315.4	16 432	16 433.4
1626	17 317	17 318.4	16 435	16 436.4
1627	17 320	17 321.4	16 438	16 439.4

(continued)

Channel No.	16 MHz band *(end)*			
	Coast stations		**Ship stations**	
	Carrier frequency	**Assigned frequency**	**Carrier frequency**	**Assigned frequency**
1628	17 323	17 324.4	16 441	16 442.4
1629	17 326	17 327.4	16 444	16 445.4
1630	17 329	17 330.4	16 447	16 448.4
1631	17 332	17 333.4	16 450	16 451.4
1632	17 335	17 336.4	16 453	16 454.4
1633	17 338	17 339.4	16 456	16 457.4
1634	17 341	17 342.4	16 459	16 460.4
1635	17 344	17 345.4	16 462	16 463.4
1636	17 347	17 348.4	16 465	16 466.4
1637	17 350	17 351.4	16 468	16 469.4
1638	17 353	17 354.4	16 471	16 472.4
1639	17 356	17 357.4	16 474	16 475.4
1640	17 359	17 360.4	16 477	16 478.4
1641	17 362	17 363.4	16 480	16 481.4
1642 [2]	17 365	17 366.4	16 483	16 484.4
1643 [2]	17 368	17 369.4	16 486	16 487.4
1644 [2]	17 371	17 372.4	16 489	16 490.4
1645 [2]	17 374	17 375.4	16 492	16 493.4
1646 [2]	17 377	17 378.4	16 495	16 496.4
1647 [2]	17 380	17 381.4	16 498	16 499.4
1648 [2]	17 383	17 384.4	16 501	16 502.4
1649 [2]	17 386	17 387.4	16 504	16 505.4
1650 [2]	17 389	17 390.4	16 507	16 508.4
1651 [2]	17 392	17 393.4	16 510	16 511.4
1652 [2]	17 395	17 396.4	16 513	16 514.4
1653 [2]	17 398	17 399.4	16 516	16 517.4
1654 [2]	17 401	17 402.4	16 519	16 520.4
1655 [2]	17 404	17 405.4	16 522	16 523.4
1656 [2]	17 407	17 408.4	16 525	16 526.4

Channel No.	18/19 MHz band			
	Coast stations		Ship stations	
	Carrier frequency	Assigned frequency	Carrier frequency	Assigned frequency
1801 [2]	19 755	19 756.4	18 780	18 781.4
1802 [2]	19 758	19 759.4	18 783	18 784.4
1803 [2]	19 761	19 762.4	18 786	18 787.4
1804 [2]	19 764	19 765.4	18 789	18 790.4
1805 [2]	19 767	19 768.4	18 792	18 793.4
1806	19 770 *	19 771.4 *	~~18 795~~ 19 770 *	~~18 796.4~~ 19 771.4 *
1807 [2]	19 773	19 774.4	18 798	18 799.4
1808 [2]	19 776	19 777.4	18 801	18 802.4
1809 [2]	19 779	19 780.4	18 804	18 805.4
1810 [2]	19 782	19 783.4	18 807	18 808.4
1811 [2]	19 785	19 786.4	18 810	18 811.4
1812 [2]	19 788	19 789.4	18 813	18 814.4
1813 [2]	19 791	19 792.4	18 816	18 817.4
1814 [2]	19 794	19 795.4	18 819	18 820.4
1815 [2]	19 797	19 798.4	18 822	18 823.4

Channel No.	22 MHz band			
	Coast stations		Ship stations	
	Carrier frequency	Assigned frequency	Carrier frequency	Assigned frequency
2201	22 696	22 697.4	22 000	22 001.4
2202	22 699	22 700.4	22 003	22 004.4
2203	22 702	22 703.4	22 006	22 007.4
2204	22 705	22 706.4	22 009	22 010.4
2205	22 708	22 709.4	22 012	22 013.4
2206	22 711	22 712.4	22 015	22 016.4
2207	22 714	22 715.4	22 018	22 019.4
2208	22 717	22 718.4	22 021	22 022.4
2209	22 720	22 721.4	22 024	22 025.4
2210	22 723	22 724.4	22 027	22 028.4
2211	22 726	22 727.4	22 030	22 031.4
2212	22 729	22 730.4	22 033	22 034.4
2213	22 732	22 733.4	22 036	22 037.4
2214	22 735	22 736.4	22 039	22 040.4
2215	22 738	22 739.4	22 042	22 043.4
2216	22 741	22 742.4	22 045	22 046.4
2217	22 744	22 745.4	22 048	22 049.4
2218	22 747	22 748.4	22 051	22 052.4
2219	22 750	22 751.4	22 054	22 055.4
2220	22 753	22 754.4	22 057	22 058.4
2221	22 756 *	22 757.4 *	~~22 060~~ 22 756*	~~22 061.4~~ 22 757.4 *
2222	22 759	22 760.4	22 063	22 064.4
2223	22 762	22 763.4	22 066	22 067.4

(continued)

Channel No.	22 MHz band *(end)*			
	Coast stations		Ship stations	
	Carrier frequency	Assigned frequency	Carrier frequency	Assigned frequency
2224	22 765	22 766.4	22 069	22 070.4
2225	22 768	22 769.4	22 072	22 073.4
2226	22 771	22 772.4	22 075	22 076.4
2227	22 774	22 775.4	22 078	22 079.4
2228	22 777	22 778.4	22 081	22 082.4
2229	22 780	22 781.4	22 084	22 085.4
2230	22 783	22 784.4	22 087	22 088.4
2231	22 786	22 787.4	22 090	22 091.4
2232	22 789	22 790.4	22 093	22 094.4
2233	22 792	22 793.4	22 096	22 097.4
2234	22 795	22 796.4	22 099	22 100.4
2235	22 798	22 799.4	22 102	22 103.4
2236	22 801	22 802.4	22 105	22 106.4
2237	22 804	22 805.4	22 108	22 109.4
2238	22 807	22 808.4	22 111	22 112.4
2239	22 810	22 811.4	22 114	22 115.4
2240	22 813	22 814.4	22 117	22 118.4
2241 [2]	22 816	22 817.4	22 120	22 121.4
2242 [2]	22 819	22 820.4	22 123	22 124.4
2243 [2]	22 822	22 823.4	22 126	22 127.4
2244 [2]	22 825	22 826.4	22 129	22 130.4
2245 [2]	22 828	22 829.4	22 132	22 133.4
2246 [2]	22 831	22 832.4	22 135	22 136.4
2247 [2]	22 834	22 835.4	22 138	22 139.4
2248 [2]	22 837	22 838.4	22 141	22 142.4
2249 [2]	22 840	22 841.4	22 144	22 145.4
2250 [2]	22 843	22 844.4	22 147	22 148.4
2251 [2]	22 846	22 847.4	22 150	22 151.4
2252 [2]	22 849	22 850.4	22 153	22 154.4
2253 [2]	22 852	22 853.4	22 156	22 157.4

Channel No.	25/26 MHz band			
	Coast stations		Ship stations	
	Carrier frequency	Assigned frequency	Carrier frequency	Assigned frequency
2501 [2]	26 145	26 146.4	25 070	25 071.4
2502 [2]	26 148	26 149.4	25 073	25 074.4
2503 [2]	26 151	26 152.4	25 076	25 077.4
2504 [2]	26 154	26 155.4	25 079	25 080.4
2505 [2]	26 157	26 158.4	25 082	25 083.4
2506 [2]	26 160	26 161.4	25 085	25 086.4
2507 [2]	26 163	26 164.4	25 088	25 089.4
2508 [2]	26 166	26 167.4	25 091	25 092.4
2509 [2]	26 169	26 170.4	25 094	25 095.4
2510	26 172 *	26 173.4 *	~~25 097~~ 26 172 *	~~25 098.4~~ 26 173.4 *

1 These coast station frequencies may be paired with a ship station frequency from the table of simplex frequencies for ship and coast stations (see Sub-Section B) or with a frequency from the band 4 000-4 063 kHz (see Sub-Section C-1) to be selected by the administration concerned.

2 For the use and notification of these frequencies, see Resolution **325 (Mob-87)***.

3 These channels may also be used for simplex (single frequency) operation.

4 For the conditions of use of the carrier frequency 4 125 kHz, see Nos. **S52.224** and **S52.225**, and Appendix **S15**.

5 For the conditions of use of the carrier frequency 6 215 kHz, see Appendices **S13** and **S15**.

6 These coast station frequencies may be paired with a ship station frequency from the table of simplex frequencies for ship and coast stations (see Sub-Section B) or with a frequency from the band 8 100-8 195 kHz (see Sub-Section C-2) to be selected by the administration concerned.

7 For the conditions of use of the carrier frequency 8 291 kHz, see Appendix **S15**.

8 For the conditions of use of the carrier frequency 12 290 kHz, see Appendix **S15**.

9 For the conditions of use of the carrier frequency 16 420 kHz, see Appendix **S15**.

* The frequencies followed by an asterisk are calling frequencies (see Nos. **S52.221**~~ and **S52.222**~~).

NOC

Sub-Section B

NOC

Sub-Section C-1

NOC

Sub-Section C-2

NOC

Section II – Narrow-band direct-printing telegraphy (paired frequencies)

NOC

Section III – Narrow-band direct-printing telegraphy (non-paired frequencies)

NOC

Section IV – Morse telegraphy (calling)

NOC

Section V – Morse telegraphy (working)

* This Resolution was abrogated by WRC-95.

Proposals submitted by the following administrations

Germany, Austria, Belgium, Bulgaria, Croatia, Denmark, Spain, Estonia, Finland, France, Hungary, Ireland, Iceland, Italy, Liechtenstein, Lithuania, Luxembourg, Norway, Netherlands, Poland, Portugal, Slovakia, Czech Rep., Romania, United Kingdom, Russia, Slovenia, Sweden, Switzerland, Turkey, Ukraine

PART 1C

Agenda item 1.18 - Use of digital technology for MMS at 156-174 MHz

Introduction

As a result of both the need to consider the use of new digital technology in the maritime mobile service and the need to solve the problem of congestion in the band 156-174 MHz, a viable solution is proposed. It is based on the identification of several bands in which duplex channels which may be split into simplex channels. The upper leg of these duplex channels may be used by the administrations on a voluntary basis for initial testing and the possible future introduction of new technologies.

It is proposed to modify both Resolution 342 (WRC-97) and Appendix S18.

MOD EUR/13/33

RESOLUTION 342 (Rev.WRC-~~97~~2000)

Review of new technology to provide improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that the agenda of ~~WRC-97~~this Conference included the consideration of the use of new digital technology for the maritime mobile service in the band 156-174 MHz and the consequential revision of Appendix **S18** to the Radio Regulations~~ in respect of maritime mobile communications and the use of new technology for maritime radiotelephony channels~~;

b) Recommendation **318 (Mob-87)** particularly *noting b)* and *c)*;

c) that Appendix **S18** identifies frequencies to be used for distress and safety communications on an international basis;

d) that the introduction of new technology in the maritime mobile service shall not disrupt distress and safety communications in the VHF band including those established by the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended;

e) that the maritime mobile community has recently fully implemented the GMDSS;

~~e~~f) that ITU-R is conducting studies on improving efficiency in the use of this band, and that these studies are still ongoing;

~~f~~g) that changes made in Appendix **S18** should not prejudice the future use of these frequencies or the capabilities of systems or new applications required for use by the maritime mobile service;

~~g~~h) that the congestion on Appendix **S18** frequencies calls for the implementation of efficient new technologies;

~~h~~i) that the use of new digital technology on maritime VHF frequencies will make it possible to better respond to the emerging demand for new services~~,~~;

j) that ITU-R has adopted Recommendation ITU-R M.1312 relating to a long-tem solution for improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service;

k) that ITU-R has adopted Recommendation ITU-R M.1371 relating to technical characteristics for a universal shipborne automatic identification system using time division multiple access in the VHF maritime mobile band;

l) that there is a need to maintain some duplex channels for specific applications,

noting

~~that some administrations are considering adopting some of the above changes to their operations within the Appendix **S18** frequencies,~~

a) that the global maritime market may not be of a sufficient size to warrant the development of a new system solely for the maritime service;

b) that digital systems have been successfully implemented in the land mobile service,

noting also

that this Conference has modified Appendix **S18** with the addition of footnote *o)* to permit the possible use on a voluntary basis of various bands created by the conversion of some duplex channels to simplex channels, for initial testing and the possible future introduction of new technologies,

resolves

~~that WRC-99 should consider the use of new technology in the band 156-174 MHz and consequential revision of Appendix **S18**,~~

1 that in order to provide full worldwide interoperability of equipment on ships, there should be one technology or more that one interoperable worldwide technology implemented in Appendix **S18**;

2 that as soon as the ITU-R studies are complete, a future competent conference should consider any additional changes to Appendix **S18** to enable the use of digital communications by the maritime mobile service,

invites ITU-R

to ~~continue~~finalize the following studies~~ on the following with a view to providing a report to WRC-99~~:

a) to identify the future requirements of the maritime mobile service;

b) to identify suitable technical characteristics of the system or interoperable systems to replace existing technology;

c) to identify necessary modifications to the frequency plan contained within Appendix **S18**;

d) to recommend a ~~timetable~~transition plan for the introduction of new technology~~ and the necessary changes~~;

e) to~~ study and~~ recommend how new technology can be introduced ~~without harming~~whilst ensuring compliance with the distress and safety requirements,

instructs the Secretary-General

to communicate this Resolution to the International Maritime Organization and the International Association of Lighthouse Authorities.

APPENDIX S18

Table of transmitting frequencies in the VHF maritime mobile band

(See Article **S52**)

MOD EUR/13/34

NOTE – For assistance in understanding the Table, see notes *a)* to *~~n~~o)* below.

MOD EUR/13/35

Channel designator	Notes	Transmitting frequencies (MHz)		Inter-ship	Port operations and ship movement		Public corres-pondence
		Ship stations	Coast stations		Single frequency	Two frequency	
60		156.025	160.625			x	x
01		156.050	160.650			x	x
61	*o)*	156.075	160.675		x	x	x
02	*o)*	156.100	160.700		x	x	x
62	*o)*	156.125	160.725		x	x	x
03	*o)*	156.150	160.750		x	x	x
63	*o)*	156.175	160.775		x	x	x
04	*o)*	156.200	160.800		x	x	x
64	*o)*	156.225	160.825		x	x	x
05	*o)*	156.250	160.850		x	x	x
65	*o)*	156.275	160.875		x	x	x
06	*f)*	156.300		x			
66		156.325	160.925			x	x
07		156.350	160.950			x	x
67	*h)*	156.375	156.375	x	x		
08		156.400		x			
68		156.425	156.425		x		
09	*i)*	156.450	156.450	x	x		
69		156.475	156.475	x	x		
10	*h)*	156.500	156.500	x	x		
70	*j)*	156.525	156.525	Digital selective calling for distress, safety and calling			
11		156.550	156.550		x		
71		156.575	156.575		x		
12		156.600	156.600		x		
72	*i)*	156.625		x			
13	*k)*	156.650	156.650	x	x		
73	*h), i)*	156.675	156.675	x	x		
14		156.700	156.700		x		
74		156.725	156.725		x		
15	*g)*	156.750	156.750	x	x		
75	*n)*	156.775			x		

Channel designator	Notes	Transmitting frequencies (MHz)		Inter-ship	Port operations and ship movement		Public corres-pondence
		Ship stations	Coast stations		Single frequency	Two frequency	
16		156.800	156.800	DISTRESS, SAFETY AND CALLING			
76	*n)*	156.825			x		
17	*g)*	156.850	156.850	x	x		
77		156.875		x			
18	*m)*	156.900	161.500		x	x	x
78		156.925	161.525			x	x
19		156.950	161.550			x	x
79		156.975	161.575			x	x
20		157.000	161.600			x	x
80		157.025	161.625			x	x
21		157.050	161.650			x	x
81		157.075	161.675			x	x
22		157.100	161.700			x	x
82	*m)*	157.125	161.725		x	x	x
23		157.150	161.750			x	x
83	*m)*	157.175	161.775		x	x	x
24		157.200	161.800			x	x
84	*m)*	157.225	161.825		x	x	x
25		157.250	161.850			x	x
85	*m)*	157.275	161.875		x	x	x
26		157.300	161.900			x	x
86	*m)*	157.325	161.925		x	x	x
27		157.350	161.950			x	x
87		157.375			x		
28		157.400	162.000			x	x
88		157.425			x		
AIS 1	*l)*	161.975	161.975				
AIS 2	*l)*	162.025	162.025				

Notes referring to the Table

General notes

NOC

a) to *e)*

Specific notes

NOC

f) to *n)*

ADD EUR/13/36

o) Subject to a special arrangement between interested or affected administrations these channels may be operated as simplex channels. Furthermore the upper frequency leg of theses channels may be used to provide bands for initial testing and the possible future introduction of new technologies, subject to a special arrangement between interested or affected administrations. Stations using these bands for the testing and the possible future introduction of new technologies shall not cause harmful interference to, and shall not claim protection from harmful interference of other stations operating in accordance with Article **S5**.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 3 to Document 13-E
24 May 2000
Original: English

COMMITTEE 4
COMMITTEE 5
WORKING GROUP 1 OF THE PLENARY
WORKING GROUP 2 OF THE PLENARY

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

Add the following country names to the list of signatories to this document:

EUROPEAN COMMON PROPOSALS - PART 1

IMT-2000, maritime and aeronautical issues

Agenda item	**Part of the European contribution**	**European common proposal for WRC-2000** **Subject and supplementary country names**
1.6.1	1A1	Initial IMT-2000 spectrum identified in S5.388 **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	1A2	Bands to meet additional spectrum requirement for IMT-2000 **Cyprus, The Former Yugoslav Republic of Macedonia, Romania**
	1A3	Identification of bands already used for second generation systems for terrestrial IMT-2000 **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Romania**
	1A4	Resolution regarding the implementation of IMT-2000 **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova, Romania**

	1A5	Use of high altitude platform stations in IMT-2000 systems **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova, Romania**
1.7	1B	Use of HF bands by AM(R)S and MMS **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
1.18	1C	Use of digital technology for MMS at 156-174 MHz **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**

EUROPEAN COMMON PROPOSALS - PART 2

Mobile-satellite and radionavigation-satellite services

Agenda item	**Part of the European contribution**	**European common proposal for WRC-2000 Subject and supplementary country names**
1.9	2A	Feasibility of an MSS (space-to-Earth) allocation at 1 559-1 567 MHz (Resolutions 213 and 220 (WRC-97)) **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia**
1.10	2B	Use of bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
1.11	2C1	Non-GSO MSS under 1 GHz Resolution 214 (WRC-97) **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	2C2	Non-GSO/MSS below 1 GHz - Resolution 214 (WRC-97) **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**

1.15.1	2D1	RNSS (space-to-Earth) 960-1 215 MHz **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	2D2	RNSS (space-to-Earth) 1 260-1 300 MHz **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	2D3	Proposal for a new Resolution - Use of RNSS in the bands 1 151-1 300 MHz **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	2D4	RNSS (space-to-Earth) and RNSS (Earth-to-space) in the band 5 000-5 030 MHz **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	2D5	RNSS (Earth-to-space) 1 300-1 350 MHz **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
1.15.2	2D6	RNSS (space-to-Earth) at 1 215-1 260 MHz and 1 559-1 610 MHz **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
1.15.3	2D7	Status of allocations to services other than RNSS at 1 559-1 610 MHz **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**

EUROPEAN COMMON PROPOSALS - PART 3

Non-GSO FSS

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.13.1	3A	Modifications to Article S21 **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	3B	Modifications to Article S22 **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	3C	Resolution on aggregate non-GSO interference **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	3D	Provisions for earth stations with very large antennas **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	3E	Modifications to Article S5 **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	3F	Modifications to Articles S9 and S11 **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia**
	3G	Modifications to Appendix S4 **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
1.13.2	3H	Modifications to Articles S5 and S22 to include limits in other frequency bands **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
1.13	3I	Updated Resolutions 130, 131 and 538 **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**

EUROPEAN COMMON PROPOSALS - PART 4

Space and science services and radio astronomy

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.16	4A	Allocation of frequency bands above 71 GHz to the Earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution 723 **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
1.17	4B	Worldwide allocation for the Earth exploration-satellite (passive) and space research services in the band 18.6-18.8 GHz **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**

EUROPEAN COMMON PROPOSALS - PART 5

Appendices S30 and S30A

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.19*bis*	5A	Scope of the RoP on S23.13 **Cyprus, The Former Yugoslav Republic of Macedonia**
1.20	5B1	Procedures for the use of the guardbands of Appendices S30 and S30A plans to perform space operation functions, also taking into account Resolution 86 (Minneapolis, 1998) **Cyprus, The Former Yugoslav Republic of Macedonia, Moldova**
	5B2	Provisions relating to the suppression of Articles 6 and 7 of Appendices S30 and S30A, also taking into account Resolution 86 (Minneapolis, 1998) **Cyprus, The Former Yugoslav Republic of Macedonia, Moldova**

EUROPEAN COMMON PROPOSALS - PART 6

Fixed services and fixed-satellite services

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.4	6A1	Allocations and regulatory aspects related to the high density fixed service (HDFS): Resolution 133 (WRC-97) - HDFS in the 37-39.5 GHz band **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	6A2	Allocations and regulatory aspects related to the high density fixed service (HDFS): Resolutions 126 and 726 (WRC-97) - HDFS in the 31.8-33.4 GHz, 51.4-52 GHz, 55.78-59 GHz and 64-66 GHz bands **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	6A3	Allocations and regulatory aspects related to the high density fixed service (HDFS) **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia**
1.5	6B	High altitude platform systems (HAPS) **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
1.8	6C	Earth stations on board vessels in the FSS at 3 700-4 200 MHz and 5 925-6 425 MHz **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
1.14	6D	Non-GSO MSS feeder links in the 15.43-15.63 GHz band **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**

EUROPEAN COMMON PROPOSALS - PART 7

Appendices S3 and S7, Resolutions 28 (WRC-95) and 95 (WRC-97), PP-98 Resolutions

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.1	7A	Deletion of country names in footnotes to Article S5 **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia**
1.2	7B	Review of Appendix S3 with respect to spurious emissions for space services **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
1.3	7C	Review of Appendix S7 **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
7.1	7D	Report of the Director BR; Article S13 - Rules of Procedure **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
PP-98 Res.	7E1	PP-98 Resolution 86, Date of bringing into use of satellite network frequencies **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	7E2	PP-98 Resolution 86, Satellite coordination procedures **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	7E3	PP-98 Resolution 87, Role of the notifying administration **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**
	7E4	Resolution 88, Processing charge for satellite networks **Cyprus, Latvia, The Former Yugoslav Republic of Macedonia, Moldova**

7.1	7D2 (Add.2 to Add.7 of CMR2000/13)	Resolution 80 **Latvia, The Former Yugoslav Republic of Macedonia**
	7D3 (Add.2 to Add.7 of CMR2000/13)	S5.488 **Latvia, The Former Yugoslav Republic of Macedonia**
PP-98 Res. 86	7E2 (Add.2 to Add.7 of CMR2000/13)	S5.43 **Latvia, The Former Yugoslav Republic of Macedonia**
7.1 and PP-98 Res. 86	7F (Add.2 to Add.7 of CMR2000/13)	S11.44 (date of bringing into use) **Latvia, The Former Yugoslav Republic of Macedonia**

Agenda item	**Part of the European contribution**	**European common proposal for WRC-2000 Subject and supplementary country names**
7.2	8A (Add.8 of CMR2000/13)	Agendas for 2003 and 2006 **Latvia, The Former Yugoslav Republic of Macedonia**
	8B (Add.8 of CMR2000/13)	Resolutions for future conferences **Latvia, The Former Yugoslav Republic of Macedonia**

Agenda item	**Part of the European contribution**	**European common proposal for WRC-2000 Subject and supplementary country names**
1.9	2A (Add.1 to Add.2 of CMR2000/13)	New MSS allocations **Latvia, The Former Yugoslav Republic of Macedonia**
1.15.1	2D (Corr.1 to Add.2 of CMR2000/13)	Add space to space-to-space RNSS allocation **Latvia, The Former Yugoslav Republic of Macedonia**

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.13	3D Corrigendum (Corr.1 to Add.3 of CMR2000/13)	Very large earth stations **Latvia, The Former Yugoslav Republic of Macedonia**
	3F (Add.1 to Add.3 of CMR2000/13)	Modifications to Article S11 **Latvia, The Former Yugoslav Republic of Macedonia**
	3E (Add.1 to Add.3 of CMR2000/13)	Explanations on coupling between Section VI of Article S22, Article S5 and Resolution 130 **Latvia, The Former Yugoslav Republic of Macedonia**
	3J (Add.1 to Add.3 of CMR2000/13)	Modifications to Article S15 and S13 **Latvia, The Former Yugoslav Republic of Macedonia**

Agenda item	Part of the European contribution	European common proposal for WRC-2000 subject and supplementary country names
1.12	6E (Add.1 to Add.6 of CMR2000/13)	Modifications to Article S11 **Latvia, The Former Yugoslav Republic of Macedonia**

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WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 2 to Document 13-E
9 May 2000
Original: English

COMMITTEE 4
COMMITTEE 5
WORKING GROUP 1 OF THE PLENARY
WORKING GROUP 2 OF THE PLENARY

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

Add the following country names to the list of signatories to this document:

EUROPEAN COMMON PROPOSALS - PART 1

IMT-2000, maritime and aeronautical issues

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.6.1	1A1	Initial IMT-2000 spectrum identified in S5.388 **Andorra, Malta**
	1A2	Bands to meet additional spectrum requirement for IMT-2000 **Andorra, Malta**
	1A3	Identification of bands already used for second generation systems for terrestrial IMT-2000 **Andorra, Malta**
	1A4	Resolution regarding the implementation of IMT-2000 **Malta**
	1A5	Use of high altitude platform stations in IMT-2000 systems **Andorra, Malta**
1.7	1B	Use of HF bands by AM(R)S and MMS **Andorra, Malta**
1.18	1C	Use of digital technology for MMS at 156-174 MHz **Andorra, Malta**

EUROPEAN COMMON PROPOSALS - PART 2

Mobile-satellite and radionavigation-satellite services

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.9	2A	Feasibility of an MSS (space-to-Earth) allocation at 1 559-1 567 MHz (Resolutions 213 and 220 (WRC-97)) **Andorra, Malta**
1.10	2B	Use of bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service **Andorra, Malta**
1.11	2C1	Non-GSO MSS under 1 GHz Resolution 214 (WRC-97) **Andorra, Malta**
	2C2	Non-GSO/MSS below 1 GHz - Resolution 214 (WRC-97) **Andorra, Malta**
1.15.1	2D1	RNSS (space-to-Earth) 960-1 215 MHz **Andorra, Malta**
	2D2	RNSS (space-to-Earth) 1 260-1 300 MHz **Andorra, Malta**
	2D3	Proposal for a new Resolution - Use of RNSS in the bands 1 151-1 300 MHz **Andorra, Malta**
	2D4	RNSS (space-to-Earth) and RNSS (Earth-to-space) in the band 5 000-5 030 MHz **Andorra, Malta**
	2D5	RNSS (Earth-to-space) 1 300-1 350 MHz **Andorra, Malta**
1.15.2	2D6	RNSS (space-to-Earth) at 1 215-1 260 MHz and 1 559-1 610 MHz **Andorra, Malta**
1.15.3	2D7	Status of allocations to services other than RNSS at 1 559-1 610 MHz **Andorra**

EUROPEAN COMMON PROPOSALS - PART 3

Non-GSO FSS

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.13.1	3A	Modifications to Article S21 **Andorra, Malta**
	3B	Modifications to Article S22 **Andorra, Malta**
	3C	Resolution on aggregate non-GSO interference **Andorra, Malta**
	3D	Provisions for earth stations with very large antennas **Andorra, Malta**
	3E	Modifications to Article S5 **Malta**
	3F	Modifications to Articles S9 and S11 **Andorra, Malta**
	3G	Modifications to Appendix S4 **Andorra, Malta**
1.13.2	3H	Modifications to Articles S5 and S22 to include limits in other frequency bands **Andorra, Malta**
1.13	3I	Updated Resolutions 130, 131 and 538 **Andorra, Malta**

EUROPEAN COMMON PROPOSALS - PART 4

Space and science services and radio astronomy

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.16	4A	Allocation of frequency bands above 71 GHz to the Earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution 723 **Andorra, Malta**
1.17	4B	Worldwide allocation for the Earth exploration-satellite (passive) and space research services in the band 18.6-18.8 GHz **Andorra, Malta**

EUROPEAN COMMON PROPOSALS - PART 5

Appendices S30 and S30A

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.19*bis*	5A	Scope of the RoP on S23.13 **Andorra, Malta**
1.20	5B1	Procedures for the use of the guardbands of Appendices S30 and S30A plans to perform space operation functions, also taking into account Resolution 86 (Minneapolis, 1998) **Andorra, Malta**
	5B2	Provisions relating to the suppression of Articles 6 and 7 of Appendices S30 and S30A, also taking into account Resolution 86 (Minneapolis, 1998) **Andorra, Malta**

EUROPEAN COMMON PROPOSALS - PART 6

Fixed services and fixed-satellite services

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.4	6A1	Allocations and regulatory aspects related to the high density fixed service (HDFS): Resolution 133 (WRC-97) - HDFS in the 37-39.5 GHz band **Andorra, Malta**
	6A2	Allocations and regulatory aspects related to the high density fixed service (HDFS): Resolutions 126 and 726 (WRC-97) - HDFS in the 31.8-33.4 GHz, 51.4-52 GHz, 55.78-59 GHz and 64-66 GHz bands **Malta**
	6A3	Allocations and regulatory aspects related to the high density fixed service (HDFS) **Malta**
1.5	6B	High altitude platform systems (HAPS) **Andorra, Malta**
1.8	6C	Earth stations on board vessels in the FSS at 3 700-4 200 MHz and 5 925-6 425 MHz **Andorra, Malta**
1.14	6D	Non-GSO MSS feeder links in the 15.43-15.63 GHz band **Andorra, Malta**

EUROPEAN COMMON PROPOSALS - PART 7

Appendices S3 and S7, Resolutions 28 (WRC-95) and 95 (WRC-97), PP-98 Resolutions

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.1	7A	Deletion of country names in footnotes to Article S5 **Andorra, Malta**
1.2	7B	Review of Appendix S3 with respect to spurious emissions for space services **Andorra, Malta**
1.3	7C	Review of Appendix S7 **Andorra, Malta**
7.1	7D	Report of the Director BR; Article S13 - Rules of Procedure **Andorra, Malta**
PP-98 Res.	7E1	PP-98 Resolution 86, Date of bringing into use of satellite network frequencies **Andorra, Malta**
	7E2	PP-98 Resolution 86, Satellite coordination procedures **Andorra, Malta**
	7E3	PP-98 Resolution 87, Role of the notifying administration **Andorra, Malta**
	7E4	Resolution 88, Processing charge for satellite networks **Andorra**
7.1	7D2 (Add.2 to Add.7 of CMR2000/13)	Resolution 80 **Cyprus, Lithuania, Romania**
	7D3 (Add.2 to Add.7 of CMR2000/13)	S5.488 **Cyprus, Lithuania, Romania**

PP-98 Res. 86	7E2 (Add.2 to Add.7 of CMR2000/13)	S5.43 **Andorra, Cyprus, Romania**
7.1 and PP-98 Res. 86	7F (Add.2 to Add.7 of CMR2000/13)	S11.44 (date of bringing into use) **Andorra, Cyprus, Romania**

Agenda item	**Part of the European contribution**	**European common proposal for WRC-2000 Subject and supplementary country names**
7.2	8A (Add.8 of CMR2000/13)	Agendas for 2003 and 2006 **Andorra, Cyprus, Lithuania, Romania**
	8B (Add.8 of CMR2000/13)	Resolutions for future conferences **Andorra, Cyprus, Lithuania, Romania**

Agenda item	**Part of the European contribution**	**European common proposal for WRC-2000 Subject and supplementary country names**
1.9	2A (Add.1 to Add.2 of CMR2000/13)	New MSS allocations **Andorra, Cyprus, Romania**
1.15.1	2D (Corr.1 to Add.2 of CMR2000/13)	Add space to space-to-space RNSS allocation **Andorra, Cyprus, Romania**

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.13	3D Corrigendum (Corr.1 to Add.3 of CMR2000/13)	Very large earth stations **Andorra, Cyprus, Lithuania**
	3F (Add.1 to Add.3 of CMR2000/13)	Modifications to Article S11 **Andorra, Cyprus**
	3E (Add.1 to Add.3 of CMR2000/13)	Explanations on coupling between Section VI of Article S22, Article S5 and Resolution 130 **Cyprus**
	3J (Add.1 to Add.3 of CMR2000/13)	Modifications to Article S15 and S13 **Andorra, Cyprus**

Agenda item	Part of the European contribution	European common proposal for WRC-2000 subject and supplementary country names
1.12	6E (Add.1 to Add.6 of CMR2000/13)	Modifications to Article S11 **Andorra, Cyprus, Lithuania**

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to Document 13-E
3 May 2000
Original: English

PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

1 Add the following country names to the list of signatories to this document:

EUROPEAN COMMON PROPOSALS - PART 1

IMT-2000, Maritime and aeronautical issues

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.6.1	1A1	Initial IMT-2000 spectrum identified in S5.388 **Bosnia and Herzegovina**, **Greece**
	1A2	Bands to meet additional spectrum requirement for IMT-2000 **Bosnia and Herzegovina**, **Liechtenstein**
	1A3	Identification of bands already used for second generation systems for terrestrial IMT-2000 **Bosnia and Herzegovina**, **Greece**
	1A4	Resolution regarding the implementation of IMT-2000 **Austria, Bosnia and Herzegovina**, **Liechtenstein**
	1A5	Use of high altitude platform stations in IMT-2000 systems **Bosnia and Herzegovina**
1.7	1B	Use of HF bands by AM(R)S and MMS **Bosnia and Herzegovina**
1.18	1C	Use of digital technology for MMS at 156-174 MHz **Bosnia and Herzegovina**

EUROPEAN COMMON PROPOSALS - PART 2

Mobile-satellite and radionavigation-satellite services

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.9	2A	Feasibility of an MSS (space-to-Earth) allocation at 1 559-1 567 MHz (Resolutions 213 and 220 (WRC-97)) **Bosnia and Herzegovina**, **Greece**
1.10	2B	Use of bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service **Bosnia and Herzegovina**, **Greece**
1.11	2C1	Non-GSO MSS under 1 GHz Resolution 214 (WRC-97) **Bosnia and Herzegovina, Greece**
	2C2	Non-GSO/MSS below 1 GHz - Resolution 214 (WRC-97) **Bosnia and Herzegovina**, **Greece**
1.15.1	2D1	RNSS (space-to-Earth) 960-1 215 MHz **Austria, Bosnia and Herzegovina**, **Greece**
	2D2	RNSS (space-to-Earth) 1 260-1 300 MHz **Austria, Bosnia and Herzegovina**, **Greece**
	2D3	Proposal for a new Resolution - Use of RNSS in the bands 1 151-1 300 MHz **Austria, Bosnia and Herzegovina**, **Greece**
	2D4	RNSS (space-to-Earth) and RNSS (Earth-to-space) in the band 5 000-5 030 MHz **Bosnia and Herzegovina, Greece**
	2D5	RNSS (Earth-to-space) 1 300-1 350 MHz **Bosnia and Herzegovina**, **Greece**
1.15.2	2D6	RNSS (space-to-Earth) at 1 215-1 260 MHz and 1 559-1 610 MHz **Bosnia and Herzegovina**, **Greece**
1.15.3	2D7	Status of allocations to services other than RNSS at 1 559-1 610 MHz **Bosnia and Herzegovina**, **Greece**

EUROPEAN COMMON PROPOSALS - PART 3

Non-GSO FSS

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.13.1	3A	Modifications to Article S21 **Bosnia and Herzegovina**
	3B	Modifications to Article S22 **Bosnia and Herzegovina, Greece**
	3C	Resolution on aggregate non-GSO interference **Bosnia and Herzegovina, Greece**
	3D	Provisions for earth stations with very large antennas **Bosnia and Herzegovina, Greece**
	3E	Modifications to Article S5 **Bosnia and Herzegovina, Greece**
	3F	Modifications to Articles S9 and S11 **Bosnia and Herzegovina, Greece**
	3G	Modifications to Appendix S4 **Bosnia and Herzegovina, Greece**
1.13.2	3H	Modifications to Articles S5 and S22 to include limits in other frequency bands **Bosnia and Herzegovina, Greece**
1.13	3I	Updated Resolutions 130, 131 and 538 **Bosnia and Herzegovina, Greece**

EUROPEAN COMMON PROPOSALS - PART 4

Space and science services and radio astronomy

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.16	4A	Allocation of frequency bands above 71 GHz to the Earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution 723 **Bosnia and Herzegovina, Greece**
1.17	4B	Worldwide allocation for the Earth exploration-satellite (passive) and space research services in the band 18.6-18.8 GHz **Bosnia and Herzegovina, Greece**

EUROPEAN COMMON PROPOSALS - PART 5

Appendices S30 and S30A

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.19*bis*	5A	Scope of the RoP on S23.13 **Bosnia and Herzegovina**, **Greece**
1.20	5B1	Procedures for the use of the guardbands of Appendices S30 and S30A plans to perform space operation functions, also taking into account Resolution 86 (Minneapolis, 1998) **Bosnia and Herzegovina**
	5B2	Provisions relating to the suppression of Articles 6 and 7 of Appendices S30 and S30A, also taking into account Resolution 86 (Minneapolis, 1998) **Bosnia and Herzegovina**

EUROPEAN COMMON PROPOSALS - PART 6

Fixed services and fixed-satellite services

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.4	6A1	Allocations and regulatory aspects related to the high density fixed service (HDFS): Resolution 133 (WRC-97) - HDFS in the 37-39.5 GHz band **Bosnia and Herzegovina**
	6A2	Allocations and regulatory aspects related to the high density fixed service (HDFS): Resolutions 126 and 726 (WRC-97) - HDFS in the 31.8-33.4 GHz, 51.4-52 GHz, 55.78-59 GHz and 64-66 GHz bands **Bosnia and Herzegovina**
	6A3	Allocations and regulatory aspects related to the high density fixed service (HDFS) **Bosnia and Herzegovina**
1.5	6B	High altitude platform systems (HAPS) **Bosnia and Herzegovina**, **Greece**
1.8	6C	Earth stations on board vessels in the FSS at 3 700-4 200 MHz and 5 925-6 425 MHz **Bosnia and Herzegovina**
1.14	6D	Non-GSO MSS feeder links in the 15.43-15.63 GHz band **Bosnia and Herzegovina**

EUROPEAN COMMON PROPOSALS - PART 7

Appendices S3 and S7, Resolutions 28 (WRC-95) and 95 (WRC-97), PP-98 Resolutions

Agenda item	**Part of the European contribution**	**European common proposal for WRC-2000 Subject and supplementary country names**
1.1	7A	Deletion of country names in footnotes to Article S5 **Bosnia and Herzegovina**, **Greece**
1.2	7B	Review of Appendix S3 with respect to spurious emissions for space services **Bosnia and Herzegovina**, **Greece**
1.3	7C	Review of Appendix S7 **Bosnia and Herzegovina**, **Greece**
7.1	7D	Report of the Director BR; Article S13 - Rules of Procedure **Bosnia and Herzegovina**
PP-98 Res.	7E1	PP-98 Resolution 86, Date of bringing into use of satellite network frequencies **Bosnia and Herzegovina**, **Greece**
	7E2	PP-98 Resolution 86, Satellite coordination procedures **Bosnia and Herzegovina**, **Greece**
	7E3	PP-98 Resolution 87, Role of the notifying administration **Bosnia and Herzegovina**, **Greece**
	7E4	Resolution 88, Processing charge for satellite networks **Bosnia and Herzegovina**, **Greece**
7.1	7D2 (Add.2 to Add.7 of CMR2000/13)	Resolution 80 **Czech Republic, Poland, United Kingdom**
	7D3 (Add.2 to Add.7 of CMR2000/13)	S5.488 **Czech Republic, Poland, United Kingdom**

PP-98 Res. 86	7E2 (Add.2 to Add.7 of CMR2000/13)	S5.43 **Czech Republic, Poland, United Kingdom**
7.1 and PP-98 Res. 86	7F (Add.2 to Add.7 of CMR2000/13)	S11.44 (date of bringing into use) **Czech Republic, Poland, United Kingdom**

Agenda item	**Part of the European contribution**	**European common proposal for WRC-2000 Subject and supplementary country names**
7.2	8A (Add.8 of CMR2000/13)	Agendas for 2003 and 2006 **Czech Republic, Poland, United Kingdom**
	8B (Add.8 of CMR2000/13)	Resolutions for future conferences **Czech Republic, Poland, United Kingdom**

Agenda item	**Part of the European contribution**	**European common proposal for WRC-2000 Subject and supplementary country names**
1.9	2A (Add.1 to Add.2 of CMR2000/13)	New MSS allocations **Poland, United Kingdom**
1.15.1	2D (Corr.1 to Add.2 of CMR2000/13)	Add space to space-to-space RNSS allocation **Czech Republic, Poland, United Kingdom**

Agenda item	Part of the European contribution	European common proposal for WRC-2000 Subject and supplementary country names
1.13	3D Corrigendum (Corr.1 to Add.3 of CMR2000/13)	Very large earth stations **Czech Republic, Poland, United Kingdom**
	3F (Add.1 to Add.3 of CMR2000/13)	Modifications to Article S11 **Czech Republic, Poland, United Kingdom**
	3E (Add.1 to Add.3 of CMR2000/13)	Explanations on coupling between Section VI of Article S22, Article S5 and Resolution 130 **Czech Republic, Poland, United Kingdom**
	3J (Add.1 to Add.3 of CMR2000/13)	Modifications to Article S15 and S13 **Czech Republic, Poland**

Agenda item	Part of the European contribution	European common proposal for WRC-2000 subject and supplementary country names
1.12	6E (Add.1 to Add.6 of CMR2000/13)	Modifications to Article S11 **Czech Republic, Poland, United Kingdom**

2 Delete the following country name from the list of signatories to this document:

Agenda item	Part of the European contribution	WITHDRAWN European common proposal for WRC-2000 Subject and supplementary country names
1.4	6A3	Allocations and regulatory aspects related to the high density fixed service (HDFS): withdraw: **Luxembourg**

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

EUROPEAN COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

This contribution presents the European common proposals for WRC-2000. These have been developed by the CEPT Conference Preparatory Group (CPG). As in past conferences, the intent of these proposals is to provide timely and effective response to emerging radiocommunication needs while maximizing efficient use of the spectrum, protecting current services and their expected development, and enabling equitable access to frequencies by all countries and systems.

The European administrations welcome the opportunity offered by WRC-2000 for in-depth discussions with the other ITU administrations on the issues included in this conference agenda. To this effect, coordinators have been designated for each agenda item to act as point of contact with the other administrations to contribute to the efforts of the Conference in arriving at decisions that can be supported by all ITU countries. Annex 1 to this contribution provides the list of European coordinators for each of the WRC-2000 agenda items.

The main part of this contribution contains a summarized presentation of the European common proposals. The detailed proposals are provided in eight addenda to this contribution, which parallel the structure adopted in the CPM Report to WRC-2000. The table of contents for these addenda and the cross-references to WRC-2000 agenda items are provided in Annex 2.

1.1 Agenda item 1.1 - Deletion of country names from footnotes of Article S5

Considering the evolution of the intended use of frequencies by the civil aviation community since WARC Mob-87, the European countries appearing in footnotes S5.181, S5.197 and S5.259 propose the suppression of their names from these footnotes.

1.2 Agenda item 1.2 - Review of Appendix S3 (Spurious emissions for space services)

This agenda item covers the finalization of the spurious emission limits for space services in Appendix S3 to the Radio Regulations. Currently, the limits for space services are design objectives only, but will become hard limits for space service transmitters installed after 1 January 2003, and for all space service transmitters after 1 January 2012, after further review by WRC-2000.

The ITU-R studies have agreed to the deletion of the "design objectives" text, with no changes to the spurious emission limits or reference bandwidth for space services. In addition a number of proposed modifications to Appendix S3 have been agreed on the following issues:

- the limiting case of a very narrow-band or unmodulated signal in a wideband amplifier operating particularly in the space services;
- the special case of spurious emission limits applying at frequencies used by adjacent transponders within the same transmitting system;
- amateur earth stations operating below 30 MHz;
- spurious emission limits for deep-space satellites.

Europe supports the conclusions of these studies. The European proposal for transponders within the same transmitting system also addresses the case of two transponders spaced far apart.

These studies have also identified a further item requiring modifications to Appendix S3 which, although not directly related to agenda item 1.2, may be considered in order to bring attention to one particular WRC-97 decision that may be misunderstood. The modifications relate to clarifications on the applicability of the limits in Appendix S3 to radar emissions.

Additional proposals are made, which relate to:

- a further splitting of the space services categories "space services (space stations)" and "space services (earth stations)" in Table II of Appendix S3 to the ITU Radio Regulations into a larger number of categories based on definitions existing in the Radio Regulations to permit clear identification/differentiation and allow the use of different limits if deemed appropriate at any future point;
- to request the modification of WRC-03 agenda item 2.3 (see Resolution 722 (WRC-97)) to include consideration of the results of the studies pursuant to Recommendation 66, *recommends* 7 and 8.

1.3 Agenda item 1.3 - Revision of Appendix S7 (Earth station coordination area)

This agenda item is to review the earth station coordination procedures of Appendix S7, including the scope of the systems covered, the methodologies employed, the frequency range of applicability, the time percentage range of applicability, the propagation aspects and the tables of system parameters.

Europe supports the revision of Appendix S7 based on:

- replacement of the current text of Appendix S7 by essential regulatory material taken from Recommendation ITU-R SM.[Document 1/1004]. Europe does not support incorporation of this Recommendation by reference into the Radio Regulations;
- in order to provide a single text dealing with coordination distances in the Radio Regulations, relocation of material relating to pre-determined coordination distances from Appendix S5 to the revised Appendix S7;
- provision of a mechanism (via a new resolution) for updating the tables of system parameters within the revised Appendix S7. Method 3 as described in § 7.2.3 of the CPM Report is the proposed method;
- consequential changes elsewhere in the Radio Regulations (Articles S1 and S9; Appendices S4 and S5; Resolutions 27, 60 and 712; Recommendations 105 and 711).

1.4 Agenda item 1.4 - High-density fixed service (HDFS)

1.4.1 Conditions of use by HDFS of the frequency bands 31.8-33.4 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz (Resolutions 126 (WRC-97) and 726 (WRC-97))

Europe supports the use of HDFS in the bands 31.8-33.4 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz.

Band 31.8-33.4 GHz

Europe supports the CPM conclusion that sharing between FS and other services is possible with some constraints, and therefore proposes that WRC-2000 confirm the FS allocation in this band.

Europe supports the CPM conclusion that sharing between FS and the inter-satellite service (ISS) in the band 32-33 GHz is possible provided that adequate pfd limits are met by the ISS.

Europe also supports the CPM conclusion that sharing between FS and receiving earth stations in the space research service (SRS) in the band 31.8-32.3 GHz is feasible on a geographical basis (a coordination zone around the earth station would be necessary). Europe has concluded that sharing between SRS and FS receivers is also feasible with an adequate pfd limit on the SRS emissions.

Band 51.4-52.6 GHz

Europe supports the CPM conclusion that out-of-band emissions from FS complying with the spurious emission limits shown in Tables I and II of RR Appendix S3 do not exceed the protection criteria of EESS within the 50.2-50.4 GHz band, as given in Recommendation ITU-R SA.1029.

Europe also considers that sharing is feasible with the few radio astronomy sites in remote places.

Band 55.78-59 GHz

Based on technical parameters for the fixed service as given in Recommendation ITU-R SA.1259, compatibility studies have shown that sharing between FS and EESS in the 55.78-59 GHz band is feasible.

Europe proposes to limit the ISS use to GSO satellites and LEO satellites with a pfd limit of –147 dB(W/m^2/100 MHz).

In the band 55.78-56.26 GHz, Europe supports that the output power density of stations in the FS be limited to –21.5 dB(W/MHz), and that the e.i.r.p. density in the zenith direction be limited to –31 dBW/MHz (option 2 of the CPM Report).

Band 64-66 GHz

Europe supports HDFS.

1.4.2 Spectrum requirements for HDFS at 37-40 GHz (Resolution 133 (WRC-97))

Europe supports the use of HDFS in the 37-39.5 GHz band, which is already heavily used in Europe, and the inclusion of such use into S5.547. Europe also supports the use of the band 39.5-40.5 GHz for FSS, so that both FS and FSS have the opportunity to use the 38 GHz range.

Europe supports the pfd limits defined in option A of section 6.1.2.3.2 of the CPM Report in order to adequately protect the fixed service from FSS systems.

Europe also supports that the pfd limits proposed for FSS in option A be applied as well to SRS in the band 37.5-38 GHz and to GSO SRS in the band 37-37.5 GHz. For non-GSO SRS in the band 37-37.5 GHz, Europe proposes to keep the existing pfd mask.

1.4.3 Interference to the radio astronomy service (Resolution 128 (WRC-97)), and use of the band 40.5-42.5 GHz by the fixed service (Resolutions 129 (WRC-97) and 134 (WRC-97))

In this band, WRC-97 added a primary allocation to the fixed-satellite (space-to-Earth) service in Regions 2 and 3, and in certain non-European countries in Region 1. This allocation is subject to discussions at WRC-2000, according to the resolutions mentioned above. WRC-97 also upgraded the fixed service to primary.

The band will be used in many countries including Europe to provide fixed wireless access directly to the end user for multimedia services, and such use is expected to grow in the future. In Europe, terrestrial multimedia wireless systems (MWS) have priority in this band. The band 42.5-43.5 GHz is used by the radio astronomy service in many countries.

Europe is concerned about coexistence between MWS terminals and uncoordinated FSS and BSS earth stations in the band 40.5-42.5 GHz. Therefore, the introduction of FSS in Region 1 is opposed and the BSS allocation is proposed for deletion in Region 1. It is also proposed to introduce adequate pfd limits to protect terrestrial services from space services allocated in Regions 2 and 3, and in many countries in Region 1.

1.5 Agenda item 1.5 - High altitude platform stations (HAPS), (Resolution 122 (WRC-97))

Since further studies are being undertaken on interference mitigation, and since the first HAPS systems are not yet operational, Europe proposes to extend the time-frame of Resolution 122 (WRC-97) until WRC-03. A revision of Resolution 122 is proposed to this effect.

The possible use of HAPS in the IMT-2000 context is addressed under agenda item 1.6.

Proposals have been made in ITU for the use of HAPS in the fixed service in frequency bands other than 47.2-47.5 GHz and 47.9-48.2 GHz, however there are difficulties due to general sharing problems and these proposals are not supported. Europe believes that it is not appropriate at this stage to make additional allocations or designations for services using HAPS, apart from a consideration of the use of HAPS in the terrestrial component of IMT-2000.

It is suggested however, that studies be undertaken by ITU-R in order to assess the feasibility of using HAPS in the fixed service in other frequency bands.

1.6 Agenda item 1.6 - IMT-2000

1.6.1 Agenda item 1.6.1 - Review of spectrum and regulatory issues for IMT-2000 and adjustments to the Table of Frequency Allocations

With respect to satisfying the future spectrum requirements for IMT-2000, WRC-2000 agenda item 1.6.1 addresses the need to consider "spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component…".

In line with the wording of the agenda item, Europe has decided to place a clear priority on the spectrum requirements of the terrestrial component of IMT-2000 over those of the satellite component.

The CPM Report concludes on total spectrum requirements for the terrestrial element of IMT-2000 for the three Regions[1], which are based on the sum of the spectrum currently identified for IMT-2000 in S5.388, the spectrum currently identified in the three Regions for existing second generation systems and an additional spectrum requirement to meet the forecasted traffic volume in geographic areas where the traffic is the highest. This additional spectrum is estimated to be 160 MHz in all three Regions by 2010. Europe fully supports these conclusions.

The CPM Report also concludes on spectrum requirements for the MSS, including the satellite component of IMT-2000. Europe does not consider it necessary to propose additional spectrum to satisfy MSS requirements under agenda item 1.6, but seeks identification of the existing MSS bands below 3 GHz for possible IMT-2000 applications. The proposed method of identification is one element of a proposed new resolution.

For the terrestrial component, the purpose of the WRC-2000 Conference should be to find global bands for all three regions to meet the requirement of 160 MHz of additional spectrum. Globally harmonized spectrum will facilitate worldwide roaming and reduce cost and complexity of IMT-2000 implementation. To this end, Europe is proposing to identify the band 2 500-2 690 MHz as the new global additional band for IMT-2000, with the band 2 520-2 670 MHz specifically for the terrestrial component.

The bands 2 500-2 520 MHz and 2 670-2 690 MHz are used today by a number of non-MSS services, thereby making these bands unavailable for MSS use in most parts of the world. Transitional arrangements in these bands, similar to those introduced in the 2 GHz MSS allocations would enhance the usability of these MSS spectrum allocations.

The identification of the additional bands should be done through a new footnote(s) in Article S5, referring to a supporting resolution. It is believed that this approach, whereby the identification of spectrum is made by a footnote in association with a WRC Resolution, rather than the use of a WRC Resolution alone which is generally considered to apply to transitional matters, gives the most stable identification of spectrum for IMT-2000. For this reason, Europe is proposing a **NOC** to footnote S5.388. This is important to further facilitate global roaming and global economies of scale in the manufacture of equipment, and is particularly important for developing countries to gain the greatest benefit from IMT-2000. This approach also underlines the importance of the IMT-2000 project within ITU, and the significant efforts both within ITU and external standardization bodies in the development of harmonized radio standards for IMT-2000.

Europe also proposes that WRC-2000 should identify for IMT-2000 spectrum that is currently used on a large scale in the various regions for existing (second generation) cellular/mobile systems within which IMT-2000 may be implemented in the longer term. Because the location of existing second generation spectrum is not common to the three Regions, the location of additional spectrum for IMT-2000 may similarly vary. As a result, some flexibility in the identification of additional spectrum for IMT-2000 may be needed.

Future frequency arrangements for these bands should aim to achieve compatibility with the existing frequency arrangements in operation, including the current duplex spacing and direction employed (for instance, in the GSM1800 band, 1 710-1 785 MHz paired with 1 805-1 880 MHz).

Europe recognizes that High Altitude Platform Stations (HAPS) could provide a platform to support base stations for the terrestrial component of IMT-2000 in appropriate situations. Regulatory action is required to enable HAPS to fulfil this role.

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[1] 555 MHz in Region 1, 390 MHz in Region 2 and 480 MHz in Region 3.

To fulfil the requirements outlined above, Europe is presenting a comprehensive set of proposals divided into five parts:

- the first part addresses that no change is needed for the current footnote S5.388;
- the second part addresses spectrum which is proposed to satisfy the additional global requirement and particularly the regulatory provisions relating to the band 2 500-2 690 MHz;
- the third part addresses spectrum which is currently identified for second generation mobile systems and which is proposed, under certain conditions, to be identified globally for IMT-2000. In Europe, it is worth noting that second generation systems (GSM900 and GSM1800) are widely deployed and hence refarming of this spectrum is envisaged only in the longer term;
- the fourth part introduces new resolutions to be considered at WRC-2000:
  - Resolution ZZZ [EUR/13/1] concerning the extension bands for the implementation of IMT-2000;
  - Resolution TTT [EUR/13/2] dealing with frequency bands for the satellite component of IMT-2000 and appropriate transitional arrangements;
- the fifth part addresses the possible implementation of High Altitude Platform Stations (HAPS) in an IMT-2000 system.

1.6.2 Agenda item 1.6.2 - Identification of a global radio control channel

The interest of having a control channel is to enable a terminal to gather all appropriate information on availability of frequencies (rasters, TDD/FDD, public/private…), operators, radio interfaces, services, (etc…) which are available in its area. In line with the conclusions of ITU-R on this issue, Europe considers that facilitation of multimode terminal operation and worldwide roaming of IMT-2000 is possible without a specific physical global control channel. Hence no proposals are made by Europe in the context of this agenda item.

1.7 Agenda item 1.7 - Use of the HF bands by the aeronautical mobile (R) and maritime-mobile services

Europe does not propose re-allocation of maritime and aeronautical HF bands and considers that this agenda item can be satisfied through the following modifications of the maritime procedures and HF channelling tables:

- conversion of the maritime HF distress and safety frequencies to be exclusive, interlinked with a transition period;
- encouraging the use of digital selective calling instead of calling by radiotelephony;
- arranging the residual radiotelephony routine calling on frequencies other than those used for distress and safety.

1.8 Agenda item 1.8 - Earth stations on board vessels

Agenda item 1.8 requests to consider regulatory and technical provisions to enable earth stations located on board vessels (ESV) to operate in fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands.

Both bands are heavily used by the fixed service throughout Europe and significant growth is expected in the future, in order to satisfy the fixed service spectrum requirements for long haul high capacity systems which could not be accommodated in other bands.

The ESV operation bears a great potential of interference to the fixed service applications in the 5 925-6 425 MHz band and could constraint the FS development in the 3 700-4 200 MHz band if protection from the FS were to be requested. Therefore, a change to the Radio Regulations which would permit use of ESVs could not be supported if it had the potential to allow harmful interference to the FS, or if it introduced additional constraints on the development of the fixed service.

Considering that the studies of the technical and regulatory environment of the use of the ESV have not been completed within ITU-R, Europe proposes to make no change to the existing Radio Regulations and that further studies be conducted to resolve the technical, regulatory and legal uncertainties before a future possible recognition of the ESV in the Radio Regulations.

1.9 Agenda item 1.9 - MSS downlinks at 1 559-1 567 MHz (Resolutions 213 (Rev.WRC-95) and 220 (WRC-97))

The studies in ITU-R have demonstrated that the frequency band 1 559-1 567 MHz can not be shared co-frequency with RNSS systems. On the other hand, as indicated in the CPM Report, some studies have shown that the existing RNSS systems would be protected against interference. Considering the development of new RNSS systems which are planned to be introduced in this band, Europe proposes no change in the frequency band 1 559-1 567 MHz at this WRC.

In order to respond to Resolution 213, consideration is being given to a proposal for an alternative downlink allocation to MSS.

It should be noted that the frequency band 1 559-1 567 MHz is also dealt with under agenda items 1.15.2 and 1.15.3.

1.10 Agenda item 1.10 - Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service

Europe supports keeping generic MSS allocations in these bands and would oppose any proposals to return to segmented allocations.

Strengthening of current provisions is proposed to ensure that spectrum will be made available, as required, to satisfy the spectrum requirements of AMS(R)S communications with priority 1 to 6 of Article S44 and of distress, urgency and safety GMDSS communications. Towards this, a new Resolution [EUR/13/4] is proposed to be referenced in the present footnotes (S5.383A and S5.357A). Europe would be cautious about any modification to the current footnotes since it could have an unpredictable outcome.

Europe is proposing extension of S5.357A to the bands 1 555-1 559 MHz and 1 656.5-1 660.5 MHz. However, it was felt premature to further extend the frequency range since it would lead to GMDSS and AMS(R)S having equal priority in the same bands, the consequences of which need to be evaluated before the WRC, in cooperation with IMO and ICAO.

The coordination process satisfactorily provides spectrum for GMDSS and AMS(R)S today and is expected to continue to do so in the future, with the proposed Resolution [EUR/13/4]. This also means there would be no need to determine the future spectrum requirements of GMDSS and AMS(R)S or to further study the feasibility of inter-system prioritization and pre-emption. Resolution 218 (WRC-97) is therefore proposed to be suppressed.

Clarification of the current provisions on the issue of GMDSS safety related communications carried under priority 4 of Article S53 is required. This clarification is achieved by referring to Articles S32 and S33 through appropriate provisions in the proposed Resolution [EUR/13/4].

1.11 Agenda item 1.11 - Non-GSO/MSS below 1 GHz (Resolutions 214 (Rev.WRC-97) and 219 (WRC-97))

Concerning Resolution 214, Europe considers that the protection of the existing and planned systems from MSS interference must be ensured. Europe also supports the continued protection of the MetSS in the sub-bands 137.025-137.175 MHz and 137.825-138.000 MHz, and opposes any proposal for upgrading the MSS to primary status in these two bands.

Europe strongly opposes the identification of any portion of the bands 410-430 MHz and 440-470 MHz, and in particular the extension to Region 1 of the existing allocation in Region 2 for the bands 454-456 MHz and 459-460 MHz. Europe does not consider that there is any need for further allocation to MSS below 1 GHz.

Concerning Resolution 219, Europe believes that all of the band 403-406 MHz is needed to secure the existing radiosonde operations, and as there is an increase in radiosonde operations, allocation of MSS in the band 405-406 MHz to MSS is opposed.

1.13 Agenda item 1.13 - Review of the power limits on non-GSO FSS systems (Resolutions 130 (WRC-97), 131 (WRC-97) and 538 (WRC-97))

1.13.1 Review of the limits in the frequency band covered by Resolutions 130 (WRC-97), 131 (WRC-97) and 538 (WRC-97)

WRC-97 decided to include power limits in Articles S21 and S22 in order to ensure coexistence among non-GSO FSS, GSO FSS, GSO BSS, space science and terrestrial systems in several frequency bands in the 10-18 GHz ("Ku-band") and 18-30 GHz ("Ka-band") range. WRC-97 adopted the concept of "hard limits" in these bands, and the regulatory conditions associated to these limits, subject to review and possible revision of the levels of these limits at WRC-2000.

Europe supports the introduction of new services such as non-GSO FSS and competition in the provision of telecommunication services while ensuring the protection of GSO FSS, GSO BSS, space sciences and terrestrial systems in operation and their future evolution and growth.

The ITU-R studies relating to the non-GSO FSS issue have validated the technical and regulatory proposals that formed the basis of WRC-97 decisions, with unanimous agreement reached at the CPM on the equivalent power flux-density (epfd) levels specifying the limits on non-GSO FSS emissions in all cases. Europe supports the agreement which was unanimously reached at the CPM, in particular on the following aspects:

- the modifications proposed to Article S21, concerning the limits on non-GSO FSS systems to protect the fixed service and the suppression of Resolution 131 (WRC-97);
- the modifications proposed to Section II of Article S22, concerning the "validation", "operational" and "additional operational" limits on non-GSO FSS systems to protect the GSO FSS and GSO BSS systems;
- the need to control the aggregate interference caused into operational GSO earth stations by all the non-GSO FSS systems, through a resolution.

On the limits to enable coexistence between GSO FSS, non-GSO FSS, radiolocation, radionavigation and space research in the 13.75-14 GHz band, Europe proposes the suppression of the minimum e.i.r.p. limit of 68 dBW currently included in S5.502. It is also proposed that, in line with the information provided in Recommendation ITU-R S.1068, the e.i.r.p. density limit specified in S5.502 be extended to all directions of space. Europe also proposes the introduction in S5.503 of a maximum e.i.r.p. density limit for non-GSO earth stations operating in the band 13.772-13.778 GHz.

Modifications are also proposed to Articles S9 and S11 to clarify that the provisions of Appendices S30, S30A and S30B are not applicable to non-GSO FSS systems. In the absence of such modifications, the provisions of Appendices S30, S30A and S30B may be understood as applying to non-GSO FSS systems, which would be in contradiction with the conclusions of the ITU-R studies.

Concerning several items where several possible options were identified by the CPM, the following proposals are made:

- Along with option 2 of Annex 7 of Chapter 3 of the CPM Report, a proposal is made to update Section VI of Article S22 (earth station off-axis e.i.r.p. density limits), taking into account the results of the ITU-R studies, and the need for relaxed values for these limits, compared with the ones included in the corresponding ITU-R recommendations. Depending on the outcome of the ITU-R studies prior to WRC-2000 on the applicability of such limits to earth stations within non-GSO systems, this proposal may need to be updated.
- The proposals under Article S5 and Article S22 reflect the incorporation in these Articles of provisions currently appearing in Resolutions 130 (WRC-97) and 538 (WRC-97), and the suppression in these resolutions of transitional measures, which are no longer considered relevant after WRC-2000, as highlighted in Annex 5 of Chapter 3 of the CPM Report.
- Along with option 2C of Section 2 of Annex 6 of Chapter 3 of the CPM Report, it is also proposed to exempt from the national or subregional restrictions appearing in S5.488 and S5.491 both GSO and non-GSO systems.

In addition, improvements are proposed to the CPM example text in four areas:

- As agreed within ITU-R, but not currently reflected in the CPM example text, the validation limits included in Tables S22-1A, S22-1B, S22-1C and S22-1D for a given GSO earth station antenna diameter should be specified as continuous curves, by straight line interpolation between the points corresponding to the same GSO earth station antenna, in the appropriate scale (linear scale for the epfd expressed in decibels and logarithmic scale for the percentage of time).
- The operational limit which applies for 2.4 m BSS in a part of Region 2 towards some orbital locations in the Region 2 BSS Plan is proposed to be moved to Table S22-4, and S22.5I (S22.5G in the CPM Report) is proposed to be slightly amended in order to give this limit a regulatory status.
- In the draft resolution relating to the limits on the aggregate interference from all non-GSO FSS systems, it should be made clear that these limits only apply for GSO orbital inclination of up to 2.5°, with a 3 dB relaxation for orbital inclinations between 2.5 and 4.5°.
- In the proposed modifications to Resolutions 130 (WRC-97) and 538 (WRC-97), the *requests the Radiocommunication Bureau* to review the findings previously made with respect to the compliance with the provisional limits are proposed to be suppressed, since, in the absence of a verification tool, the BR could not have been in a position to make such a finding.

1.13.2 Inclusion in other frequency bands of similar limits in Articles S21 and S22, or other regulatory approaches to be applied in relation to sharing situations

Europe supports the extension to Region 2 of the $epfd_{up}$ limits applying in Regions 1 and 3 in the 17.3-17.8 GHz band. In line with the conclusions of the CPM Report, Europe supports the limitation of the use of that band by non-GSO FSS (Earth-to-space) in Region 2 to non-GSO gateway operation. It is proposed that this be ensured by including in S5.516 a limitation on the minimum antenna size of 4.5 metres for non-GSO FSS transmit earth stations. The $epfd_{up}$ limits proposed in this band and region to protect BSS feeder links are the same as in the other regions.

1.14 Agenda item 1.14 - Issues relating to non-GSO MSS feeder links (space-to-Earth) at 15 GHz

Europe considers that there is no need to modify the current allocation to FSS in the 15.43-15.63 GHz band (space-to-Earth) as contained in Article S5.

However No. S5.511A should be modified to state that operation of FSS in the band 15.43-15.63 GHz (space-to-Earth) should be limited to non-GSO MSS feeder links for which advanced publication information has been received by the Bureau prior to the end of WRC-2000. In addition, these systems should be required to limit their out-of-band emissions in the band 15.35-15.4 GHz to meet the requirements of Recommendation ITU-R RA.769-1 for 98% of time, which is considered sufficient to ensure protection of the radio astronomy service. These requirements should be clearly stated in S5.511A.

On this basis, Resolution 123 (WRC-97) is proposed to be suppressed, together with the reference to this Resolution in No. S5.511A.

1.15 Agenda item 1.15 - Issues related to the radionavigation-satellite service (RNSS)

1.15.1 New allocations to the RNSS in the range 1-6 GHz

Under this agenda item, WRC-2000 will have to take major decisions for the future of the radionavigation-satellite service. These decisions relate to new allocations to the radionavigation-satellite service (RNSS) in the 1-6 GHz range, which are essential for the development of the European ***Galileo*** system as well as the improvement of the American GPS.

Several frequency bands have been investigated by the ITU-R studies. Sharing frequencies between the new RNSS signals and the services already using the bands under consideration proves to be a difficult problem. One solution to that problem would be to remove the existing services from the bands that may be allocated to RNSS by WRC-2000. This solution is not acceptable by Europe, which proposes the establishment of a regulatory scheme enabling all planned RNSS systems and existing services to coexist by requiring the new RNSS signals to adapt to their environment.

The European proposals on this issue are aimed at allowing a clear regulatory framework enabling the timely development of RNSS in these new allocations, but they also contain the necessary provisions to ensure a fully protected environment to existing services (e.g. DME, radars, radio astronomy).

The European Union initiated the development of a second-generation European radionavigation-satellite system, ***Galileo***, the space segment of which will be implemented by the European Space Agency. It is being designed as an independent, global, civil-controlled system which will be used, together with other RNSS systems, as the basis for the second-generation global navigation-satellite system, GNSS-2. ***Galileo*** will provide open access and two levels of controlled access services. One of these controlled access services will provide a reliable signal for safety purposes, including aeronautical use.

To offer these services, sufficient new allocations supporting at least two independent new wideband signals are required together with related narrow-band signals used to compensate for ionospheric delay. Discussions have already started between the European Union, Russia and the United States in order to set up a global GNSS service by cooperation of all relevant networks.

The limited spectrum in existing allocations imposes restrictions on the signal bandwidth and severe limitations on the achievable performance. Additional allocations are urgently required to allow the full development and enhancement of RNSS systems to be achieved. Wider signal bandwidth (up to 24 MHz for a single downlink signal) would allow higher code rates to provide better navigation accuracy and reduce multipath errors, which would benefit all RNSS applications. To keep the design and operational independence of the different systems, it is essential to allocate sufficient spectrum for independent, non-overlapping links.

In addition, proposals for RNSS systems have been made in which the satellites are required to be synchronized to terrestrial beacon reference stations. Less than 50 beacons are required, distributed worldwide. These would require RNSS (Earth-to-space) allocations.

To satisfy these global RNSS requirements, the following bands are proposed, under regulatory conditions that ensure a fully protected environment to existing services (e.g. DME, radars, radio astronomy), with the view to enable the continued operation and expected development of these services.

a) RNSS (space-to-Earth) in 1 151-1 215 MHz

This spectrum is part of the 960-1 215 MHz band which is currently allocated to the aeronautical radionavigation service. The 1 151-1 215 MHz portion of this band is used for ground-based DME and TACAN. In Europe, DME installations will continue to be used in conjunction with RNSS systems. This may result in an increase in the requirements for DME in Europe and this use is foreseen to extend to 2015 and beyond. The continued operation of current systems is therefore a prime consideration.

Noting that the GNSS will be a combination of at least two independent RNSS systems, adequate spectrum for GNSS in this band should therefore be made available, with provisions that protect the present and expected usage of this band by the ARNS.

It is noted that the United States have proposed to allocate the band 1 164-1 188 MHz for the implementation of a new GPS signal.

The limits of the allocation in a portion of the band 960-1 215 MHz depend on the following factors:

– sharing the same frequency between multiple RNSS systems is likely to be difficult in presence of DME. More importantly, it does not allow to build a true GNSS, due to the lack of independence between the RNSS systems involved. It is therefore essential that WRC-2000 allocate sufficient spectrum for independent, non-overlapping links of different systems;

– although it is already known that the 1 151-1 215 MHz part of the 960-1 215 MHz band is preferred for the implementation of RNSS, the best specific part of 1 151-1 215 MHz is still under investigation.

The studies in ITU-R have shown that interference from existing services into RNSS may be significant, especially at high altitudes. One solution to that problem would be to remove the existing services from the band that may be allocated to RNSS by WRC-2000. This solution is not acceptable by Europe, which proposes the establishment of a regulatory scheme enabling RNSS systems and existing services to coexist by requiring the new RNSS signals to adapt to their environment. In order to protect ARNS, a provisional pfd limit at the Earth's surface is proposed. Preliminary studies showed that a pfd limit of -111 dBW/m^2/MHz per system (allowing up to three systems to share the same frequency) should be sufficient to provide the greatest flexibility to RNSS while adequately protecting ARNS. This value must be confirmed by more detailed studies, with the aim of ensuring an efficient protection to ARNS while leaving as much flexibility as possible to RNSS, so that they can provide the desired reliable service anywhere at any altitude. This pfd value is proposed to be reviewed by WRC-03.

It is therefore proposed to allocate the band 1 151-1 215 MHz to the radionavigation-satellite service (space-to-Earth) under the condition that RNSS shall not claim protection from existing ARNS systems. A provisional pfd limit at the Earth's surface of -111 dBW/m^2/MHz is also proposed to protect the existing ARNS systems from harmful interference from RNSS systems. This value should be subject to review at WRC-03. A related Resolution is proposed to WRC-2000 to ensure that the final value of the pfd limit decided by WRC-03 is met by all RNSS systems using this new allocation, irrespective of their date of entry into use.

b) RNSS (space-to-Earth) in 1 260-1 300 MHz

In principle, there is no difference between the current allocations of 1 215-1 260 MHz and 1 260-1 300 MHz apart from the absence of RNSS from the latter. In addition, these bands are allocated by footnote S5.331 to the radionavigation service in several countries on a primary basis. According to S5.282, the amateur-satellite service (Earth-to-space) may operate in the band 1 260-1 270 MHz subject to not causing harmful interference to other services operating in accordance with the table (see S5.43).

It is considered that the band 1 260-1 300 MHz, as the band 1 215-1 260 MHz, provides scope for non-safety-of-life radionavigation-satellite applications, without operational constraints on radar installations.

A primary allocation is therefore proposed to the radionavigation-satellite service (space-to-Earth) in the band 1 260-1 300 MHz subject to not claiming protection from the radionavigation and the radiolocation services. For the protection of the radiolocation and radionavigation systems in the whole of the band 1 215-1 300 MHz, a provisional pfd limit at the Earth's surface of -133 dBW/m^2/MHz per any satellite of an RNSS system is proposed, subject to review at WRC-03. A related resolution is proposed to WRC-2000 as described in a) above.

c) RNSS (space-to-Earth) and RNSS (Earth-to-space) in 5 000-5 030 MHz

This band is allocated to the aeronautical radionavigation service for the operation (S5.444) of the microwave landing system (MLS), and to the aeronautical mobile-satellite (R) service (S5.367), subject to agreement obtained under No. S9.21. The international standard MLS system uses only frequencies above 5 030 MHz. The only use of the band 5 000-5 030 MHz is by the United Kingdom for an aircraft carrier based landing system that is used only at sea. This use is considered fairly light, below five systems, and no further implementation is expected.

The 5 000-5 030 MHz band is one of the few bands that are fairly lightly used. A 10 MHz guardband is necessary to protect the radio astronomy service below 5 000 MHz from out-of-band emissions of RNSS (space-to-Earth).

It is therefore proposed to allocate the band 5 000-5 010 MHz to the radionavigation-satellite service (Earth-to-space) and the band 5 010-5 030 MHz to the radionavigation-satellite service (space-to-Earth), while protecting the radio astronomy service below 5 000 MHz by an appropriate footnote containing a pfd limit, that would apply to out-of-band emissions from RNSS systems operating in the band 5 010-5 030 MHz falling into the radio astronomy band 4 990-5 000 MHz.

d) RNSS (Earth-to-space) in 1 300-1 350 MHz

In accordance with the Radio Regulations, the band 1 300-1 350 MHz is allocated on a primary basis to the aeronautical radionavigation service and on a secondary basis to the radiolocation service in all ITU regions. Because of the low elevation, the good discrimination found with radar antennas and the pulse modulation of the radar signal, a favourable sharing environment is foreseen. It is believed that in the case of excess interference into a satellite receiver, this would last for only a few seconds and would not be detrimental to the integrity of the system. As far as the interference into radars is concerned, this could be solved by careful location of the 50 worldwide required radio beacons. As stated in the CPM Report, a separation distance of less than 60 km is required between radars and the beacons.

In the band 1 300-1 350 MHz, the interests of the radiolocation and the radionavigation service are proposed to be safeguarded by a footnote proposing no protection for RNSS against radionavigation and a consequential upgrade of the radiolocation service to primary status.

1.15.2 Agenda item 1.15.2 - Allocation to RNSS (space-to-space) at 1 215-1 260 MHz and 1 559-1 610 MHz

This new direction of allocation to RNSS will not interfere into other services. However, the new requirement for protection of spaceborne receivers might constrain other RNSS systems in these bands.

Therefore Europe proposes the addition of the space-to-space direction to RNSS in the bands 1 215-1 260 MHz and 1 559-1 610 MHz with an additional footnote to prevent undue constraints relating to the protection requirements of spaceborne receivers from other radionavigation-satellite systems operating in these bands.

1.15.3 Agenda item 1.15.3 - FS allocation in the band 1 559-1 610 MHz

The band 1 559-1 610 MHz is currently allocated on a primary basis to the aeronautical radionavigation and radionavigation-satellite services in all ITU Regions. S4.10 recognizes that radionavigation services require special measures to ensure freedom from harmful interference. In accordance with footnotes S5.359 and S5.355, the band 1 559-1 610 MHz is additionally allocated to the fixed service on a primary and secondary basis respectively, in a number of countries.

The results of compatibility studies carried out in ITU-R show that FS emissions would cause unacceptable interference to RNSS receivers in the band and exclusion of FS transmitters from the band would protect these receivers.

Based on current and forecast use of the band by the fixed service in Europe and compatibility study results, Europe considers that RNSS should be provided with adequate protection and therefore the fixed service should be phased out. Europe proposes to phase out the FS from the band in two steps:

– FS is primary until 2005 and becomes secondary after this date;

– FS is secondary from 2005 until 2015, and is removed from the band after 2015.

1.16 Agenda item 1.16 - Allocations above 71 GHz

The allocations above 71 GHz should be re-arranged to correspond to the needs of the Earth exploration-satellite service (EESS), the space research service (SR) and the radio astronomy service (RA) with regard to the frequency spectrum and protection requirements.

A re-arranged allocation table should take into account the spectrum requirements and sharing possibilities of active services in order to provide an interference-free sharing environment and usable spectrum for all services to the extent possible.

In order to achieve this goal the following general principles for the revision of the table of allocations above 71 GHz should apply:

- The allocations to the passive services should be in response to physical processes in space or the atmosphere.
- Passive sensors of the EESS are operated on a global basis, and coordination with other services is not practical. The only sharing possibility resides in a strict compliance with the interference threshold of the passive sensors.
- No satellite downlinks within important RA bands or within bands adjacent to those in which an allocation for radio astronomy is foreseen.
- Co-allocation of RA and terrestrial services (except high altitude platforms), if possible, provided there is the necessary coordination around the radio astronomy stations. (The number of mm-wave observatories worldwide is expected to remain very limited, because, *inter alia*, few sites on Earth fulfil the stringent requirements that justify the required investment). Locations of mm-wave radio observatories are selected mostly on the basis of low water vapour content of the atmosphere, and stability of the climate. Preferred locations are, therefore, high mountain tops or plateaux in a desert environment, far from major cities and centres of urbanization. Therefore, this service will be able to share its frequency bands with terrestrial services.) See also Article S29.
- There should be, wherever possible, no difference between the total amount of frequency spectrum allocated to the various services in the present Radio Regulations, and the total amount of frequency spectrum after the re-arrangements, except for those allocations, subject to agenda item 1.16; however, this principle should not be applied at the expense of the usability of spectrum for the individual services allocated to a band due to protection requirements or interference from other allocated services. Thus, unfavourable combinations of allocations in a band should be avoided.
- Wherever there are conflicts between requirements from the different services, the services with a justified need for that specific band will have priority over the others. The other service(s) will then be re-allocated to other bands taking into account general spectrum requirements of the different services. (Although most of the active radio

services are not about to utilize the frequency bands above 71 GHz in the immediate future, adequate spectrum resources must be provided to allow for the development of radio equipment.)

- Taking due account of the convergence of the fixed and mobile services, these two services could have a co-allocation in the various frequency bands concerned, although convergence may not take place in all co-allocated bands.
- Primary allocations should be mentioned in the table of allocations itself, not in footnotes to the table.
- Europe proposes to use this review of the allocations to passive services above 71 GHz, for inclusion of allocations to the EESS (active) in the band 130-130.5 GHz (for high accuracy altimetry) and to the EESS (active) and SR (active) in the band 237.9-238 GHz (for spaceborne cloud radars); this avoids the need to open another agenda item very soon; it has minimal/no effect on other services; the requested allocations are very small; EESS (active) is the only service that has no allocation above 100 GHz, despite the fact that it may be the first active user to enter the range.

Regarding sharing between active and passive services, the European proposals support the conclusions of the CPM. Since little is known about the future characteristics of equipment used within these services, a resolution has been developed, encouraging ITU-R to develop, if appropriate, sharing criteria for these services. Meanwhile, the European proposal to WRC-2000 avoids co-allocation of active and passive services to prevent potential sharing problems.

Noting that the provisional agenda for WRC-03 includes agenda item 3 (results of studies with a view to consider for inclusion in a future agenda: … 3.2 allocations above 275 GHz), Europe has limited its proposals to frequency bands below 275 GHz.

The European view for the spectrum above 275 GHz is to extend the table of allocations until 1 000 GHz, in order to allow the indication in footnote S5.565 that certain frequency bands in this range are of interest for the science services.

1.17 Agenda item 1.17 - Worldwide allocation for EESS and SRS at 18.6-18.8 GHz

In Europe, the 18 GHz band is used extensively for fixed services in many countries and is likely to be used by the fixed-satellite service in the near future. The fixed service uses this band to provide mobile network infrastructure and medium hop links for public telecommunications networks. These requirements are expected to continue with the liberalization of European telecommunications and the introduction of new services.

The European common proposals on this issue are therefore intended to safeguard the future increasing use of the band for all the allocated services and seek to establish within the Radio Regulations the future sharing environment within which the FS, FSS and EESS (passive) must work. These proposals are in line with technical options included in the CPM Report and represent the maximum constraint on the active services in this band which can be accepted by Europe.

If agreement can be reached on the adoption of the technical constraints on the active services as proposed, an upgrade of the EESS (passive) to worldwide primary status can be supported.

1.18 Agenda item 1.18 - Use of new digital technology for the maritime mobile service in the band 156-174 MHz

The European approach under this agenda item is to continue to support the development and introduction of digital technologies to replace existing analogue technology in the VHF maritime mobile service.

To achieve this goal, Europe proposes to modify Resolution 342 (WRC-97), with a view to support the development of a new worldwide technology and to call for the finalization of the ITU-R studies to identify suitable technical characteristics of the system or interoperable systems to replace existing technology.

Europe also proposes a modification of Appendix S18 with the addition of a new footnote to permit the possible use on a voluntary basis of various bands created by the conversion of some duplex channels to simplex channels, for initial testing and the possible future introduction of new technologies. This new footnote would allow these channels to be operated as simplex channels, thus offering the possibility of extending the number of channels for solving local congestion.

1.19*bis* Agenda item 1.19*bis* - RR 2674/S23.13

The issue was first discussed at WRC-95 and WRC-97 adopted Resolution 536. Europe is of the opinion that there is no need to re-open the discussion at WRC-2000.

1.20 Agenda item 1.20 - Procedures for the coordination of unplanned services with Appendices S30 and S30A Plans

Due to lack of time, WRC-97 had to postpone the review of these procedures. ITU-R has reviewed these procedures, identified the current deficiencies in them, and possible options to correct these deficiencies, under three possible approaches:

– Approach A, in which Articles 6 and 7 of Appendix S30 and S30A would be retained and the currently suspended provisions S9.8 and S9.9 would be suppressed.

– Approach B, in which Articles 6 and 7 of Appendices S30 and S30A would be suppressed and replaced by equivalent procedures in Articles S9 and S11, retaining S9.8 and S9.9.

– Approach C, based on separating the modifications to the Plans from the original Plans.

The discussions in ITU-R have highlighted the difficulties arising from the need to update these procedures under Approach A, in order to reflect the improvements made in 30 years of application of the procedures under Articles 11 and 13 (now S9 and S11). Europe therefore continues to favour locating these procedures in Articles S9 and S11 (i.e. Approach B) in order to facilitate the task of the administrations and the Bureau when stations or networks in unplanned services need to be coordinated with the Plans.

Europe also supports the conclusions of the CPM Report taking into account Resolution 86 (Minneapolis, 1998) and considers of primary importance, for the conservation of the Appendices S30 and S30A Plans and the protection of other non-planned services and systems in the frequency bands covered by these Plans, that the deficiencies identified by the CPM regarding the existing provisions relating to the coordination between planned and non-planned services be corrected as a matter of urgency.

7.1 Agenda item 7.1 - Report of the Director, BR - Rules of Procedure

The present structure of Article S13 dealing with the Rules of Procedure of the Radio Regulations Board has resulted in some misunderstanding as to what was intended by WRC-97. The RRB have, on a provisional basis, developed some rules to clarify the application of these provisions. Europe proposes to modify Article S13 in order to clarify the sequence of these various provisions and to improve the transparency of the process.

8 Agenda item - Resolutions from the Plenipotentiary Conference (Minneapolis, 1998)

PP-98 adopted several Resolutions requesting WRC-2000 to take action on a number of items within the mandate of WRCs. These resolutions have the effect of adding to the agenda of WRC-2000.

8.1 Resolution 86 - Improvements to the satellite coordination and notification procedures

Date of bringing into use of satellite frequencies

Europe proposes regulatory amendments to clarify this item.

Separation of uplink and downlink data

It is proposed to separate the uplink and downlink data, which would result in treating the up and down bands separately in identifying the coordination requirements. This would result in there no longer being a need to submit the strapping data to the BR and Appendix S8 would be applied separately to the up and down bands. This would simplify the work of BR and administrations.

Identification of the networks with which coordination is required

Under the present procedures the BR is required to identify administrations with whom coordination is required, but the process of doing this is by satellite networks (Appendix S8). Europe sees many advantages in having the BR identify the specific networks and consequently is proposing this identification.

8.2 Resolution 87 - Role of the notifying administration

Europe proposes to clarify this aspect in the Radio Regulations.

8.3 Resolution 88 - Processing charges for satellite networks

This resolution requests WRC-2000 to consider whether any changes to the RR are necessary in the light of the PP-98 and Council-99 decisions on this matter. Europe is of the view that there must be some consequences of non-payment and that these consequences should be directed to the satellite operator and not the administration. Europe considers that the present CS/CV do not provide any consequences for non-payment of these fees and consequently there should be some changes to the RR to provide some consequences. Such changes are proposed.

Other issues in the WRC-2000 agenda or outstanding items relating to the issues addressed in the following proposals, will be the subject of additional proposals. These will be submitted as addenda to this contribution.

Annexes: 2

ANNEX 1

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ANNEX 2

Structure of the European common proposals to WRC-2000 and correspondence with WRC-2000 agenda items

Document	Title	Agenda items
Main document	European common proposals for the work of the Conference	All
Addendum 1	IMT-2000, maritime and aeronautical aspects	1.6, 1.7 and 1.18
Addendum 2	Mobile-satellite and radionavigation-satellite services	1.9, 1.10, 1.11 and 1.15
Addendum 3	Non-GSO FSS	1.13
Addendum 4	Space science services and radio astronomy	1.16 and 1.17
Addendum 5	Appendices S30 and S30A	1.19, 1.19*bis* and 1.20
Addendum 6	Fixed and fixed-satellite services	1.4, 1.5, 1.8, 1.12 and 1.14
Addendum 7	Appendices S3 and S7, Resolutions 28 (WRC-95) and 95 (WRC-97), PP-98 Resolutions	1.1, 1.2, 1.3, 2, 4, 7.1 and PP-98
Addendum 8	Future conferences	7.2

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Corrigendum 3 to
Addendum 2 to
Document 14-E
25 May 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

WORKING GROUP 1
OF THE PLENARY

CITEL Administrations

PROPOSALS FOR THE WORK OF THE CONFERENCE

Please replace the Table of Support to the Inter-American proposals (IAP) 300-361 on page 2 with the attached.

Annex: 1

ANNEX

TABLE OF SUPPORT TO THE INTER-AMERICAN PROPOSALS (IAP) 300-361

IAP No.	**Topic**	**Agenda item**	**ATG**	**ARG**	**BAH**	**BRB**	**BLZ**	**BOL**	**B**	**CAN**	**CHL**	**CLM**	**CTR**	**DMA**	**EQA**	**SLV**	**GRD**	**GTM**	**GUY**	**HTI**	**HND**	**JMC**	**MEX**	**NCG**	**PNR**	**PRG**	**PRU**	**DOM**	**SCN**	**LCA**	**VCT**	**SUR**	**TRD**	**USA**	**URG**	**VEN**
300-301	Footnotes S5.487 and S5.490	1.20		**x**					**x**	**x**						**x**			**x**				**x**					**x**				**x**	**x**	**x**	**x**	
302-361	Possible suppression of Articles 6 and 7 of Appendices S30 and S30A. Modifications to Articles S9, Appendix S5 and Articles 4, 6 and 7 of Appendices S30 and S30A to update these Appendices in relation to non-planned services	1.20		**x**					**x**	**x**						**x**			**x**				**x**					**x**				**x**	**x**	**x**	**x**	

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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300-301	Footnotes S5.487 and S5.490	1.20		x					x	x						x							x					x				x		x	x	
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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

CITEL Administrations

PROPOSALS FOR THE WORK OF THE CONFERENCE

TABLE OF SUPPORT TO THE INTER-AMERICAN PROPOSALS (IAP) 300 - 361

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
300-301	Footnotes S5.487 and S5.490	1.20							x	x						x																		x	x	
302-361	Possible suppression of Articles 6 and 7 of Appendices S30 and S30A. Modifications to Articles S9, Appendix S5 and Articles 4, 6 and 7 of Appendices S30 and S30A to update these Appendices in relation to non-planned services	1.20							x	x						x																		x	x	

CONTENTS

WRC-2000 agenda item 1.20 - to consider the issues related to the application of Nos. S9.8, S9.9 and S9.17 and the corresponding parts of Appendix S5 with respect to Appendices S30 and S30A, with a view to possible deletion of Articles 6 and 7 of Appendices S30 and S30A, also taking into consideration Recommendation 35 (WRC-95)

Footnotes S5.487 and S5.490

Background information

In considering issues related to the application of Articles 6 and 7 (or S9) of Appendices S30 and S30A, various sharing situations need to be examined. One of these situations relates to the scope of footnotes S5.487 and S5.490. Footnote S5.487 relates to Regions 1 and 3 and states that other services in the 11.7-12.5 GHz band in Regions 1 and 3 shall not cause harmful interference to BSS operating “in accordance with the provisions of Appendix S30”. Footnote S5.490 relates to Region 2 in the band 12.2-12.7 GHz and states that existing and future terrestrial radiocommunication services shall not cause interference to BSS operating “in conformity with the broadcasting-satellite Plan for Region 2 contained in Appendix S30”.

The question that has been raised in this regard is whether these footnotes apply only to assignments in the Plan or also to assignments that are in operation as a result of successful application of Article 4 procedures. This situation was discussed at the CPM and alternative arguments are presented in section 5.2.3.3.5 of Chapter 5 of the CPM Report. Some views were expressed that these provisions provide a super-primary status to the BSS over other co-primary services in the band, in that it requires the other services not to cause harmful interference to the broadcasting-satellite stations operating in accordance with the provisions of Appendix S30. From this some expressed the view that these footnotes should not apply to modifications to the Plans.

However, when administrations agreed to the BSS Plans they did so with the understanding that modification procedures would be available to provide administrations with the flexibility of modifying their assignments to suit their future needs and/or take advantage of currently available technology. Further, administrations understood and agreed assignments resulting from successful completion of the Article 4 modification procedures would be entitled to the same rights as the original assignments in the Plan. This is clearly stated in section 4.3.17 of Appendix S30 where it states in this regard: “The frequency assignment concerned shall enjoy the same status as those appearing in the appropriate Regional Plan and will be considered as a frequency assignment in conformity with the Plan”. The text establishes the link with S5.487 and S5.490 concerning assignments in conformity with the plans or their provisions.

NOC IAP/14/300

S5.487 In the band 11.7-12.5 GHz in Regions 1 and 3, the fixed, fixed-satellite, mobile, except aeronautical mobile, and broadcasting services, in accordance with their respective allocations, shall not cause harmful interference to broadcasting-satellite stations operating in accordance with the provisions of Appendix **S30**.

NOC IAP/14/301

S5.490 In Region 2, in the band 12.2-12.7 GHz, existing and future terrestrial radiocommunication services shall not cause harmful interference to the space services operating in conformity with the broadcasting-satellite Plan for Region 2 contained in Appendix **S30**.

Reasons: Footnotes S5.487 and S5.490 should continue to apply to assignments that are implemented after having successfully completed the Article 4 modification procedure.

WRC-2000 agenda item 1.20 - to consider the issues related to the application of Nos. S9.8, S9.9 and S9.17 and the corresponding parts of Appendix S5 with respect to Appendices S30 and S30A, with a view to possible deletion of Articles 6 and 7 of Appendices S30 and S30A, also taking into consideration Recommendation 35 (WRC-95)

Possible suppression of Articles 6 and 7 of Appendices S30 and S30A. Modifications to Articles S9, Appendix S5 and Articles 4, 6 and 7 of Appendices S30 and S30A to update these Appendices in relation to non-planned services.

Background information

At present, Appendices S30 and S30A are self-contained insofar as the procedures for coordinating assignments to other services with those in the BSS Plans are concerned. For example, Article 6 of Appendices S30 and S30A covers the coordination, notification and recording of terrestrial stations in the BSS and feeder link bands subject to a Plan, respectively, and Article 7 plays a similar role for FSS assignments. The purpose of agenda item 1.20 is to reopen the WRC-97 issue of whether it would be simpler to use the general coordination procedure of Article S9 and the notification and recording procedures of Article S11 (after appropriate additions) in place of Articles 6 and 7 of Appendices S30 and S30A.

The fundamental issue of WRC-2000 agenda item 1.20 is whether or not to suppress Article 6 and 7 of Appendices S30 and S30A. Upon careful review of the SC Report, it is apparent that suppressing Articles 6 and 7 (or effectively suppressing these articles by simply using them to refer to provisions of Article S9) would result in significant changes to how coordination is conducted between the planned and unplanned services.

CITEL remains unconvinced that suppression of Articles 6 and 7, with the associated complex and significant changes, improves on the current situation. The existing procedures have been used for 20 years and no problems have arisen that cannot be corrected within the Appendices. Further, such significant revisions lead to the risk of unintended consequences associated with revising the still evolving procedures of Articles S9 and S11 to make them applicable to the other services with allocations in the Appendices S30 and S30A bands, in respect of the Plans.

Considering all this, CITEL proposes that Approach “A” of CPM-99 Report (retention of Articles 6 and 7 of Appendices S30 and S30A and corresponding suppression or modification, as appropriate, of provisions in Article S9 and Appendix S5) is the best solution. CITEL notes that Approach “A” includes updating of Appendices S30 and S30A to cover the sharing situations that are not currently addressed in these two Appendices. CITEL, in general, supports the corresponding modifications to the Radio Regulations (Article S9, Appendix S5, Appendices S30 and S30A) as contained in Annex 1 to Chapter 5 of the CPM Report. However, the CPM highlighted several issues in both Approach A and Approach B, as requiring further study. (For example, see the Note on page 37 of the English text regarding ADD 5.1.3A of Appendix S30A, and Note on page 42 of the English text of Approach B regarding ADD 1f*bis*)). Taking into account the items requiring further study, CITEL provides the following proposals as a modification of Approach A.

In addition, CITEL could support changes to the procedures of Article 4 that would facilitate modification of the Plans, and there may be consequential changes to Article 4 under Approach “A”.

ARTICLE S9

Procedure for effecting coordination with or obtaining agreement of other administrations[1, 2, 3, 4, 5]

("APPROACH A")

Sub-Section IIA – Requirement and request for coordination

NOC

S9.6 to **S9.7**

SUP IAP/14/302

S9.8

SUP IAP/14/303

S9.9

Reasons: As in Approach A in the CPM Report, S9.8 and S9.9 are suppressed. Under Approach A, the coordination and notification of unplanned services with respect of planned BSS is maintained within Articles 6 and 7 of Appendices S30 and S30A.

NOC

S9.10 to **S9.16**

MOD IAP/14/304

S9.17 *f)*~~[13]~~ for any specific earth station, ~~or~~ typical mobile earth station or typical earth station in the broadcasting-satellite service in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services, in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**, Article 4 of Appendix **S30A** and BSS receive earth stations associated with assignments subject to the Appendix **S30** Plans;

Reasons: As in Approach A in the CPM Report, additional text is required to except coordination under Appendices S30 and S30A. In addition to the modifications to S9.17 in Approach A in the CPM Report, text is added to take into account the fact that earth stations in the BSS are typical. The typical nature of BSS receive earth stations is recognized in Chapters 5 and 7 of the CPM Report, and in the draft new Recommendation ITU-R SM.[XX] on determining coordination areas developed by Task Group 1/6.

MOD IAP/14/305

S9.17A *g)* for any specific earth station, in respect of other earth stations operating in the opposite direction of transmission, in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission and where the

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~~[13] **S9.17.1** Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending a decision of WRC-99 on the revision of these two Appendices.~~

coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of another earth station, with the exception of the ~~frequency bands subject to the~~coordination under Article 6 of Appendix **S30**, Article 7 of Appendix **S30A** ~~Plans~~and **S9.19**;

Reasons: As in Approach A in the CPM Report, additional text is required to except coordination under Appendices S30 and S30A, and as coordination of transmitting earth stations with BSS is covered under S9.19, coordination under S9.19 is also excepted from S9.17A.

MOD IAP/14/306

S9.18 *h)* for any transmitting station of a terrestrial service in the bands referred to in No. **S9.17** within the coordination area of an earth station, in respect of this earth station, with the exception of the coordination under Nos. **S9.16**, ~~and~~ **S9.19** and Article 6 of Appendix **S30**;

Reasons: As in Approach A in the CPM Report, additional text is required to except coordination under Article 6 of Appendix S30.

MOD IAP/14/307

S9.19 *i)* for any transmitting station of a terrestrial service or a transmitting earth station in the fixed-satellite service (Earth-to-space) in a frequency band shared on an equal primary basis with the broadcasting-satellite service, with respect to a~~n~~ typical earth station within the service area of a space station in the broadcasting-satellite service, except where this service is subject to the Appendix **S30** Plans;

Reasons: As in Approach A in the CPM Report, S9.19 is modified to include coordination of transmitting earth stations with BSS. In addition to the modifications to S9.19 in Approach A in the CPM Report, text is added to clarify that earth stations in the BSS are typical. The typical nature of BSS receive earth stations is recognized in Chapters 5 and 7 of the CPM Report, and in the draft new Recommendation ITU-R SM.[XX] on determining coordination areas developed by Task Group 1/6.

NOC

S9.20 to **S9.31**

MOD IAP/14/308

S9.32 If the responsible administration concludes that coordination is not required under No~~s~~. **S9.7** ~~to **S9.9**~~, it shall send the relevant information pursuant to Appendix **S4** to the Bureau for action under No. **S9.34**.

Reasons: As in Approach A in the CPM Report, suppression of this text is consequential to the suppression of S9.8 and S9.9.

NOC

S9.32A to **S9.40A**

MOD IAP/14/309

S9.41 Following receipt of the Weekly Circular referring to requests for coordination under No~~s~~. **S9.7** ~~to **S9.9**~~, an administration believing that it should have been included in the request shall, within four months of the date of publication of the relevant Weekly Circular, inform the initiating administration and the Bureau, giving its technical reasons for doing so, and shall request that its name be included.

Reasons: As in S9.32, suppression of this text is consequential to the suppression of S9.8 and S9.9.

NOC

S9.42 to **S9.44**

Sub-Section IIB – Acknowledgement of receipt of a request for coordination

NOC

S9.45 to **S9.49**

Sub-Section IIC – Action upon a request for coordination

NOC

S9.50

MOD IAP/14/310

S9.51 Following its action under No. **S9.50**, the administration with which coordination was sought under No~~s~~. **S9.7** ~~to **S9.9**~~ shall, within four months of the date of publication of the Weekly Circular under No. **S9.38**, either inform the requesting administration and the Bureau of its agreement or act under No. **S9.52**.

Reasons: As in S9.32, suppression of this text is consequential to the suppression of S9.8 and S9.9.

NOC

S9.51A to **S9.59**

Sub-Section IID – Action in the event of no reply, no decision or disagreement on a request for coordination

MOD IAP/14/311

S9.60 If, within the same four-month period specified in Nos. **S9.51** or **S9.51A**, an administration with which coordination is sought under Nos. **S9.7** ~~to **S9.9**~~ and **S9.15** to **S9.19** fails to reply or to give a decision under Nos. **S9.51** or **S9.51A** or, following its disagreement under No. **S9.52**, fails to provide information concerning its own assignments on which its disagreement is based, the requesting administration may seek the assistance of the Bureau.

Reasons: As in S9.32, suppression of this text is consequential to the suppression of S9.8 and S9.9.

NOC

S9.61 to **S9.65**

MOD IAP/14/312

TABLE S5-1

Technical conditions for coordination
(see Article **S9**)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
~~No. **S9.8** GSO/GSO~~	~~A transmitting space station in the fixed-satellite service (FSS) using the GSO in a frequency band shared with the broadcasting-satellite service (BSS) on an equal primary basis, in respect of space stations in the latter service which are subject to the Plans in Appendix **S30**~~	~~11.7-12.2 GHz (Region 2)~~ ~~12.2-12.7 GHz (Region 3)~~ ~~12.5-12.7 GHz (Region 1)~~	~~i) There is an overlap in the necessary bandwidths of the FSS and BSS space stations; and~~ ~~ii) the power flux-density (pfd) of the FSS space station exceeds the value given in Annex 4 of Appendix S30 on the territory of another administration located in another Region~~	~~Check by using the assigned frequencies and bandwidths;~~	~~See also Article 7 of Appendix **S30**.~~ ~~Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices.~~

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
~~No. **S9.9** GSO/GSO~~	~~A station of the FSS in a frequency band shared on an equal primary basis with the feeder links of the BSS, which are subject to the Plans in Appendix **S30A**~~	~~17.7-18.1 GHz (Region 1)~~ ~~17.7-18.1 GHz (Region 3)~~ ~~17.7-17.8 GHz (Region 2)~~	~~i) Value of $\Delta T_s/T_s$ exceeds 4% (see Section I of Annex 4 of Appendix **S30A**); and~~ ~~ii) geocentric inter-satellite angular separation is less than 3° or greater than 150°~~	~~i) Case II of Appendix **S8**~~ ~~ii) Annex 1 of Appendix **S8**~~	~~The threshold/conditions do not apply when the geocentric angular separation, between an FSS transmitting space station and a receiving space station in the feeder-link plan, exceeds 150° of arc and the free-space pfd of the FSS transmitting space station does not exceed a value of –137 dB(W/m²/MHz) on the surface of the Earth at the equatorial limb.~~ ~~Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices.~~

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.17** GSO, non-GSO/ terrestrial	A specific earth station, ~~or a~~ typical mobile earth station or typical earth station in the broadcasting-satellite service in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**, Article 4 of Appendix **S30A** and BSS receive earth stations associated with assignments subject to the Appendix **S30** Plans	Any frequency band allocated to a space service~~, except those mentioned in the Plans in Appendix **S30A**~~	The coordination area of the earth station covers the territory of another administration	Appendix **S7** (for earth stations in the radiodeter-mination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz, 2 483.5-2 500 MHz and 2 500-2 516.5 MHz, see Remarks column) 1) The coordination area of aircraft earth stations is determined by increasing the service area by 1 000 km with respect to the aeronau-tical mobile service (terrestrial) or 500 km with respect to terres-trial services other than the aeronautical mobile service	NOTE – For RDSS earth stations, a uniform coor-dination distance of 400 km corresponding to an airborne earth station shall be used. In cases where the earth stations are all ground-based, a coordination distance of 100 km shall be used

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.17** GSO, non-GSO/ terrestrial (*cont.*)				2) For receiving earth stations in the meteorological-satellite service in frequency bands shared with the meteorological aids service, the coordination distance is considered to be the visibility distance as a function of the earth station horizon elevation angle for a radiosonde at an altitude of 20 km above mean sea level, assuming 4/3 Earth radius	~~Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices~~

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.17A** GSO, non-GSO/ GSO, non-GSO	A specific earth station in respect of other earth stations operating in the opposite direction of transmission in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission, where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of a coordinated earth station, with the exception of the ~~frequency bands subject to the Plans in~~coordination under Article 6 of Appendix **S30**, Article 7 of Appendix **S30A** and **S9.19**	Any frequency band allocated to a space service	The coordination area of the earth station covers the territory of another administration or the earth station is located within the coordination area of an earth station	i) For bands in Table S5-2, see § 2 of Annex 1 of this Appendix ii) See Recommendations ITU-R IS.847, ITU-R IS.848 and ITU-R IS.849	
No. **S9.18** Terrestrial/ GSO, non-GSO	Any transmitting station of a terrestrial service in the bands referred to in No. **S9.17** within the coordination area of an earth station, in respect of this earth station, with the exception of the coordination under Nos. **S9.16** ~~and~~, **S9.19** and Article 6 Appendix **S30**	Any frequency band allocated to a space service	Transmitting terrestrial station is situated within the coordination area of a receiving earth station	See Remarks column	The coordination area of the affected earth station has already been determined using the calculation method of No. **S9.17**

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.19** Terrestrial/ GSO	A transmitting station in a terrestrial service or a transmitting earth station in the fixed-satellite service (Earth-to-space) in a frequency band shared on an equal primary basis with the BSS, with respect to a typical earth station within the service area of a space station in the broadcasting-satellite service, except where the service is subject to the Plans in Appendix **S30**	Bands listed in No. **S9.11**	i) Necessary bandwidths overlap; and ii) the pfd of the terrestrial or transmitting earth station at the edge of the BSS service area, or on the territory of another administration, exceeds the permissible level	Check by using the assigned frequencies and bandwidths	

Reasons: These modifications to Appendix S5 are required to align the text with the proposed changes to Article S9.

APPENDIX S30

NOC

ARTICLE 1

General definitions

ARTICLE 2

Frequency bands

NOC

2.1

ADD IAP/14/313

2.2 The use of the guardbands of the Plans in Appendix **S30**,[1] specifically the frequency bands 11.7-11.714 GHz (Regions 1 and 3), 12.189-12.2 GHz (Region 3), 12.2-12.212 GHz (Region 2), 12.489-12.5 GHz (Region 1), 12.688-12.7 GHz (Region 2), to provide space operations functions for GSO BSS systems in accordance with No. **S1.23** shall be coordinated with the assignments subject to these Plans using the provisions of Article 7 of this Appendix. Coordination among assignments intended to provide space operation functions and services not subject to a Plan shall be effected using the provisions of No. **S9.7** and the associated provisions of Articles **S9** and **S11**. Coordination of modifications to the Plans which extend into the guardbands with assignments intended to provide space operation functions shall be effected using paragraph 4.3.1.5 or 4.3.3.5, as appropriate, of Article 4 of Appendix **S30**.

Reasons: As described in section 5.2.1 of the CPM Report, there is currently no coordination procedure, or associated criteria, for use of the guardbands of the Plans for space operation of BSS satellites. The addition of this provision specifies a coordination process for use of the Appendix S30 guardbands.

NOC

ARTICLE 3

Execution of the provisions and associated Plans

[1] As defined in section 3.9 of Annex 5 to this Appendix.

NOC

ARTICLE 4

Procedure for modifications to the Plans

NOC

ARTICLE 5

Notification, examination and recording in the Master International Frequency Register of frequency assignments to space stations in the broadcasting-satellite service

MOD IAP/14/314

ARTICLE 6

Coordination, notification and recording in the Master International Frequency Register of frequency assignments to terrestrial stations or to earth stations in the fixed-satellite service (Earth-to-space) affecting broadcasting-satellite frequency assignments in the frequency bands 11.7-12.2 GHz (in Region 3), 11.7-12.5 GHz (in Region 1) and 12.2-12.7 GHz (in Region 2)[5]

Reasons: As in the CPM Report, to cover coordination of transmitting earth stations in Region 1 in 12.5-12.7 GHz with planned BSS in Region 2, which is currently not covered by the Radio Regulations.

Section I – Coordination procedure to be applied

MOD IAP/14/315

6.1.1 Before notifying to the Bureau a frequency assignment to a terrestrial transmitting station or to a transmitting earth station in the fixed-satellite service, an administration shall initiate coordination with any other administration having a frequency assignment to a broadcasting-satellite station in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated, and administrations whose territory is included in the service area of such an assignment, if:

– the necessary bandwidths of the two transmissions overlap; *and*

– the power flux-density which would be produced by the proposed terrestrial transmitting station or by the transmitting earth station in the fixed-satellite service exceeds the value derived in accordance with Annex 3 at one or more points on the edge of the service area which is within the coverage area of the broadcasting-satellite station of that administration.

Reasons: As in the CPM Report, to include coordination of transmitting earth stations in Region 1 in 12.5-12.7 GHz with planned BSS, which is currently not covered by the Radio Regulations. Also, additional text is required to include protection of modifications to the Plans from their date of receipt. Adjustments are required to ensure that the administration on whose territory the receiving earth stations are located conducts the coordination.

MOD IAP/14/316

6.1.2 For the purpose of effecting coordination, the administration responsible for the terrestrial station or for the earth station in the fixed-satellite service shall send to the administrations concerned, by the fastest possible means, a diagram drawn to an appropriate scale indicating the location of the terrestrial station or the earth station in the fixed-satellite service and all other data of the proposed frequency assignment and the approximate date on which it is planned to bring the station into use.

Reasons: As in the CPM Report, to include coordination of transmitting earth stations in Region 1 in 12.5-12.7 GHz with planned BSS.

MOD IAP/14/317

6.1.3 An administration with which coordination is sought shall acknowledge receipt of the coordination data immediately by telegram. If no acknowledgement is received within fifteen days of dispatch, the administration seeking coordination may dispatch a telegram requesting acknowledgement of receipt of the coordination data, to which the receiving administration shall reply. Upon receipt of the coordination data, an administration with which coordination is sought shall promptly examine the matter with regard to interference[6] which would be caused to its frequency assignments in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated and shall, within an overall period of two months from dispatch of the coordination data, either notify the administration requesting coordination of its agreement to the proposed assignment or, if this is impossible, indicate the reasons therefor and make such suggestions as it may be able to offer with a view to a satisfactory solution of the problem.

Reasons: Additional text is required to include protection of modifications to the Plans from their date of receipt.

NOC

6.1.4 to 6.1.9

MOD IAP/14/318

6.1.10 Where an administration fails to reply within one month of dispatch of the Bureau's telegram sent under § 6.1.7 requesting an acknowledgement or fails to give a decision on the matter within two months of dispatch of the Bureau's telegram of request sent under § 6.1.8, the administration with which coordination was sought shall be considered to have undertaken that no complaint will be made in respect of any harmful interference which may be caused by the terrestrial station or by the earth station in the fixed-satellite service being coordinated to the service rendered or to be rendered by its satellite-broadcasting station.

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[6] The criteria to be employed in evaluating interference levels shall be based on the relevant ITU-R Recommendations or, in the absence of such Recommendations, shall be agreed between the administrations concerned.

Reasons: As in the CPM Report, to include coordination of transmitting earth stations in Region 1 in 12.5-12.7 GHz with planned BSS.

NOC

6.1.11 to 6.1.12

Section II – Notification procedure for frequency assignments

MOD IAP/14/319

6.2.1 Any frequency assignment to a fixed, land or broadcasting station or to an earth station in the fixed-satellite service shall be notified to the Bureau if the use of the frequency concerned is capable of causing harmful interference to the service rendered or to be rendered by a broadcasting-satellite station of any other administration, or if it is desired to obtain international recognition of the use of the frequency[7].

Reasons: As in the CPM Report, to include protection of planned BSS from transmitting earth stations in the FSS in the 12.5-12.7 GHz frequency band in Region 1.

MOD IAP/14/320

6.2.2 For this notification, an individual notice for each frequency assignment shall be drawn up as prescribed in Appendix **S4**, Annexes 1A and 1B, or Annexes 2A and 2B, as appropriate, which specifies the basic characteristics to be furnished as required. It is recommended that the notifying administration should also supply the additional data called for in that Appendix, together with such further data as it may consider appropriate.

Reasons: As in the CPM Report, Article 6 is being modified to include protection of planned BSS from transmitting earth stations in the FSS in the 12.5-12.7 GHz frequency band in Region 1. Therefore, Annexes 2A and 2B, characteristics for satellite networks or earth or radio astronomy stations, need to be referenced as well.

NOC

6.2.3 to 6.2.4

Section III – Procedure for the examination of notices and the recording of frequency assignments in the Master Register

MOD IAP/14/321

6.3.1 Whatever the means of communication, including telegram, by which a notice is transmitted to the Bureau, it shall be considered complete if it contains at least the appropriate basic characteristics specified in Appendix **S4**, Annexes 1A and 1B or Annexes 2A and 2B, as appropriate.

Reasons: Same as for MOD 6.2.2 above.

NOC

6.3.2 to 6.3.9

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[7] The attention of administrations is specifically drawn to the provisions of Section I of this Article.

MOD IAP/14/322

6.3.10 – where appropriate, with respect to the probability of harmful interference to a broadcasting-satellite station whose frequency assignment is in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated.

Reasons: Additional text is required to include protection of modifications to the Plans from their date of receipt.

NOC

6.3.11 to 6.3.32

6.3.33 Change in the basic characteristics of assignments already recorded in the Master Register

MOD IAP/14/323

6.3.34 Any notice of a change in the basic characteristics of an assignment already recorded in the Master Register, as specified in Appendix **S4**, Annexes 1A and 1B or Annexes 2A and 2B, as appropriate (except those entered in Columns 2c, 3 and 4a of the Master Register), shall be examined by the Bureau in accordance with the provisions of § 6.3.8 and 6.3.9 and, where appropriate, § 6.3.10 and the provisions of § 6.3.12 to 6.3.32 inclusive shall be applied. Where the change should be recorded, the original assignment shall be amended according to the notice.

Reasons: Same as for MOD 6.2.2 above.

NOC

6.3.35 to 6.3.41

ARTICLE 7

MOD IAP/14/324

Procedures for coordination, notification and recording in the Master International Frequency Register of frequency assignments to stations in the fixed-satellite service (space-to-Earth) in the frequency bands 11.7-12.2 GHz (in Region 2), 12.2-12.7 GHz (in Region 3) and 12.5-12.7 GHz (in Region 1), and to stations in the broadcasting-satellite service in the frequency band 12.5-12.7 GHz (in Region 3) when frequency assignments to broadcasting-satellite stations ~~in~~ subject to ~~conformity with~~ the Regions 1 and 3 Plan, or the Region 2 Plan, respectively, are involved[8]

Reasons: Deletion of "in conformity with" is required so as not to preclude protection of modifications to the Plans from their date of receipt. As in the CPM Report, additional text is required to include coordination of Region 3 BSS space stations in the 12.5-12.7 GHz band with planned BSS.

MOD IAP/14/325

Section I – Procedure for the advance publication of information on planned fixed-satellite (space-to-Earth) or broadcasting-satellite systems

Publication of information

MOD IAP/14/326

7.1.1 An administration which intends to establish a fixed-satellite or broadcasting-satellite system not subject to a Plan shall, prior to the procedure described in § 7.2.1, where applicable, send to the Bureau, not earlier than five years and preferably not later than two years before the date of bringing into service each satellite network of the planned system, the information listed in Appendix **S4**, Annexes 2A and 2B.

Reasons: As in the CPM Report, additional text is required to include coordination of Region 3 BSS space stations in the 12.5-12.7 GHz band with planned BSS.

NOC

7.1.2 to 7.1.3.1

Comments on published information

MOD IAP/14/327

7.1.4 If, after studying the information published under § 7.1.3, any administration is of the opinion that interference which may be unacceptable may be caused to its frequency assignments in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated, it shall, within ~~three~~ four months after the date of the Weekly Circular publishing the information listed in Appendix **S4**, Annexes 2A and 2B, send its comments to the administration concerned. A copy of these comments shall also be sent to the Bureau. If no such comments are received from an administration within the period mentioned above, it may be assumed that that administration has no basic objections to the planned fixed-satellite or broadcasting-satellite network(s) of that system of which details have been published.

Reasons: As in the CPM Report, additional text is required to include coordination of Region 3 BSS space stations in the 12.5-12.7 GHz band with planned BSS. In addition, the comment period is updated from three to four months. It is a burden on administrations to have different comment periods for AP30/C Special Sections and other Special Sections.

Resolution of difficulties

NOC

7.1.5 to 7.1.6

Results of advance publication

NOC

7.1.7

Commencement of coordination or notification procedure

MOD IAP/14/328

7.1.8 In complying with the provisions of § 7.1.5 and 7.1.6, an administration responsible for a planned fixed-satellite system in the fixed-satellite service, or in the broadcasting-satellite service not subject to a Plan shall, if necessary, defer its commencement of the coordination procedure of

§ 7.2.1 or, where this is not applicable, the sending of its notices to the Bureau until ~~five~~six months after the date of the Weekly Circular containing the information listed in Appendix **S4**, Annexes 2A and 2B on the relevant satellite network. However, in respect of those administrations with which difficulties have been resolved or which have responded favourably, the coordination procedure, where applicable, may be commenced prior to the expiry of the ~~five~~six months mentioned above.

Reasons: As in the CPM Report. Same as for MOD 7.1.4 above.

Section II – Coordination procedures to be applied in appropriate cases

MOD IAP/14/329

7.2.1 Before an administration notifies to the Bureau or brings into use any frequency assignment to a space station in the fixed-satellite service (space-to-Earth), or in the broadcasting-satellite service not subject to a Plan, it shall seek the agreement of any other administration having a frequency assignment in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated, if:

a) any portion of the necessary bandwidth proposed for the space station in the fixed-satellite or broadcasting-satellite service falls within the necessary bandwidth associated with the frequency assignment to the broadcasting-satellite station; and

b) the power flux-density which would be produced by the proposed fixed-satellite or broadcasting-satellite assignment exceeds the value specified in Annex 4.

For this purpose, the administration seeking agreement shall send to ~~any other such administration~~ the Bureau the information listed in Appendix **S4**, Annexes 2A and 2B.

Reasons: As in the CPM Report, additional text is required to include coordination of Region 3 BSS space stations in the 12.5-12.7 GHz band with planned BSS. Additional text is required to include protection of modifications to the Plans from their date of receipt. The last paragraph is aligned with the current practice for non-planned services (see S9.30) where this information is only sent to the Bureau (this issue was highlighted in the CPM Report).

NOC

7.2.2

MOD IAP/14/330

7.2.3 ~~An administration seeking coordination under § 7.2.1 shall at the same time send to the Bureau a copy of the request for coordination together with the information listed in Appendix **S4**, Annexes 2A and 2B and the name(s) of the administration(s) whose agreement is sought.~~ The Bureau shall determine on the basis of Annex 4 which frequency assignments in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated are considered to be affected. The Bureau shall include the names of those administrations with the information received from the administration seeking coordination and shall publish this information in a special section of its Weekly Circular, together with a reference to the Weekly Circular in which details of the satellite system were published in accordance with Section I of this Article. When the Weekly Circular contains such information, the Bureau shall so inform all administrations by circular telegram.

Reasons: Consequential to the modification to the last paragraph of section 7.2.1, which now specifies that the Appendix S4 information is only sent to the Bureau.

NOC

7.2.4 to 7.2.13

Section III – Notification of frequency assignments

MOD IAP/14/331

7.3.1 Any frequency assignment to a space station in the fixed-satellite or in the broadcasting-satellite service not subject to a Plan shall be notified to the Bureau:

a) if the use of the frequency concerned is capable of causing harmful interference to a frequency assignment of another administration which is in conformity with the appropriate Regional Plan[10] or for which the corresponding Plan modification procedure has been initiated; *or*

b) if it is desired to obtain international recognition of the use of the frequency.

Reasons: As in the CPM Report, additional text is required to include coordination of Region 3 BSS space stations in the 12.5-12.7 GHz band with planned BSS. Additional text is required to include protection of modifications to the Plans from their date of receipt.

NOC

7.3.2 to 7.3.5

Section IV – Procedure for the examination of notices and the recording of frequency assignments in the Master Register

NOC

7.4.1 to 7.4.5.1

MOD IAP/14/332

7.4.5.2 where appropriate, with respect to its conformity with the provisions of § 7.2.1, relating to the coordination of the use of the frequency assignment with the other administrations concerned having a frequency assignment in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated;

Reasons: Additional text is required to include protection of modifications to the Plans from their date of receipt.

MOD IAP/14/333

7.4.5.3 where appropriate, with respect to the probability of harmful interference to the service rendered or to be rendered by a broadcasting-satellite station whose frequency assignment is in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated.

NOC

7.4.6 to **7.4.9**

MOD IAP/14/334

7.4.9.1 Where the Bureau finds that the coordination procedures mentioned in § 7.4.5.2 have been successfully completed with all administrations whose frequency assignments in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated may be affected, the frequency assignment shall be recorded in the Master Register. The date of receipt by the Bureau of the notice shall be entered in Column 2d.

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[10] The attention of administrations is specifically drawn to the application of § 7.2.1 above.

NOC

7.4.9.2 to 7.4.9.3

MOD IAP/14/335

7.4.9.4 Where the notifying administration resubmits the notice and the Bureau finds that the coordination procedure mentioned in § 7.4.5.2 has been successfully completed with all administrations whose frequency assignments in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated may be affected, the frequency assignment shall be recorded in the Master Register. The date of receipt of the original notice by the Bureau shall be entered in Column 2d. The date of receipt by the Bureau of the resubmitted notice shall be entered in the Remarks Column.

NOC

7.4.9.5 to **7.4.12**

MOD IAP/14/336

7.4.12.1 A notice of a change in the basic characteristics of an assignment in the fixed-satellite or broadcasting-satellite service not subject to a Plan already recorded, as specified in Appendix **S4**, Annexes 2A and 2B (except the name of the station or the name of the locality in which it is situated or the date of bringing into use), shall be examined by the Bureau in conformity with § 7.4.5.1 and, where appropriate, § 7.4.5.2 and 7.4.5.3, and the provisions of § 7.4.7 to 7.4.11.3 inclusive shall apply. Where the change should be recorded, the original assignment shall be amended accordingly.

Reasons: As in the CPM Report, additional text is required to include coordination of Region 3 BSS space stations in the 12.5-12.7 GHz band with planned BSS.

MOD IAP/14/337

7.4.12.2 However, in the case of a change in the characteristics of an assignment which is in conformity with § 7.4.5.1, should the Bureau reach a favourable finding with respect to § 7.4.5.2 and 7.4.5.3, where appropriate, or find that the changes do not increase the probability of harmful interference to frequency assignments in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated, the amended assignment shall retain the original date in Column 2d. The date of receipt of the notice by the Bureau relating to the change shall be entered in the Remarks Column.

Reasons: Additional text is required to include protection of modifications to the Plans from their date of receipt.

NOC

7.4.12.3 to 7.4.12.4

MOD IAP/14/338

7.4.13 Recording of frequency assignments in the fixed-satellite or broadcasting-satellite service not subject to a Plan notified before being brought into use

Reasons: As in the CPM Report, additional text is required to include coordination of Region 3 BSS space stations in the 12.5-12.7 GHz band with planned BSS.

NOC

7.4.13.1 to 7.4.13.3

Section V – Recording of findings in the Master Register

NOC

7.5

Section VI – Categories of frequency assignments

NOC

7.6.1

MOD IAP/14/339

7.6.2 If harmful interference is actually caused to the reception of any broadcasting-satellite station whose frequency assignment is in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated, by the use of a frequency assignment to a space radiocommunication station subsequently recorded in the Master Register in accordance with the provisions of § 7.4.11.3, the station using the latter frequency assignment must, upon receipt of advice thereof, immediately eliminate this harmful interference.

Reasons: Additional text is required to include protection of modifications to the Plans from their date of receipt.

MOD IAP/14/340

7.6.3 If harmful interference to the reception of any broadcasting-satellite station whose frequency assignment is in conformity with the appropriate Regional Plan or for which the corresponding Plan modification procedure has been initiated, is actually caused by the use of a frequency assignment which is not in conformity with § 7.4.5.1, the station using the latter frequency assignment must, upon receipt of advice thereof, immediately eliminate this harmful interference.

Section VII – Review of findings

NOC

7.7.1 to 7.7.4

Section VIII – Modification, cancellation and review of entries in the Master Register

NOC

7.8

MOD IAP/14/341

7.8.1 Where the use of a recorded assignment to a station in the fixed-satellite or broadcasting-satellite service not subject to a Plan is suspended for a period of eighteen months, the notifying administration shall, within this eighteen-month period, inform the Bureau of the date on which such use was suspended and of the date on which the assignment is to be brought back into regular use. This later date shall not exceed two years from the date of suspension.

Reasons: As in the CPM Report, additional text is required to include coordination of Region 3 BSS space stations in the 12.5-12.7 GHz band with planned BSS. In order to align 7.8.1-7.8.3 with the current practice as contained in S11.49 (an issue highlighted in the CPM Report), the last sentence was added.

MOD IAP/14/342

7.8.2 Whenever it appears to the Bureau, whether or not as a result of action under § 7.8.1, that a recorded assignment to a space station in the fixed-satellite or broadcasting-satellite service not subject to a Plan has not been in regular use for more than eighteen months, the Bureau shall inquire of the notifying administration as to when the assignment is to be brought back into regular use.

Reasons: As in the CPM Report, additional text is required to include coordination of Region 3 BSS space stations in the 12.5-12.7 GHz band with planned BSS.

MOD IAP/14/343

7.8.3 If no reply is received within six months of action by the Bureau under § 7.8.2, or if the reply does not confirm that the assignment to a space station in the fixed-satellite or broadcasting-satellite service not subject to a Plan is to be brought back into regular use within this six-month limit, a mark should be entered against the entry in the Master Register.

NOC

7.8.4 to 7.8.6

APPENDIX S30

ANNEX 4

MOD IAP/14/344

Need for coordination of a transmitting space station in the fixed-satellite service or in the broadcasting-satellite service where this service is not subject to a Plan: in Region 2 (11.7-12.2 GHz) with respect to the Regions 1 and 3 Plan, in Region 1 (12.5-12.7 GHz) and in Region 3 (12.2-12.7 GHz) with respect to the Region 2 Plan

(See Article 7)

NOC

With respect to § 7.2.1 of Article 7, coordination of a space station in the fixed-satellite service of Region 2 is required when, under assumed free-space propagation conditions, the power flux-density on the territory of an administration in Region 1 or Region 3 exceeds the value derived from the expressions given below.

MOD IAP/14/345

With respect to § 7.2.1 of Article 7, coordination of a space station in the fixed-satellite service (space-to-Earth) in Region 1 or 3 or broadcasting-satellite service not subject to a Plan in Region 3 is required when, under assumed free-space propagation conditions, the power flux-density on the territory of an administration in Region 2 exceeds the value derived from the same expressions:

-147 dB(W/m^2/27 MHz)	for $0° \leq \theta < 0.44°$;
$-138 + 25 \log \theta$ dB(W/m^2/27 MHz)	for $0.44° \leq \theta < 19.1°$;
-106 dB(W/m^2/27 MHz)	for $\theta \geq 19.1°$;

where θ is:

– the difference in degrees between the longitude of the interfering fixed-satellite space station in Region 2 and the longitude of the affected broadcasting-satellite space station in Regions 1 and 3, *or*

– the difference in degrees between the longitude of the interfering fixed-satellite space station in Region 1 or 3 or the interfering broadcasting-satellite space station in Region 3 and the longitude of the affected broadcasting-satellite space station in Region 2.

Reasons: As in the CPM Report. The modifications are consequential to the text added in Article 7 of Appendix S30 to include coordination of Region 3 BSS space stations in the 12.5-12.7 GHz band with planned BSS.

APPENDIX S30A

NOC

ARTICLE 1

General definitions

ARTICLE 2

Frequency bands

NOC

2.1

ADD IAP/14/346

2.2 The use of the guardbands of the Plans in Appendix **S30A**,[2*bis*] specifically the frequency bands 14.5-14.5118 GHz (Regions 1 and 3),[*]14.78814-14.8 GHz (Regions 1 and 3), 17.3-17.312 GHz (Region 2), 17.3-17.314 GHz (Regions 1 and 3), 17.788-17.8 GHz (Region 2), 18.089-18.1 GHz (Regions 1 and 3), to provide space operations functions for GSO BSS systems in accordance with No. **S1.23** shall be coordinated with the assignments subject to these Plans using the provisions of Article 7 of this Appendix. Coordination among assignments intended to provide space operation functions and services not subject to a Plan shall be effected using the provisions of No. **S9.7** and the associated provisions of Articles **S9** and **S11**. Coordination of modifications to the Plans which extend into the guardbands with assignments intended to provide space operation functions shall be effected using paragraph 4.2.1.4 or 4.2.3.4, as appropriate, of Article 4 of Appendix **S30A**.

Reasons: As described in section 5.2.1 of the CPM Report, there is currently no coordination procedure, or associated criteria, for use of the guardbands of the Plans for space operation of BSS satellites. The addition of this provision specifies a coordination process for use of the Appendix S30A guardbands.

[2*bis*] As defined in sections 3.1 and 4.1 of Annex 3 to this Appendix.

[*] Region 1, except Europe. See RR No. S5.510.

NOC

ARTICLE 3

Execution of the provisions and associated Plans

ARTICLE 4

Procedure for modifications to the Plans

NOC

4.1 to 4.1.1

NOC

4.2 Proposed modifications to a frequency assignment in conformity with one of the Regional Plans or proposed inclusion in that Plan of a new frequency assignment

For Regions 1 and 3

NOC

4.2.1 to 4.2.1.4

ADD IAP/14/347

4.2.1.4*bis* having a frequency assignment in the band 17.3-17.8 GHz in the broadcasting-satellite service, which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **S9.7**, or whose territory is included in the service area of such a frequency assignment, and whose territory is located within the coordination area of the feeder-link fixed-satellite earth station; *or*

ADD IAP/14/348

4.2.1.4*ter* of Region 2 having a frequency assignment in the band 17.8-18.1 GHz to feeder links in the fixed-satellite service (Earth-to-space) with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment, which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **S9.7**;

NOC

4.2.1.5 to 4.2.1.6

NOC

4.2.2

For Region 2

NOC

4.2.3 to 4.2.3.4

ADD IAP/14/349

4.2.3.4*bis* having a frequency assignment in the band 17.3-17.8 GHz in the broadcasting-satellite service, which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **S9.7**, or whose territory is included in the service area of such a frequency assignment, and whose territory is included within the coordination area of the feeder-link fixed-satellite earth station;

NOC

4.2.3.5 to 4.4.2

Reasons: Unlike "Approach A" in the CPM Report, it is proposed that provisions 4.2.1.2, 4.2.1.3, 4.2.3.2 and 4.2.3.3 are not suppressed. Coordination of feeder-link earth stations should occur during the Plan modification stage. The modifications in Approach A in the CPM Report are unnecessarily sweeping, and limiting on the flexibility of administrations to deploy feeder-link earth stations. CITEL supports maintaining the current situation where an administration can locate feeder-link earth stations anywhere within a coordinated service area. An administration should be able to file for a feeder-link service area or specific feeder-link earth stations, as it chooses, and undertake the appropriate coordination at the Plan modification stage.

In addition, Article 4 provisions are added to cover interference situations not covered in the current Radio Regulations. Specifically, 4.2.1.4*bis* and 4.2.3.4*bis* are added for coordination of modifications to the feeder-link Plans with BSS receive earth stations in Region 2 in 17.3-17.8 GHz, and 4.2.1.4*ter* is added for modifications to the Regions 1 and 3 feeder-link Plan to coordinate with Region 2 feeder links in 17.8-18.1 GHz.

ARTICLE 5

Coordination, notification, examination and recording in the Master International Frequency Register of frequency assignments to feeder-link transmitting earth stations and receiving space stations in the fixed-satellite service

NOC

5.1 to 5.1.2

MOD IAP/14/350

5.1.3 Before an administration in Region 1 or 3 notifies to the Bureau or brings into use any frequency assignment to a transmitting feeder-link earth station in the bands 14.5-14.8 GHz and 17.3~~7~~-18.1 GHz with an e.i.r.p. greater than the sum of the values specified in column~~s~~ 13 ~~and 14~~ of the Plan, it shall effect coordination of this assignment with each administration whose territory lies wholly or partly within the coordination area of the planned earth station using the method detailed in Appendix **S7**.

NOC

5.1.4 to 5.3.2

Reasons: To cover the situation of receiving BSS earth stations in Region 2, the frequency band is extended down to 17.3 GHz. In addition, following the revision of the Regions 1 and 3 feeder-ink Plan by WRC-97, the correct column reference for e.i.r.p is column 13 in the 1998 Edition of the Radio Regulations.

NOC

ARTICLE 6

Procedure concerning coordination, notification and recording in the Master International Frequency Register of frequency assignments to receiving terrestrial stations in Regions 1 and 3 in the bands 14.5-14.8 GHz and 17.7-18.1 GHz, and in Region 2 in the band 17.7-17.8 GHz, when frequency assignments to feeder-link transmitting earth stations for the broadcasting-satellite service in conformity with the Regions 1 and 3 Plan or the Region 2 Plan are involved

MOD IAP/14/351

ARTICLE 7

Procedure concerning coordination, notification and recording in the Master International Frequency Register of frequency assignments to stations in the fixed-satellite service (space-to-E~~e~~arth) in Regions 1, 2 and 3 in the band 17.7-18.1 GHz ~~and in Region 2 in the band 17.7-17.8 GHz~~, to stations in the fixed-satellite service (Earth-to-space) in Region 2 in the band 17.8-18.1 GHz and to stations in the broadcasting-satellite service in Region 2 in the band 17.3-17.8 GHz when frequency assignments to feeder-links for broadcasting-satellite stations ~~appearing~~ subject to ~~in~~ the Regions 1 and 3 Plan or the Region 2 Plan are involved

MOD IAP/14/352

7.1 The provisions of No. **S9.7** and the associated provisions under Articles **S9** and **S11** and Appendi~~x~~ces **S5** and **S8** are applicable to transmitting space stations in the fixed-satellite service in the band 17.7-18.1 GHz, to transmitting earth stations in the fixed-satellite service in Region 2 in the band 17.8-18.1 GHz and the provisions of Resolution **33** **(Rev.WRC-97)** are applicable to transmitting space stations in the broadcasting-satellite service in Region 2 in the band 17.3-17.8 GHz together with the provisions of Annex 4, except that in relation to feeder-link stations, the relevant criteria mentioned in Appendix **S8** are replaced by those given in Section 1 of Annex 4.

MOD IAP/14/353

7.2 Administrations planning to implement assignments for receiving earth stations in Regions 1 and 3 in the 17.7-18.1 GHz band and in Region 2 in the 17.7-17.8 GHz band in the fixed-satellite service (space-to-Earth) or in the 17.3-17.8 GHz band in the broadcasting-satellite service should evaluate the level of interference, assessed on the basis of coordination contours calculated in accordance with ~~Section 3 of Annex 4~~Appendix **S7**, which might be caused by the closest feeder-link earth station which could be located on the border of the territory of another administration.

Should the administration planning receiving earth stations find that interference may be caused by such a feeder-link earth station, it may request the administration responsible for the feeder-link earth stations to indicate the geographical coordinates, the antenna characteristics and the elevation angle of the horizon around its actual and planned feeder-link earth stations.

MOD IAP/14/354

7.3 In the case of Region 2, when the entry in the Plan contains information on specific earth stations this shall be used in the interference calculations mentioned in § 7.2 above. When such information is not contained in the Plan an administration which receives a request under § 7.2 shall, within a period of ~~three~~four months, communicate the details of the feeder-link earth stations to the administration planning the receiving earth station, and to the Bureau in order to update the Plan.

MOD IAP/14/355

7.4 In the case of Regions 1 and 3, an administration which receives a request under § 7.2 shall, within a period of ~~three~~ four months, communicate the details of the feeder-link earth stations to the administration planning the receiving earth station, and to the Bureau for information.

MOD IAP/14/356

7.5 If, at the end of the period of ~~three~~ four months, the administration responsible for the fixed-satellite or broadcasting-satellite receiving earth station(s) does not receive a reply, it may request the assistance of the Bureau.

MOD IAP/14/357

7.6 If the administration responsible for the feeder-link earth stations does not communicate to the Bureau, within a period of ~~three~~ four months, the information requested under § 7.2, this administration shall only implement its feeder-link earth station provided it does not cause harmful interference to the fixed-satellite or broadcasting-satellite earth station(s) under consideration.

NOC

7.7

Reasons: Unlike “Approach A” in the CPM Report, which points one back to provisions in Article S9, this proposal does not suppress sections 7.3-7.7, and it proposes a different modification to section 7.2. This proposal keeps Appendix S30A self-contained. Further, the current modifications in Approach A are unnecessarily sweeping. It is unnecessary to refer to provisions in Article S9, as the text above fully describes the coordination that is necessary.

In addition, as in the CPM Report, modifications are necessary to include coordination with receiving BSS earth stations in Region 2 in the 17.3-17.8 GHz band, and to change the comment period from three to four months. It is a burden on administrations to have different comment periods for AP30/C Special Sections and other Special Sections. Also, the text is modified to refer to Appendix S7, vs. section 3 of Annex 4, as Appendix S7 is the current methodology for calculating the coordination area around an earth station.

ANNEX 1

Limits for determining whether a service of an administration is considered to be affected by a proposed modification to one of the regional Plans or when it is necessary under this Appendix to seek the agreement of any other administration

MOD IAP/14/358

1 Limits applicable to protect a frequency assignment in the band 17.7-18.1 GHz to an earth station in the fixed-satellite service (space-to-Earth) or in the band 17.3-17.8 GHz in the broadcasting-satellite service (see § 4.2.1.2, 4.2.1.4*bis*, ~~and~~ 4.2.3.2 and 4.2.3.4*bis* of Article 4)

An administration shall be considered as being affected if, upon application of the procedures of ~~Section 3 of Annex 4~~Appendix S7, that administration is included in the coordination area of the frequency assignment to a transmitting feeder-link earth station.

For the purpose of this calculation, the feeder-link transmitting earth station parameters notified by the administration, which may differ from those given in Annex 3, are used.

NOC

2 to **5**

Reasons: The maintenance of sections 1 and 2, with the above modifications, is consequential to maintaining provisions 4.2.1.2, 4.2.1.3, 4.2.3.2 and 4.2.3.3 in Article 4, and adding provisions 4.2.1.4*bis* and 4.2.3.4*bis* (for coordination of modifications to the feeder-link Plans with BSS receive earth stations in Region 2 in 17.3-17.8 GHz). Unlike Approach A in the CPM Report, sections 1 and 2 of Annex 1 are not deleted, but simply modified as necessary to include coordination with BSS earth stations in the 17.3-17.8 GHz band in Region 2.

ADD IAP/14/359

6 Limits applicable to protect a frequency assignment in the band 17.8-18.1 GHz (Region 2) to a receiving feeder-link space station in the fixed-satellite service (Earth-to-space)

An administration in Region 2 shall be considered affected by a proposed modification to the Regions 1 and 3 Plan when the power flux-density arriving at the Region 2 receiving space station of a broadcasting-satellite feeder-link station would cause an increase in the noise temperature of the receiving feeder-link space station which exceeds the threshold value of $\Delta T/T$ corresponding to 3%, where $\Delta T/T$ is calculated in accordance with the method given in Appendix **S8**, except that the maximum power densities per hertz averaged over the worst 1 MHz are replaced by power densities per hertz averaged over the total RF bandwidth of the feeder-link carriers.

Reasons: Consequential to the addition of provision 4.2.1.4*ter* in Article 4 (for modifications to the Regions 1 and 3 feeder-link Plan to coordinate with Region 2 feeder links in 17.8-18.1 GHz). Basically the same text as in the CPM Report, except for editorial improvements.

NOTE – The applicability of 3% $\Delta T/T$ criterion for the protection of unplanned feeder links requires further study.

ANNEX 4

Criteria for sharing between services

NOC

1

ADD IAP/14/360

2 Threshold values for determining when coordination is required between transmitting feeder-link earth stations in the fixed-satellite service in Region 2 and a receiving space station in the feeder-link Plans in the frequency bands 17.8-18.1 GHz

With respect to § 7.1, Article 7 of this Appendix, coordination of a transmitting feeder-link earth station in the fixed-satellite service with a receiving space station in a broadcasting-satellite feeder link in the Regions 1 and 3 Plan or the Region 2 Plan is required, when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder-link station of another administration would cause an increase in the noise temperature of the feeder-link space station which exceeds a threshold value of $\Delta T/T$ corresponding to 3%, where $\Delta T/T$ is calculated in accordance with the method given in Appendix **S8**.

Reasons: As in the CPM Report, because of the addition of protection of the Regions 1 and 3 feeder-link plan from unplanned feeder links in Region 2 in 17.8-18.1 (see MOD section 7.1 in Article 7), it is necessary to add the appropriate criteria to determine affected administrations.

SUP IAP/14/361

3 Method for the determination of the coordination area around a feeder-link transmitting earth station of the Region 2 and Regions 1 and 3 Plans with respect to receiving earth stations in the fixed-satellite service in the frequency band 17.7-18.1 GHz

Reasons: Appendix S7 is the current methodology for calculating the coordination area around an earth station.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 2 to Addendum 1 to Document 14-E
16 May 2000
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COMMITTEE 4
COMMITTEE 5
WORKING GROUP 1 OF THE PLENARY

CITEL Administrations

PROPOSALS FOR THE WORK OF THE CONFERENCE

Please replace the Table of Support to the Inter-American proposals (IAP) 74-299 on pages 2 to 4 with the following:

Annex: 1

ANNEX

Table of support to the Inter-American prposals (IAP) 74-299

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
74	Addition of country names of Region 2 in the footnotes to Tables S5.293 and S5.480 of the ITU Radio Regulations	1.1		x						x					x	x		x					x				x	x				x		x	x	x
75-84	Modification of Recommendation 66 (Rev.WRC-97)	1.2		x				x		x		x	x		x	x		x					x					x				x		x	x	
85	A proposal for the suppression of Resolution 60	1.3		x				x	x	x		x	x		x	x		x					x					x				x		x	x	
86-106	Proposal for the addition of the fixed-satellite service in the 40.5-42.5 GHz band in Region 1, mobile-satellite service in the 40.5-41 GHz band and the broadcast-satellite service in the 40-40.5 GHz band, and the use of the frequency range 37-43.5 GHz by terrestrial and satellite services	1.4		x				x	x	x		x	x		x	x							x				x	x				x		x	x	x
107	Proposal to modify Resolution 122, high altitude platform stations in the fixed service	1.5		x				x		x		x	x		x								x			x	x	x				x		x	x	x
108-110	Proposal to identify additional spectrum for IMT-2000	1.6.1		x					x	x	x	x	x		x	x		x					x				x	x				x			x	x
111	Proposal for NOC in the 2 700-2 900 band	1.6.1		x				x	x		x	x	x		x	x		x					x			x		x				x		x	x	x
112-117	Proposal to modify footnotes S5.353A and S5.357A	1.10		x				x		x		x	x		x			x					x			x		x				x		x	x	x
118-123	Resolution 131 (WRC-97): power flux-density limits applicable to non-GSO FSS systems for protection of terrestrial services in the bands 10.7-12.75 GHz and 17.7-19.3 GHz	1.13.1		x				x	x	x		x	x		x								x					x				x		x	x	
124	Inclusion in other frequency bands of similar limits in Articles S21 and S22, or other regulatory approaches to be applied in relation to sharing situations	1.13.2		x					x	x		x	x		x								x					x				x		x	x	x
125-126	Proposal for RNSS allocation (space-to-Earth) in the upper part of the band 960-1 215 MHz	1.15.1		x				x		x	x	x	x		x	x							x					x				x		x	x	x
127-128	Proposal for RNSS allocation (space-to-Earth) in the upper part of the band 1 260-1 300 MHz	1.15.1						x	x	x	x	x	x		x	x							x									x			x	x

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
129-131	Proposal for RNSS (Earth-to-space) 5 000 to 5 010 MHz and (space-to-Earth) 5 010-5 030 MHz	1.15.1		x				x	x	x	x	x	x		x	x							x					x				x			x	x
132-133	Proposal for RNSS (Earth-to-space) in the band 1 300-1 350 MHz	1.15.1		x				x	x	x	x	x	x		x	x							x					x				x			x	x
134-135	Radionavigation-satellite service allocations in the bands 1 215-1 260 and 1 559-1 610 MHz	1.15.2		x					x	x		x	x		x	x							x					x				x		x	x	x
136-228	Proposal to modify the allocations above 71 GHz	1.16		x				x	x	x	x	x	x		x	x		x					x			x		x				x		x	x	x
229	Ensuring the protection of other radiocommunication services and Region 2 BSS against interference from any revisions to the Regions 1 and 3 Plan, and not requiring these services to provide greater protection to Regions 1 and 3 BSS than at present	1.19		x					x	x					x								x					x				x		x	x	x
230	Radio Regulations Board's Rules of Procedure relating to the application of RR 2674/S23.13	1.19 bis		x				x	x	x			x		x			x					x					x				x		x	x	x
231	pfd limits in Annex 1 to Appendix S30 (sections 5 *b)* and 5 *c)*)	1.20		x					x	x						x							x					x				x		x	x	
232-233	Proposals to modify Resolution 27 (Rev.WRC-97) and Resolution 28 (WRC-95)	2		x				x	x	x		x	x		x								x					x				x		x	x	
234	A proposal for the suppression of Resolution 63	4		x				x		x			x		x	x							x					x				x		x	x	
235-236	Footnote S5.488											x	x		x	x		x									x	x				x			x	x
237-241	Additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions 214 (Rev.WRC-97) and 219 (WRC-97)	1.11		x				x		x		x			x	x																x		x	x	x
242-268	Modifications to Section II of Article S22 in relation to the sharing conditions among non-GSO FSS, FSS and GSO BSS services	1.13.1		x				x	x	x		x	x		x	x							x					x				x		x	x[1]	

[1] Supports 245-248 only.

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
269-270	Proposed modifications to APS4	1.13.1		x				x	x	x		x			x	x							x					x				x		x	x	
271-276	Revisions to Articles S9, S11 and Appendix S5 for non-GSO systems which are subject to S22.2	1.13.1		x				x	x	x		x			x	x							x					x				x		x	x	
277-286	Additions and/or modifications to Articles S9, S11, S22 and Appendices S4 and S5 to require coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antenna	1.13.1		x				x	x	x		x			x	x							x					x				x		x	x	
287	Protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where epfd limits have been adopted	1.13.1		x				x	x	x		x	x		x	x							x					x				x		x	x	
288	Section VII - Procedures for assuring compliance with operational $epfd_{down}$ and additional operational $epfd_{down}$ limits in Article S22	1.13.1		x				x	x	x		x	x		x	x							x					x				x		x		
289	Proposed suppression of Annex 1 of Resolution 130 (WRC-97)	1.13.1		x				x	x	x		x			x	x							x					x				x		x		
290	Proposed suppression of Annex 1 of Resolution 538 (WRC-97)	1.13.1		x					x	x		x			x	x							x					x				x		x		
291-294	Resolution 87 (Minneapolis, 1998) role of the notifying administration when acting as the notifying administration on behalf of a named group of administrations			x				x								x							x					x				x		x	x	
295-298	Annex 7 to Appendix S30. Ensuring continued future access for Region 2 FSS networks to the GSO arc segment 37° W to 10° E in the band 11.7-12.2 GHz as currently provided by Annex 7 of Appendix S30	1.19		x				x	x	x						x							x					x				x		x	x	
299	pfd limits in Annex 1 to Appendix S30 (section 8 *b)*)	1.20		x					x	x			x			x							x					x				x		x	x	

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to
Addendum 1 to
Document 14-E
10 May 2000
Original: English

COMMITTEE 4
COMMITTEE 5
WORKING GROUP 1
OF THE PLENARY

CITEL Administrations

PROPOSALS FOR THE WORK OF THE CONFERENCE

1 Please replace the Table of support to the Inter-American proposals (IAP) 74-299 on pages 2 to 4 with the attached:

Annex: 1

ANNEX

Table of support to the Inter-American proposals (IAP) 74-299

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
74	Addition of country names of Region 2 in the footnotes to Tables S5.293 and S5.480 of the ITU Radio Regulations	1.1		X						X					X	X		X					X				X							X	X	X
75-84	Modification of Recommendation 66 (Rev.WRC-97)	1.2		X				X		X		X			X	X		X					X											X	X	
85	A proposal for the suppression of Resolution 60	1.3		X				X	X	X		X	X		X	X		X					X											X	X	
86-106	Proposal for the addition of the fixed-satellite service in the 40.5-42.5 GHz band in Region 1, mobile-satellite service in the 40.5-41 GHz band and the broadcasting-satellite service in the 40-40.5 GHz band, and the use of the frequency range 37-43.5 GHz by terrestrial and satellite services	1.4		X				X	X	X		X	X		X	X							X				X							X	X	X
107	Proposal to modify Resolution 122, high altitude platform stations in the fixed service	1.5		X				X		X		X	X		X								X			X	X							X	X	X
108-110	Proposal to identify additional spectrum for IMT-2000	1.6.1		X					X	X	X	X	X		X	X		X					X				X								X	X
111	Proposal for NOC in the 2 700-2 900 band	1.6.1		X				X	X		X	X	X		X	X		X					X			X								X	X	X
112-117	Proposal to modify footnotes S5.353A and S5.357A	1.10		X				X		X		X	X		X			X					X			X								X	X	X
118-123	Resolution 131 (WRC-97): power flux-density limits applicable to non-GSO FSS systems for protection of terrestrial services in the bands 10.7-12.75 GHz and 17.7-19.3 GHz	1.13.1		X				X	X	X		X	X		X								X											X	X	
124	Inclusion in other frequency bands of similar limits in Articles S21 and S22, or other regulatory approaches to be applied in relation to sharing situations	1.13.2		X					X	X		X	X		X								X											X	X	X
125-126	Proposal for RNSS allocation (space-to-Earth) in the upper part of the band 960-1 215 MHz	1.15.1		X				X		X	X	X	X		X	X							X											X	X	X

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
127-128	Proposal for RNSS allocation (space-to-Earth) in the upper part of the band 1 260-1 300 MHz	1.15.1						X	X	X	X	X	X		X	X							X												X	X
129-131	Proposal for RNSS (Earth-to-space) 5 000 to 5 010 MHz and (space-to-Earth) 5 010-5 030 MHz	1.15.1		X				X	X	X	X	X	X		X	X							X												X	X
132-133	Proposal for RNSS (Earth-to-space) in the band 1 300-1 350 MHz	1.15.1		X				X	X	X	X	X	X		X	X							X												X	X
134-135	Radionavigation-satellite service allocations in the bands 1 215-1 260 and 1 559-1 610 MHz	1.15.2		X					X	X		X	X		X	X							X											X	X	X
136-228	Proposal to modify the allocations above 71 GHz	1.16		X				X	X	X	X	X	X		X	X		X					X			X								X	X	X
229	Ensuring the protection of other radiocommunication services and Region 2 BSS against interference from any revisions to the Regions 1 and 3 Plan, and not requiring these services to provide greater protection to Regions 1 and 3 BSS than at present	1.19		X					X	X					X								X											X	X	X
230	Radio Regulations Board's Rules of Procedure relating to the application of RR 2674/S23.13	1.19 bis		X				X	X	X			X		X			X					X											X	X	X
231	pfd limits in Annex 1 to Appendix S30 (sections 5 b) and 5 c))	1.20		X					X	X						X							X											X	X	
232-233	Proposals to modify Resolution 27 (Rev.WRC-97) and Resolution 28 (WRC-95)	2		X				X	X	X		X			X								X											X	X	
234	A proposal for the suppression of Resolution 63	4		X				X		X					X	X							X											X	X	
235-236	Footnote S5.488											X			X	X		X									X								X	X
237-241	Additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions 214 (Rev.WRC-97) and 219 (WRC-97)	1.11		X				X		X		X			X	X																		X	X	X
242-268	Modifications to Section II of Article S22 in relation to the sharing conditions among non-GSO FSS, FSS and GSO BSS services	1.13.1		X				X	X	X		X			X	X							X											X	X[1]	

[1] Supports 245-248 only.

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
269-270	Proposed modifications to APS4	1.13.1		X				X	X	X		X			X	X							X											X	X	
271-276	Revisions to Articles S9, S11 and Appendix S5 for non-GSO systems which are subject to S22.2	1.13.1		X				X	X	X		X			X	X							X											X	X	
277-286	Additions and/or modifications to Articles S9, S11, S22 and Appendices S4 and S5 to require coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antennas	1.13.1		X				X	X	X		X			X	X							X											X	X	
287	Protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where epfd limits have been adopted	1.13.1		X				X	X	X		X			X	X							X											X	X	
288	Section VII - Procedures for assuring compliance with operational $epfd_{down}$ and additional operational $epfd_{down}$ limits in Article S22	1.13.1		X				X	X	X		X			X	X							X											X		
289	Proposed suppression of Annex 1 of Resolution 130 (WRC-97)	1.13.1		X				X	X	X		X			X	X							X											X		
290	Proposed suppression of Annex 1 of Resolution 538 (WRC-97)	1.13.1		X					X	X		X			X	X							X											X		
291-294	Resolution 87 (Minneapolis, 1998) role of the notifying administration when acting as the notifying administration on behalf of a named group of administrations			X				X								X							X											X	X	
295-298	Annex 7 to Appendix S30. Ensuring continued future access for Region 2 FSS networks to the GSO arc segment 37° W to 10° E in the band 11.7-12.2 GHz as currently provided by Annex 7 of Appendix S30	1.19		X				X	X	X						X							X											X	X	
299	pfd limits in Annex 1 to Appendix S30 (section 8 *b)*)	1.20		X					X	X						X							X											X	X	

2 Please note that proposals IAP/14/291 to IAP/14/294 do not correspond to agenda item 1.18 but are in relation to PP-98 Resolutions.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 1 to
Document 14-E
27 March 2000
Original: English

PLENARY MEETING

CITEL Administrations

PROPOSALS FOR THE WORK OF THE CONFERENCE

Table of support to the Inter-American proposals (IAP) 74-299

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
74	Addition of country names of Region 2 in the footnotes to Tables S5.293 and S5.480 of the ITU Radio Regulations	1.1		x						x					x	x		x					x				x							x	x	x
75-84	Modification of Recommendation 66 (Rev.WRC-97)	1.2		x				x		x		x			x	x		x					x											x	x	
85	A proposal for the suppression of Resolution 60	1.3		x				x		x		x	x		x	x		x					x											x	x	
86-106	Proposal for the addition of the fixed-satellite service in the 40.5-42.5 GHz band in Region 1, mobile-satellite service in the 40.5-41 GHz band and the broadcasting-satellite service in the 40-40.5 GHz band, and the use of the frequency range 37-43.5 GHz by terrestrial and satellite services	1.4		x				x	x	x		x	x		x	x							x				x							x	x	
107	Proposal to modify Resolution 122, high altitude platform stations in the fixed service	1.5		x				x		x		x	x		x								x			x	x							x	x	
108-110	Proposal to identify additional spectrum for IMT-2000	1.6.1		x						x	x	x	x			x		x					x				x								x	x
111	Proposal for NOC in the 2 700-2 900 MHz band	1.6.1		x				x			x	x	x		x	x		x					x			x								x	x	x
112-117	Proposal to modify footnotes S5.353A and S5.357A	1.10		x				x		x		x	x		x			x					x			x								x	x	
118-123	Resolution 131 (WRC-97): power flux-density limits applicable to non-GSO FSS systems for protection of terrestrial services in the bands 10.7-12.75 GHz and 17.7-19.3 GHz	1.13.1		x					x	x		x	x		x								x											x	x	
124	Inclusion in other frequency bands of similar limits in Articles S21 and S22, or other regulatory approaches to be applied in relation to sharing situations	1.13.2		x					x	x		x	x		x								x											x	x	
125-126	Proposal for RNSS allocation (space-to-Earth) in the upper part of the band 960-1 215 MHz	1.15.1		x				x		x	x	x	x		x		x						x											x	x	
127-128	Proposal for RNSS allocation (space-to-Earth) in the upper part of the band 1 260-1 300 MHz	1.15.1						x	x	x	x	x	x		x	x							x												x	
129-131	Proposal for RNSS (Earth-to-space) 5 000-5 010 MHz and (space-to-Earth) 5 010-5 030 MHz	1.15.1		x				x	x	x	x	x	x		x	x							x												x	
132-133	Proposal for RNSS (Earth-to-space) in the band 1 300-1 350 MHz	1.15.1		x				x	x	x	x	x	x		x	x							x												x	

134-135	Radionavigation-satellite service allocations in the bands 1 215-1 260 and 1 559-1 610 MHz	1.15.2		**x**					**x**	**x**		**x**	**x**		**x**	**x**							**x**											**x**	**x**	**x**
136-228	Proposal to modify the allocations above 71 GHz	1.16		**x**				**x**	**x**	**x**	**x**	**x**	**x**		**x**	**x**		**x**					**x**			**x**								**x**	**x**	
229	Ensuring the protection of other radiocommunication services and Region 2 BSS against interference from any revisions to the Regions 1 and 3 Plan, and not requiring these services to provide greater protection to Regions 1 and 3 BSS than at present	1.19		**x**					**x**	**x**					**x**								**x**											**x**	**x**	
230	Radio Regulations Board’s Rules of Procedure relating to the application of RR 2674/S23.13	1.19*bis*		**x**				**x**	**x**	**x**			**x**		**x**			**x**					**x**											**x**	**x**	**x**
231	pfd limits in Annex 1 to Appendix S30 (sections 5 *b)* and 5 *c)*)	1.20		**x**					**x**	**x**						**x**							**x**											**x**	**x**	
232-233	Proposals to modify Resolution 27 (Rev.WRC-97) and Resolution 28 (WRC-95)	2		**x**				**x**	**x**	**x**		**x**			**x**								**x**											**x**	**x**	
234	A proposal for the suppression of Resolution 63	4		**x**				**x**		**x**					**x**	**x**							**x**											**x**	**x**	
235-236	Footnote S5.488											**x**			**x**	**x**		**x**					**x**				**x**								**x**	**x**
237-241	Additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions 214 (Rev.WRC-97) and 219 (WRC-97)	1.11								**x**		**x**				**x**																		**x**	**x**	**x**
242-268	Modifications to Section II of Article S22 in relation to the sharing conditions among non-GSO FSS, FSS and GSO BSS services	1.13.1		**x**[1]					**x**	**x**		**x**				**x**							**x**											**x**	x[2]	
269-270	Proposed modifications to APS4	1.13.1							**x**	**x**		**x**				**x**							**x**											**x**	**x**	
271-276	Revisions to Articles S9, S11 and Appendix S5 for non-GSO systems which are subject to S22.2	1.13.1							**x**	**x**		**x**				**x**							**x**											**x**	**x**	
277-286	Additions and/or modifications to Articles S9, S11, S22 and Appendices S4 and S5 to require coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antennas	1.13.1							**x**	**x**		**x**				**x**							**x**											**x**	**x**	

287	Protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where epfd limits have been adopted	1.13.1							**x**	**x**		**x**				**x**							**x**											**x**	**x**	
288	Section VII - Procedures for assuring compliance with operational $epfd_{down}$ and additional operational $epfd_{down}$ limits in Article S22	1.13.1							**x**	**x**		**x**				**x**							**x**											**x**		
289	Proposed suppression of Annex 1 of Resolution 130 (WRC-97)	1.13.1							**x**	**x**		**x**				**x**							**x**											**x**		
290	Proposed suppression of Annex 1 of Resolution 538 (WRC-97)	1.13.1							**x**	**x**		**x**				**x**							**x**											**x**		
291-294	Resolution 87 (Minneapolis, 1998) role of the notifying administration when acting as the notifying administration on behalf of a named group of administrations	1.18		**x**				**x**								**x**																		**x**	**x**	
295-298	Annex 7 to Appendix S30. Ensuring continued future access for Region 2 FSS networks to the GSO arc segment 37° W to 10° E in the band 11.7-12.2 GHz as currently provided by Annex 7 of Appendix S30	1.19						**x**	**x**	**x**						**x**																		**x**	**x**	
299	pfd limits in Annex 1 to Appendix S30 (section 8 *b)*)	1.20							**x**	**x**						**x**							**x**											**x**	**x**	

[1] Supports 55-78 only.
[2] Supports 58-79 only.

CONTENTS

Page

WRC-2000 agenda item 1.1 - requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution 26 (Rev.WRC-97)

Addition of country names of Region 2 in the footnotes to Tables S5.293 and S5.480 of the ITU Radio Regulations

Background information

Footnote S5.293

In the Table of Frequency Allocations of the Radio Regulations, the frequency ranges 470-512 MHz and 614-806 MHz have been allocated in Region 2, on a primary basis, to broadcasting and, on a secondary basis, to the fixed and mobile services.

Footnote S5.293 indicates that Chile, Colombia, Cuba, the United States, Guyana, Honduras, Jamaica, Mexico and Panama allocated with a different category of service, on a primary basis, in the bands 470-512 MHz and 614-806 MHz to the fixed and mobile services, replacing the secondary category of service, and subject to agreement under S9.21.

In relation to the use of the band, the table incorporates footnote S5.292: Different category of service, indicates that Mexico and Venezuela allocate the band 470-512 MHz to the fixed and mobile services, and Argentina and Uruguay to the mobile service, on a primary basis, subject to agreement under No. S9.21.

Footnote S5.309: Different category of service, indicates that Costa Rica, El Salvador and Honduras allocate the band 614-806 MHz to the fixed service on a primary basis, subject to agreement under No. S9.21.

Footnote S5.311 indicates that, in the frequency band 620-790 MHz, assignments may be made to the television stations with frequency modulation in the broadcasting-satellite service, with prior agreement among the concerned administrations and with those administrations whose services, operating in accordance with the Table of Frequency Allocations, may be affected (see Resolutions 33 (Rev.WRC-97) and 507). These stations will not be able to produce a power flux-density above –129 dB (W/m^2) for angles of arrival below 20° (see Recommendation 705) in other countries' territories.

Footnote S5.480

In the Table of Frequency Allocations, the frequency range 10-10.45 GHz has been allocated in Region 2, on a primary basis, to radiolocation and, on a secondary basis, to the amateur service.

The footnote indicates that Brazil, Costa Rica, Ecuador, Guatemala, Honduras and Mexico have allocated, on a primary basis, the band 10-10.45 GHz to the fixed and mobile services.

MOD IAP/14/74

To request from ITU WRC-2000 to open the footnotes of Tables S5.293 and S5.480 to enable countries of Region 2 to add their names to such footnotes.

Reasons: In preparation for WRC-2000 by the Inter-American Telecommunication Commission (CITEL), countries of Region 2 expressed the need to add their country names to these footnotes, in order to provide their services with the level of protection accorded other services allocated on a primary basis.

In order to satisfy this need, it is requested that WRC-2000 approve the consideration of these footnotes, using the same criteria as was adopted by WRC-97 on this issue, which allowed the addition of country names to the footnotes.

WRC-2000 agenda item 1.2 - to finalize remaining issues in the review of Appendix S3 to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation 66 (Rev.WRC-97) and the decisions of WRC-97 on adoption of new values, due to take effect at a future time, of spurious emissions for space services

Modification of Recommendation 66 (Rev.WRC-97)

Background information

Recommendation 66 is being modified to reflect the current status of this document. Work has been completed on space service spurious emissions, so we are proposing the suppression of *considering f)*, and *recommends* 1 and 2. We are editing *considering i)* to conform to the concept that limits may be needed for specific situations. We are proposing the suppression of *recommends* 9 because TG 1/5 has concluded that OOB emission limits are not appropriate at this time.

MOD IAP/14/75

RECOMMENDATION 66 (Rev.WRC-~~97~~2000)

Studies of the maximum permitted levels of unwanted emissions

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that Appendix **S3** specifies the maximum permitted levels of spurious emissions, in terms of the mean power level of any spurious component supplied by a transmitter to the antenna transmission line;

b) that the principal objective of Appendix **S3** is to specify the maximum permitted levels of spurious emissions that, while being achievable, provide protection against harmful interference;

c) that excessive levels of unwanted emissions may give rise to harmful interference;

d) that while out-of-band emissions can also give rise to harmful interference, the Radio Regulations do not provide general limits for these emissions;

e) that while Appendix **S3** applies generally to the mean power of a transmitter and its spurious emissions, it also takes account of a variety of emissions where interpretation of the term “mean power”, and thus its measurement, would be difficult, particularly in the cases of digital modulation broadband systems, pulsed modulation and narrow-band high-power transmitters;

SUP IAP/14/76

f)

Reasons: Work has been completed on space service spurious emissions.

MOD IAP/14/77

~~g~~f) that unwanted emissions from transmitters operating in space stations may cause harmful interference, particularly emissions from wideband amplifiers which cannot be adjusted after launch;

~~h~~g) that unwanted emissions may cause harmful interference to safety services and radio astronomy and space services using passive sensors;

Reasons: Consequential numbering changes.

MOD IAP/14/78

~~i~~h) that, for technical or operational reasons, more stringent spurious emission limits than the general limits in Appendix **S3** may be required to protect specific services, such as safety services and passive services in specific bands or situations;

Reasons: Edited to conform to the concept in the *recommends* that limits may be needed for specific situations.

MOD IAP/14/79

~~j~~i) that broadband digital modulation may cause unwanted emissions at frequencies far from the carrier frequency,

Reasons: Consequential numbering change.

noting

a) that safety services and passive services have in many cases been allocated frequencies adjacent or close to those of services employing high-power transmitters;

b) that some administrations have adopted more stringent limits for spurious emissions than those specified in Appendix **S3**,

recommends that ITU-R

SUP IAP/14/80

1

Reasons: Work has been completed on space service spurious emissions.

SUP IAP/14/81

2

Reasons: Work has been completed on space service spurious emissions.

MOD IAP/14/82

~~3~~1 continue the study of spurious emission levels in all frequency bands, emphasizing the study of those frequency bands, services and modulation techniques not presently covered by Appendix **S3**;

~~4~~2 study the question of unwanted emissions resulting from transmitters of all services and all modulation methods, and, on the basis of those studies, develop a Recommendation or Recommendations for maximum permitted levels of spurious emissions and out-of-band emissions;

~~5~~3 establish appropriate measurement techniques for unwanted emissions, where those techniques do not currently exist, including the determination of reference levels for wideband transmissions as well as the applicability of reference measurement bandwidths;

~~6~~4 study the reasonable boundary of spurious emissions and out-of-band emissions with a view to defining such a boundary in Article **S1**;

~~7~~5 study those frequency bands and instances where, for technical or operational reasons, more stringent spurious emission limits than the general limits in Appendix **S3** may be required to protect safety services and passive services such as radio astronomy, and the impact on all concerned services of implementing or not implementing such limits;

~~8~~6 study those frequency bands and instances where, for technical or operational reasons, out-of-band limits may be required to protect safety services and passive services such as radio astronomy, and the impact on all concerned services of implementing or not implementing such limits;

Reasons: Consequential numbering changes.

SUP IAP/14/83

9

Reasons: Suppressed because TG 1/5 has concluded that OOB emission limits are not appropriate at this time.

MOD IAP/14/84

~~10~~7 report the results of studies under *recommends that ITU-R* ~~6, 7 and 8~~4, 5 and 6 above to a competent world radiocommunication conference(s).

Reasons: Consequential numbering changes.

WRC-2000 agenda item 1.3 - to consider the results of ITU-R studies in respect of Appendix S7/28 on the method for the determination of the coordination area around an earth station in frequency bands shared among space services and terrestrial radiocommunication services, and take the appropriate decisions to revise this Appendix

A proposal for the suppression of Resolution 60

Background information

A proposal for the suppression of Resolution 60 is being submitted because this Resolution is no longer needed.

SUP IAP/14/85

RESOLUTION 60

Relating to information on the propagation of radio waves used in the determination of the coordination area

Reasons: Working Party 3M provided updated propagation material to TG 1/6. Resolution no longer required.

WRC-2000 agenda item 1.4 - to consider issues concerning allocations and regulatory aspects related to Resolutions 126 (WRC-97), 128 (WRC-97), 129 (WRC-97), 133 (WRC-97), 134 (WRC-97) and 726 (WRC-97)

Proposal for the addition of the fixed-satellite service in the 40.5-42.5 GHz band in Region 1, mobile-satellite service in the 40.5-41 GHz band and the broadcasting-satellite service in the 40-40.5 GHz band, and the use of the frequency range 37-43.5 GHz by terrestrial and satellite services

Background information

WRC-97 added co-primary allocations for the fixed-satellite service (space-to-Earth) in Regions 2 and 3 and some countries of Region 1 in the band 40.5-42.5 GHz and upgraded worldwide secondary allocations to the fixed service (FS) to co-primary status. This band is also allocated on a co-primary basis to the fixed service, broadcasting service, and broadcasting-satellite service (BSS).

Resolution 134 (WRC-97) makes the date of the provisional application of the allocation to the FSS in Regions 1 and 3 in the band 40.5-42.5 GHz 1 January 2001, and calls for review of the allocation and provisional application date. On the basis of studies conducted in ITU-R, it is appropriate to advance the date of the application of the FSS allocation in Regions 1 and 3 to 2 June 2000 (upon the conclusion of WRC-2000), and to extend the allocation to all of Region 1 (thereby enabling the removal of RR S5.551C, RR S5.551D and RR S5.551E, and the suppression of Resolution 134 (WRC-97)).

The use of FSS allocations is subject to the ITU-R studies referred to in Resolutions 128 and 129 (both WRC-97). Resolution 133 (WRC-97) deals with sharing of high-density FS applications (HDFS) with other services in the range 37-40 GHz. Since HDFS and ubiquitously deployed FSS and BSS terminals cannot share the same spectrum in the same area, it is necessary to identify regulatory solutions to meet the spectrum requirements for HDFS (both point-to-point and point-to-multipoint), and FSS (both global and regional) in the range 37-51.4 GHz.

HDFS deployments can make sharing difficult with FSS systems, depending on the population of earth station receivers and the nature of the business plan. It is recognized that economy of scale is a key factor in the success of high-density deployments of FS and FSS systems and that this will be enhanced by the degree of global spectrum harmonization.

A number of administrations are actively seeking spectrum for high-density FS and FSS systems in the 37-42.5 GHz frequency range. Given the system characteristics, service requirements and the need to provide global spectrum for FSS systems, it is anticipated that approximately 2 GHz of spectrum is required to meet future needs of high-density FSS systems in this frequency range. Within the frequency range 37-42.5 GHz, it is proposed to use the band 37-40 GHz by high-density FS applications and the band 40-42 GHz for high-density FSS applications. The allocations to FS and FSS are retained in the range 37-42.5 GHz in order to provide flexibility to administrations to implement lower density applications subject to certain constraints. Furthermore, it should be noted that, as a result of this proposal, an appropriate pairing of 2 GHz will be needed for high-density FSS near 50 GHz for Earth-to-space transmissions, taking into account existing allocations in that band. The band 48.2-50.2 GHz appears at this time to be suitable for that purpose.

Since it will no longer be possible to effectively implement MSS in the 39.5-40.0 GHz band given the proposed power flux-density limits in the 37.5-40.0 GHz band, it is necessary to add a secondary MSS allocation to the band 40.5-41.0 GHz.

It should also be noted that high-density FSS applications are similar in nature to BSS systems, particularly in the delivery of multimedia and interactive services. Taking this into account, it is proposed to align the broadcast satellite allocation with the high-density FSS allocation in the 40-42 GHz band. This results in a new allocation to the BSS in the band 40-40.5 GHz. The alignment of FSS and BSS in the 40-42 GHz band also presents an opportunity to make available additional HDFS spectrum in the 42-43.5 GHz band.

It is proposed that the protection of the radio astronomy service in the frequency band 42.5-43.5 GHz be dealt with under the provisions of Resolution 128 (Rev.WRC-2000).

The fixed service continues to evolve, and the fixed-satellite service has a requirement to establish at WRC-2000 the regulatory/procedural certainty that will enable networks that have been on file with ITU's Radiocommunication Bureau since 1997 and earlier to proceed with implementation plans. Rather than continue to study sharing conditions within ITU-R for another cycle, which will have the effect of freezing fixed-service evolution and hampering the ability of fixed-satellite service networks to be established and globally deployed, the following proposals are made for modifications and additions to Article S5, Table S21-4 of Article S21, Resolution 128 (WRC-97), and for the suppression of Resolutions 133 and 129 (both WRC-97). These proposals are intended to be considered as a comprehensive package that would establish on a worldwide basis the regulatory conditions that would permit the establishment and evolution of both the fixed service and the fixed-satellite service in the 37.5-42.5 GHz frequency range.

ARTICLE S5

Frequency allocations

MOD IAP/14/86

34.2-40.5 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
37-37.5	FIXED MOBILE SPACE RESEARCH (space-to-Earth) MOD S5.547 ADD S5.HDFS	
37.5-38	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE SPACE RESEARCH (space-to-Earth) Earth exploration-satellite (space-to-Earth) MOD S5.574 ADD S5.HDFS	
38-39.5	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Earth exploration-satellite (space-to-Earth) MOD S5.547 ADD S5.HDFS	
39.5-40	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) Earth exploration-satellite (space-to-Earth) MOD S5.547 ADD S5.HDFS	
40-40.5	EARTH EXPLORATION-SATELLITE (Earth-to-space) FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) BROADCASTING-SATELLITE SPACE RESEARCH (Earth-to-space) Earth exploration-satellite (space-to-Earth) ADD S5.SAT	

40.5-55.78 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
40.5-~~42.5~~41 FIXED FIXED-SATELLITE (space-to-Earth) BROADCASTING BROADCASTING-SATELLITE Mobile Mobile-satellite (space-to-Earth) ~~S5.551B S5.551D~~ADD S5.SAT	**40.5-~~42.5~~41** FIXED FIXED-SATELLITE (space-to-Earth) ~~S5.551B S5.551E~~ BROADCASTING BROADCASTING-SATELLITE Mobile Mobile-satellite (space-to-Earth) S5.551C ~~S5.551F~~ ADD S5.SAT	**40.5-~~42.5~~41** FIXED FIXED-SATELLITE (space-to-Earth) ~~S5.551B S5.551E~~ BROADCASTING BROADCASTING-SATELLITE Mobile Mobile-satellite (space-to-Earth) S5.551C ~~S5.551F~~ ADD S5.SAT
41-42 FIXED FIXED-SATELLITE (space-to-Earth) MOD S5.551B BROADCASTING BROADCASTING-SATELLITE Mobile ~~S5.551D~~ ADD S5.SAT	**41-42** FIXED FIXED-SATELLITE (space-to-Earth) MOD S5.551B ~~S5.551E~~ BROADCASTING BROADCASTING-SATELLITE Mobile S5.551C ~~S5.551F~~ ADD S5.SAT	**41-42** FIXED FIXED-SATELLITE (space-to-Earth) MOD S5.551B ~~S5.551E~~ BROADCASTING BROADCASTING-SATELLITE Mobile S5.551C S5.551F ADD S5.SAT
42-42.5 FIXED FIXED-SATELLITE (space-to-Earth) ADD S5.551X BROADCASTING BROADCASTING-SATELLITE Mobile MOD S5.551B ~~S5.551D~~ MOD S5.547 ADD S5.HDFS	**42-42.5** FIXED FIXED-SATELLITE (space-to-Earth) ~~S5.551E~~ ADD S5.551X BROADCASTING BROADCASTING-SATELLITE Mobile S5.551C ~~S5.551F~~ MOD S5.547 MOD S5.551B ADD S5.HDFS	**42-42.5** FIXED FIXED-SATELLITE (space-to-Earth) ~~S5.551E~~ ADD S5.551X BROADCASTING BROADCASTING-SATELLITE Mobile S5.551C S5.551F MOD S5.547 MOD S5.551B ADD S5.HDFS
42.5-43.5	FIXED FIXED-SATELLITE (Earth-to-space) S5.552 MOBILE except aeronautical mobile RADIO ASTRONOMY S5.149 MOD S5.547 ADD S5.HDFS	

Reasons:

Elevation of the fixed-satellite service (FSS) to primary allocation in all three Regions in the 40.0-42.5 GHz band

With the exception of sharing issues and studies identified in Resolution 128, studies in ITU-R confirm the feasibility of the fixed-satellite service allocation in the band 40.5-42.5 GHz, and the need for harmonized global allocations. With the elevation of the allocation to full primary status in all three Regions, the footnote allocation for countries in Region 1 can be removed. Those countries that are listed or that have territories listed in S5.551C should give consideration to whether the alternative allocation in certain countries and territories in Regions 2 and 3 can be suppressed. Acceleration of the effective date allows for removal of the reference to Resolution 134 (WRC-97). In advancing this proposal, it is proposed that broadcasting-satellite service and fixed-satellite service systems in the band 42.0-42.5 GHz not be implemented until technical and operational measures have been identified and agreed within ITU-R to protect the radio astronomy service in the band 42.5-43.5 GHz from harmful interference.

Addition of the broadcasting-satellite service (BSS) primary allocation in the 40.0-40.5 GHz band

This consequential allocation is necessary since it may not be possible to implement BSS in the 42.0-42.5 GHz band without causing interference detrimental to radio astronomy observations in the 42.5-43.5 GHz band. Resolution 128 (Rev.WRC-2000) calls for additional study within ITU-R to determine appropriate protection methods for the radio astronomy service (RAS) from BSS in the band 42.0-42.5 GHz.

Addition of the mobile-satellite service (MSS) secondary allocation in the 40.5-41.0 GHz band

This consequential allocation is necessary since it will no longer be possible to effectively implement MSS in the 39.5-40.0 GHz band given the proposed power flux-density limits in the 37.5-40.0 GHz band.

MOD IAP/14/87

S5.547 The bands 31.8-33.4 GHz, 37-40 GHz, 42.0-43.5 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are available for high-density applications in the fixed service (see Resolution **726 (Rev.WRC-~~97~~2000)**).

Reasons: Many administrations throughout the world have permitted the deployment of high-density fixed systems in various parts of the frequency range 37-40 GHz. The band 42.0-43.5 GHz is very suitable for HDFS applications given the radio astronomy use of the band 42.5-43.5 GHz.

ADD IAP/14/88

S5.HDFS In the bands 37.0-40.0 GHz and 42.0-43.5 GHz, administrations should take the availability of these bands for high-density applications in the fixed service into account when considering the use of other allocated services.

Reasons: To encourage and facilitate fixed service use of the subject bands.

ADD IAP/14/89

S5.SAT Terrestrial radiocommunication services shall not constrain the future use, development and deployment of high-density applications in the fixed-satellite service in the band 40-42 GHz, or of the mobile-satellite service in the band 40.0-40.5 GHz.

Reasons: To encourage and facilitate fixed-satellite service and mobile-satellite service use of the subject bands. The band 40-42 GHz meets the spectrum requirements for high-density applications in the fixed-satellite service in this frequency range. In addition, it is necessary to recognize the global nature of FSS applications in this frequency range, and consequently, the designation should be made to all three Regions. It should be noted that the band 40-42 GHz is also allocated on a primary basis to the BSS. It is anticipated that high-density FSS applications are similar in nature to BSS systems, particularly in the delivery of multimedia and interactive services.

MOD IAP/14/90

S5.551B The use of the band ~~41.5~~42.0-42.5 GHz by the broadcasting-satellite service and fixed-satellite service (space-to-Earth) is subject to Resolution **128 (Rev.WRC-~~97~~2000)**. The limitation on the broadcasting-satellite service shall apply to systems where advanced publication materials are received by the Bureau after 2 June 2000. For non-geostationary fixed-satellite service systems operating in the band 41.5-42.0 GHz, see also Resolution **128 (Rev.WRC-2000)**.

Reasons: It is recognized that the use of adjacent spectrum by the fixed-satellite service below 42.5 GHz and its impact on radio astronomy operations above 42.5 GHz is under study within ITU-R. However, to give timely access to the FSS in the 40-42 GHz range and provide adequate protection to the radio astronomy service while studies are under way, it is reasonable to limit the scope of Resolution 128 to 500 MHz below 42.5 GHz. Studies on the protection of the radio astronomy service from unwanted emissions should also apply to the broadcasting-satellite service in the band 42.0-42.5 GHz.

SUP IAP/14/91

S5.551D

Reasons: With the elevation of the FSS allocation to full primary status in all three Regions, the footnote allocation for countries in Region 1 can be removed.

SUP IAP/14/92

S5.551E

Reasons: Consequential to the suppression of Resolution 134, and with the elevation of the allocation to full primary status in all three Regions, the footnote allocation for countries in Region 1 can be removed.

SUP IAP/14/93

S5.551F

Reasons: With the separation of the Table of Frequency Allocations into three Regions, as opposed to the current table where Regions 2 and 3 are joined, it is appropriate to suppress No. S5.551F from Region 2, as it applies exclusively to Region 3.

ADD IAP/14/94

S5.551X Use of the band 42.0-42.5 GHz by the fixed-satellite service shall be limited as noted in the *resolves* of Resolution **128 (Rev.WRC-2000)**.

Reasons: To reduce the potential harmful interference caused to the radio astronomy service in the 42.5-43.5 GHz band.

MOD IAP/14/95

TABLE **S21-4** *(end)*

Frequency band	Service*	Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane				Reference bandwidth
		0°-5°	5°-25°		25°-90°	
31.0-31.3 GHz 34.7-35.2 GHz (space-to-Earth transmissions referred to in No. **S5.550** on the territories of countries listed in No. **S5.549**) ~~37.0-40.5 GHz~~	~~Fixed-satellite~~ ~~Mobile-satellite~~ Space research	−115 ~~[10]~~	−115 + 0.5(δ – 5) ~~[10]~~		−105 ~~[10]~~	1 MHz
37.0-38.0 GHz	Space research (non-geostationary)	−120[17]	−120 + 0.75(δ-5)[17]		−105[17]	1 MHz
37.0-38.0 GHz	Space research (geostationary)	−125	−125 + (δ-5)		−105	1 MHz
37.5-40.0 GHz	Fixed-satellite (non-geostationary) Mobile-satellite (non-geostationary)	−130[10, 16]	**5° - 15°** −130 +.85(δ-5)[10, 16]	**15° - 25°** −121.5 + .3(δ-15)[10, 16]	−118.5[10, 16]	1 MHz
37.5-40.0 GHz	Fixed-satellite (geostationary) Mobile-satellite (geostationary)	−135[16]	**5° - 15°** −135 + 1.35(δ-5)[16]	**15° - 25°** −121.5 + .3(δ-15)[16]	−118.5[16]	1 MHz
40.0-42.0 GHz	Fixed-satellite (non-geostationary) Mobile-satellite	−115[10]	−115 + 0.5(δ-5)[10]		−105[10]	1 MHz
40.0-42.0 GHz	Fixed-satellite (geostationary)	−120	**5° - 15°** −120 + (δ-5)	**15° - 25°** −110 + 0.5(δ-15)	−105	1 MHz
42.0-42.5 GHz	Fixed-satellite (non-geostationary)	−130[16]	**5° - 15°** −130 +.85(δ-5)[16]	**15° - 25°** −121.5 + .3(δ-15)[16]	−118.5[16]	1 MHz
42.0-42.5 GHz	Fixed-satellite (geostationary)	−135[16]	**5° - 15°** −135+ 1.35(δ-5)[16]	**15° - 25°** −121.5+ .3(δ-15)[16]	−118.5[16]	1 MHz

MOD IAP/14/96

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[10] **S21.16.4** The values given in this box shall apply ~~until such time as modified by a competent world radiocommunication conference~~to emissions of space stations of non-geostationary satellites in networks operating with 99 or fewer satellites. Further study concerning the applicability of these values is necessary in order to apply them to networks operating with 100 or more satellites.

ADD IAP/14/97

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[16] **S21.16.10** The pfd limit in this table entry may be exceeded by not more than 13.5 dB under fade conditions, and the Radiocommunication Bureau's examination under Nos. **S9.35** and/or **S11.31** shall be based on the levels in this table entry plus 13.5 dB. In order to operate in excess of the levels in this table entry, the agreement of all administrations whose territory is within the half-power beamwidth of the satellite antenna beam shall have been obtained. The percentage of time that the values in this table entry may be exceeded shall be determined by reference to an appropriate ITU-R Recommendation (see Resolution **JJJ (WRC-2000)**).

ADD IAP/14/98

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[17] **S21.16.11** During the launch and deployment phase of deep-space facilities, the values in this box may be exceeded for short periods of time.

Reasons: The pfd-review objectives of Resolutions 133 (WRC-97) and 129 (WRC-97) have been met. The values stated above for FSS systems are consistent with the Report of the Conference Preparatory Meeting for WRC-2000 and those included in a draft new Recommendation approved by ITU-R. See draft new Recommendation [4-9S/AH1], Maximum allowable values of power flux-density at the surface of the Earth produced by non-geostationary satellites in the fixed-satellite service operating in the 37.5-40.5 GHz and 40.5-42.5 GHz bands to protect the fixed service. The studies under Resolution 129 were done with respect to the fixed service, but are assumed to be adequate for protecting the co-primary terrestrial broadcasting service as well. In addition, studies have demonstrated the suitability for application to FSS systems of higher pfd limits in the 40.5-42.5 GHz band.

SUP IAP/14/99

RESOLUTION 133 (WRC-97)

Sharing between the fixed service and other services in the band 37-40 GHz

Reasons: Consequential.

SUP IAP/14/100

RESOLUTION 129 (WRC-97)

Criteria and methodologies for sharing between the fixed-satellite service and other services with allocations in the band 40.5-42.5 GHz

Reasons: Consequential.

SUP IAP/14/101

RESOLUTION 134 (WRC-97)

Use of the frequency band 40.5-42.5 GHz by the fixed-satellite service

Reasons: Consequential to change of FSS allocation.

MOD IAP/14/102

RESOLUTION 128 (Rev.WRC-~~97~~2000)

Allocation to the ~~fixed-~~satellite services (space-to-Earth) in the ~~41.5~~42-42.5 GHz band, use of the 41.5-42.0 GHz band by non-geostationary fixed-satellite service systems, and protection of the radio astronomy service in the 42.5-43.5 GHz band

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that ~~this Conference has~~WRC-97 added a primary allocation to the fixed-satellite service (space-to-Earth) in the band ~~41.5~~42-42.5 GHz in Regions 2 and 3 and in certain countries in Region 1, that this Conference expanded this allocation to include all of Region 1, and that this band is adjacent to the band 42.5-43.5 GHz which is allocated, *inter alia,* to the radio astronomy service for both continuum and spectral line observations;

b) that there is also a worldwide primary allocation to the broadcasting-satellite service in the 42-42.5 GHz band;

~~b~~c) that unwanted emissions from space stations in the broadcasting-satellite service and fixed-satellite service (space-to-Earth) in the band ~~41.5~~42-42.5 GHz may result in harmful interference to the radio astronomy service in the band 42.5-43.5 GHz;

d) that aggregate unwanted emissions from space stations in the non-geostationary fixed-satellite service (space-to-Earth) in the band 41.5-42.0 GHz may result in harmful interference to the radio astronomy service in the band 42.5-43.5 GHz;

~~c~~e) that various technical means may be used to reduce these unwanted emissions from space stations in the broadcasting-satellite and fixed-satellite service;

~~d~~f) that a limited number of radio astronomy stations worldwide require protection, and that there may be means to limit the susceptibility of radio astronomy receivers to interference,

taking into account

the relevant provisions of the Radio Regulations,

resolves

that administrations shall not implement broadcasting-satellite service systems where advanced publication materials are received by the Bureau after 2 June 2000 and fixed-satellite systems in the band ~~41.5~~42-42.5 GHz until technical and operational measures have been identified and agreed within ITU-R to protect the radio astronomy service from harmful interference in the band 42.5-43.5 GHz,

invites ITU-R

1 to study, as a matter of urgency, the harmful interference that space stations in the broadcasting-satellite service where advanced publication materials are received by the Bureau after 2 June 2000 and fixed-satellite service (space-to-Earth) operating in the band ~~41.5~~42-42.5 GHz may cause to stations in the radio astronomy service operating in the band 42.5-43.5 GHz;

2 to identify technical and operational measures that may be taken to protect stations in the radio astronomy service operating in the band 42.5-43.5 GHz, including geographical separation and out-of-band emission limits to be applied to space stations operating in the broadcasting-satellite service where advanced publication materials are received by the Bureau after 2 June 2000 and fixed-satellite service in the band ~~41.5~~42-42.5 GHz, as well as measures that may be implemented to reduce the susceptibility of stations in the radio astronomy service to harmful interference;

3 to report on the results of ~~these~~the studies in *invites* 1 and 2 to the Conference Preparatory Meeting for WRC-~~99~~02/03~~,~~;

4 to complete the ongoing ITU-R studies on aggregate unwanted emissions from non-geostationary fixed-satellite service systems operating in the band 41.5-42.0 GHz for protection of the radio astronomy service in the band 42.5-43.5 GHz,

urges administrations

1 to participate actively in the aforementioned studies by submitting contributions to ITU-R, and;

2 when implementing non-geostationary fixed-satellite service systems, to take into account the results of the studies identified in *invites* ITU-R 4,

requests

WRC-~~99~~02/03 to take appropriate action based on those studies.

Reasons: Consequential to the change of the FSS allocation to primary status and the required ITU-R studies have not been completed.

ADD IAP/14/103

RESOLUTION JJJ (WRC-2000)

Determination of the percentage of time during which the fixed-satellite service (space-to-Earth) links in the 37.5-40.0 GHz and 42.0-42.5 GHz band may increase power to overcome fade conditions, while taking into account the impact on the performance of fixed systems

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that this Conference established power flux-density limits for the fixed-satellite service (space-to-Earth) in the 37.5-40.0 GHz and 42.0-42.5 GHz bands;

b) that this Conference determined that the power flux-density limits in the 37.5-40.0 GHz and 42.0-42.5 GHz bands on the fixed-satellite service may be exceeded by not more than 13.5 dB under fade conditions;

c) that there is a need for further study to determine the percentage of time during which fade conditions will require the use of increased power on fixed-satellite service links in the 37.5-40.0 GHz and 42.0-42.5 GHz bands,

recognizing

that the percentage of time during which fade conditions will exist on fixed-satellite service links in the 37.5-40.0 and 42.0-42.5 GHz bands will likely be small for significant fade depths, and is expected to be in the range of between one per cent and five per cent of the time; however, further study is needed,

recognizing further

that operation of fixed-satellite service links with increased power to overcome fade may affect the performance of fixed service links operating in unfaded conditions in the same frequency band,

resolves to invite ITU-R

1 taking into account the *recognizing* and *recognizing further* above, to conduct studies as a matter of urgency toward the development of an appropriate recommendation that establishes the relationship between the percentage of time and the amount of increased power with which fixed-satellite service links in the 37.5-40.0 GHz and 42.0-42.5 GHz bands may operate at increased power levels to overcome fade conditions, taking into account the impact on the performance of fixed systems;

2 to report on the results of these studies to the Conference Preparatory Meeting for WRC-02/03,

requests

WRC-02/03 to take appropriate action based on the results of those studies.

Reasons: To determine the appropriate percentage of time during which fade conditions exist on FSS links in the 37.5-40.0 and 42.0-42.5 GHz bands pursuant to Note 16 to Table S21-4.

MOD IAP/14/104

RESOLUTION 726 (Rev.WRC-~~97~~2000)

Frequency bands above 30 GHz available for high-density applications in the fixed service

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that there is a dramatically increasing demand for high-density applications in the fixed service resulting from the deployment of new mobile networks and from the rapid worldwide deregulation in the provision of local broadband services, including multimedia;

b) that the frequency range from 30 GHz to about 50 GHz is the range preferred to satisfy initial requirements, as indicated in *considering a)*, while the bands above about 50 GHz are preferred for similar applications but which take technical advantage of high atmospheric absorption;

c) that the lower part of the spectrum above 30 GHz has advantages for the fixed service in areas where longer path lengths are necessary;

d) that the 38 GHz band is already heavily used by many administrations for high-density applications in the fixed service;

e) that the needs of other services to which the relevant frequency bands are already allocated must be taken into account;

f) that the band 37-37.5 GHz is being planned for use by the space research service (space-to-Earth) to provide moon-to-Earth and planetary communication links;

g) that the band 37-38 GHz is being planned for use by the space research service to provide space based very long baseline interferometry;

h) that the deployment of high-density applications in the fixed service in some bands potentially presents sharing difficulties with other primary services allocated to the same band, e.g. the fixed-satellite service;

i) that operations in the space services, such as in the fixed-satellite service, in those bands used by high-density applications in the fixed service may lead to sharing difficulties;

j) that there is a need for global harmonization of new and existing allocations of radio frequency bands to facilitate coordination between administrations and encourage development of competitive products, through economies of scale, and the worldwide introduction of new telecommunication services, including the provision of reliable global information infrastructure access at an affordable cost,

MOD IAP/14/105

resolves

that administrations should take into account that the bands 31.8-33.4 GHz*, 37-40 GHz, 42.0-43.5 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are available for high-density applications in the fixed service, when considering allocations or other regulatory provisions in relation to these bands,

MOD IAP/14/106

requests ITU-R

1 to undertake studies leading to the identification of system characteristics of high-density systems in the fixed service in ~~the~~certain bands listed in the *resolves*;

2 to ~~undertake~~develop, as a matter of urgency, ~~studies of~~ITU-R recommendations addressing technical and operational criteria and of methods to facilitate sharing between high-density systems in the fixed service and other services in the bands listed in the *resolves*,

urges administrations

to participate actively in the aforementioned studies by submitting contributions to ITU-R.

Reasons: Consequential.

* ~~The date of provisional application of this allocation shall be in conformity with Resolution **126 (WRC-97)**.~~

WRC-2000 agenda item 1.5 - to consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution 122 (WRC-97)

Proposal to modify Resolution 122, high altitude platform stations in the fixed service

Background information

Resolution 122 (WRC-97), "Use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz by high altitude platform stations in the fixed service and by other services", instructs the Director of the Radiocommunication Bureau, that from 22 November 1997, to accept notices in the bands 47.2-47.5 GHz and 49.2-48.2 GHz only for high altitude platform stations in the fixed service and for feeder links for the broadcasting-satellite services pending review of sharing studies between co-primary services in the band. On the basis of studies conducted in ITU-R, it is appropriate to modify Resolution 122 (WRC-97) to take account of draft new Recommendation [4-9S/AAX] that establishes the performance parameters for certain FSS antennas that can share with the HAPS system and to take account of the need for continued studies.

MOD IAP/14/107

RESOLUTION 122 (Rev.WRC-~~97~~2000)

Use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz by high altitude platform stations in the fixed service and by other services

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that the band 47.2-50.2 GHz is allocated to the fixed, mobile and fixed-satellite services on a co-primary basis;

b) that ~~this Conference has~~WRC-97 made provision for operation of high altitude platform stations, also known as stratospheric repeaters, within the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz;

c) that ITU has among its purposes "to promote the extension of the benefit of the new telecommunication technologies to all the world's inhabitants" (No. 6 of the Constitution of the ITU (Geneva, 1992));

d) that systems based on new technologies using high altitude platforms in the bands 47.2-47.5 and 47.9-48.2 GHz will be able to provide high-capacity, competitive services to urban and rural areas;

e) that high altitude platform systems are in an advanced stage of development and some countries have notified such systems to ITU;

f) that WRC-97 adopted a new definition of high altitude platform stations in Article **S1**, modified No. **S11.24** and added No. **S11.26** in the Radio Regulations providing for notices relating to assignments for high altitude platform stations in the bands 47.2-47.5 GHz and 47.9-48.2 GHz and that the Radio Regulations Board issued a provisional rule of procedure concerning notification periods in No. **S11.24/1228** in February 1997;

g) that ~~in spite of the urgency attached to the development of such systems, technical, sharing and regulatory issues should be studied in order to achieve the most efficient use of the spectrum available for these systems~~ITU-R has confirmed that in certain cases sharing is feasible between high altitude platform stations and the FSS;

h) that technical studies are still required in order to ascertain the extent to which sharing of the bands 47.2-47.5 GHz and 47.9-48.2 GHz is feasible between systems using high altitude platforms in the fixed service and systems in the fixed, fixed-satellite (other than the specific deployment FSS scenario referenced in draft new Recommendation [4-9S/AAX]) and mobile services, and to ascertain the requirements to protect radio astronomy services in adjacent bands from spurious emissions;

i) that the radio astronomy service has primary allocations in the bands 42.5-43.5 GHz and 48.94-49.04 GHz;

j) that ITU-R studies are already under way on the preferred characteristics of systems using high altitude platforms and the feasibility of sharing between these systems and systems of other services and between these systems and other systems in the fixed service (Questions ITU-R 212/9, ITU-R 218/9 and ITU-R 251/4) and that although draft new Recommendations [4-9S/AAX] and [9B/HAPS2] have been developed, further studies are required to fully assess the implications of these scenarios and to consider the effect of mitigation techniques on increasing shared use of these bands by HAPS and other systems;

k) that No. **S5.552** urges administrations to reserve fixed-satellite service use of the band 47.2-49.2 GHz for feeder links for the broadcasting-satellite service, and that preliminary ITU-R studies indicate that high altitude platform stations in the fixed service may share with broadcasting-satellite feeder links;

l) that the development of services using high altitude platform stations in these bands requires major investment and that manufacturers and operators should be given the confidence to make the necessary investment in these applications,

resolves

1 to urge administrations to facilitate coordination between high altitude platform stations in the fixed service operating in the bands 47.2-47.5 GHz and 47.9-48.2 GHz and other co-primary services in their territory and adjacent territories;

2 that, on a provisional basis, the procedures of Article **S9** shall be used for coordination between satellite systems and high altitude platform systems;

3 to request ITU-R to ~~carry out urgently~~continue studies on the appropriate technical sharing criteria for the situations referred to in *considering h)*, with priority given to the sharing with other systems in the fixed and fixed-satellite services~~, in particular the determination of the appropriate geographical separation from feeder links in the broadcasting-satellite service~~;

4 that WRC-~~99~~03 should review the results of these studies and consider refinement of the regulatory provisions ~~that might facilitate a broader application of these~~for high altitude platform technologies,

instructs the Director of the Radiocommunication Bureau

1 that notices concerning high altitude platform stations that were received by the Bureau prior to 22 November 1997, and provisionally recorded in the Master International Frequency Register in accordance with the provisional rule of procedure issued by the Board, shall be maintained;

2 that from 22 November 1997, and pending review of the sharing studies in *considering h)* and review of the notification process by WRC-~~99~~03, the Bureau shall accept notices in the bands 47.2-47.5 GHz and 47.9-48.2 GHz only for high altitude platform stations in the fixed service and for feeder links for the broadcasting-satellite service, shall continue to process notices for fixed-satellite service networks (except for feeder links for the broadcasting-satellite service) for which complete information for advance publication has been received prior to 27 October 1997, and shall inform the notifying administrations accordingly.

Reasons: To further develop possible sharing criteria among high altitude platform stations and other services in the 47.2-47.5 GHz and 47.9-48.2 GHz bands.

WRC-2000 agenda item 1.6.1 - review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

Proposal to identify additional spectrum for IMT-2000

Background information

In the Americas, cellular and PCS services are experiencing significant growth, and there is strong interest in the evolution of these services towards IMT-2000. In view of the present PCS use of the 2 GHz band and the MSS allocations in the frequency spectrum currently identified for IMT-2000 by RR S5.388, there is limited clear spectrum available for the implementation of IMT-2000.

In order to consider additional requirements for the terrestrial component of IMT-2000, current PCS and cellular services should be able to evolve to IMT-2000 in existing bands to the extent possible. ITU-R Task Group 8/1 (TG 8/1) efforts towards global harmonization of technology and spectrum and, in particular, the forecast of 160 MHz of additional spectrum beyond that currently in the bands used for first and second generation mobile systems (e.g. cellular and PCS in Region 2) to implement IMT-2000 should be supported.

Proposals to identify frequency bands to accommodate the additional forecasted requirements should take into account the principles of placing priority on the selection of bands already allocated to the mobile service and of taking into consideration the impact on existing uses of the spectrum. Also, consideration should be given to the possibility of achieving harmonization through all or parts of the identified band(s) with other regions of the world. Globally harmonized spectrum will greatly assist in the success of IMT-2000 system deployment and enhance roaming services.

The band 1 710-1 850 MHz has the advantages of being immediately adjacent to the spectrum currently identified for IMT-2000 and it is also used today in parts of the world for PCS, increasing the possibility of harmonization with other regions.

The frequency range 1 710-1 885 MHz should be identified worldwide for additional spectrum for advanced mobile applications in the context of IMT-2000 through a modification of footnote S5.388.

MOD IAP/14/108

1 710-2 170 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 710-1 930	FIXED MOBILE S5.380 S5.149 S5.341 S5.385 S5.386 S5.387 S5.388 MOD S5.388	

MOD IAP/14/109

S5.388 The bands 1 710-1 885 MHz, 1 885-2 025 MHz and 2 110-2 200 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of these bands by other services to which they are allocated. The bands should be made available for IMT-2000 in accordance with Resolution **212 (Rev.WRC-~~97~~2000)**.

Reasons: The frequency range 1 710-1 885 MHz has, in many parts of the world, already been impacted by the introduction of earlier generation personal mobile systems (for example, the introduction of GSM1800 in Europe and other parts of the world in the frequency range 1 710-1 785/1 805-1 880 MHz and PCS in the Americas in 1 850-1 990 MHz). These pre-IMT-2000 systems are expected to have the capability to evolve to IMT-2000. In addition, this frequency range, 1 710-1 885 MHz is adjacent to the spectrum currently identified for IMT-2000, thus providing a large block of contiguous spectrum for future IMT-2000 systems. These attributes will facilitate cost-effective expansion of existing systems to meet advanced mobile applications in the context of IMT-2000 requirements.

MOD IAP/14/110

RESOLUTION 212 (Rev.WRC-~~97~~2000)

Implementation of International Mobile Telecommunications-2000 (IMT-2000)*

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that ITU-R has recommended the 1-3 GHz band as the most suitable for IMT-2000;

b) ~~that ITU-R has recommended approximately 60 MHz for use by personal stations and approximately 170 MHz for use by mobile stations~~that WARC-92 identified 230 MHz for IMT-2000 by regulatory provision of **S5.388**;

c) ~~that ITU-R has recognized that space techniques are an integral part of IMT-2000~~that ITU-R identified a further requirement of 160 MHz in addition to the spectrum identified in **S5.388** and also the spectrum currently used by earlier generations of personal communications;

d) ~~that, in No. **S5.388**, this Conference has identified bands to accommodate this future service~~that ITU-R has recognized that space techniques are an integral part of IMT-2000;

e) that WARC-92 identified the worldwide allocations for the mobile-satellite service as part of the satellite component of IMT-2000;

f) that ITU-R has completed the development of recommendations on detail specifications of the radio interface of IMT-2000;

g) that harmonized worldwide bands for IMT-2000 is desirable to achieve benefits of economies of scale,

considering further

~~*a)* that ITU-R has not completed its studies regarding duplexing methods, modulation techniques, channelling arrangements, signalling or communication protocols;~~

~~*b)* that no worldwide intersystem numbering plan currently exists that would facilitate worldwide roaming,~~

h) that WRC-2000 identified XXX MHz of additional spectrum for the terrestrial component of IMT-2000;

i) that WRC-2000 identified the bands for the satellite component of IMT-2000,

* IMT-2000 was previously known as Future Public Land Mobile Telecommunication Systems (FPLMTS).

noting

a) that the implementation of the terrestrial component of IMT-2000 ~~in the bands 1 885-2 025 MHz and 2 110-2 200 MHz~~ is expected to commence around the year 2000, subject to market and technical considerations;

b) that the availability of the satellite component of IMT-2000 ~~in the bands 1 980-2 010 MHz and 2 170-2 200 MHz simultaneously with the terrestrial component of IMT-2000 in the bands identified in No. **S5.388**~~ would improve the overall implementation and the attractiveness of IMT-2000 to both developed and developing countries~~,~~;

c) that ITU-R has identified additional work to address further developments in advanced mobile systems including IMT-2000 applications and applications beyond IMT-2000,

~~*invites administrations*~~

~~to give due consideration to the accommodation of other services currently operating in these bands when implementing IMT-2000,~~

invites ITU-R

to continue its studies ~~with a view to developing suitable and acceptable technical characteristics for IMT-2000 that will facilitate worldwide use and roaming,~~on further enhancements of IMT-2000 including the provision of Internet Protocol (IP) based applications and optimized arrangements for the harmonized use of spectrum identified for IMT-2000, and ensure that IMT-2000 can also meet the telecommunication needs of the developing countries and rural areas,

invites ITU-T

a) to complete its studies of signalling and communication protocols;

b) to develop a common worldwide intersystem numbering plan and associated network capabilities that will facilitate worldwide roaming,

resolves

that administrations which implement IMT-2000:

a) should make the necessary ~~frequencies~~spectrum available for system development;

b) should use those frequencies when IMT-2000 is implemented;

c) should use the relevant international technical characteristics, as identified by ITU-R and ITU-T Recommendations.

Reasons: Resolution 212 was modified to make it generally applicable to any band designated for IMT-2000 systems under RR S5.388.

WRC-2000 agenda item 1.6.1 - review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

Proposal for NOC in the 2 700-2 900 MHz band

Background information

CITEL proposes NOC for the band 2 700-2 900 MHz. This band is used extensively throughout the world for meteorological radars and other radionavigation and radiolocation systems. The impact of an allocation for mobile service use by IMT-2000 on these critical radar operations has not been studied by ITU-R.

The 2 700-2 900 MHz band is used for aeronautical radionavigation radars providing essential safety-of-life related terminal approach guidance for commercial aircraft. The NEXRAD weather radar system, operating at 2 700-2 900 MHz, also provides weather location and prediction information critical for public safety. Studies made during the implementation of NEXRAD have shown that air traffic control and weather radar cannot operate in the same band and in the same vicinity of marine radars and racons without causing interference.

Working Party 8B, in a liaison statement to Task Group 8/1, expressed serious concerns that TG 8/1 was recommending critical radionavigation and radiolocation bands via CPM text to WRC-2000 for possible reallocation to the mobile service exclusively without consulting the responsible working party.

The CPM text concludes that, given the technical characteristics of the radionavigation, radiolocation and meteorological radars (e.i.r.p. in the order of 1 GW in some systems and the trend towards high duty cycles), and the need to operate in accordance with the protection criteria contained in ITU-R recommendations, sharing with IMT-2000 systems is considered to be feasible only when explicitly confirmed by ITU-R sharing studies.

NOC IAP/14/111

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 700-2 900	AERONAUTICAL RADIONAVIGATION S5.337 Radiolocation S5.423 S5.424	

Reasons: The band 2 700-2 900 MHz is used worldwide by radar systems critical for flight safety and weather reporting.

WRC-2000 agenda item 1.10 - to consider results of ITU-R studies carried out in accordance with Resolution 218 (WRC-97) and take appropriate action on this subject

Proposal to modify footnotes S5.353A and S5.357A

Background information

In order to accommodate AMS(R)S traffic, it would be necessary that all MSS systems using this spectrum, within a certain geographical area, be technically able to release all, or parts, of the spectrum to any MSS operator that has a requirement for priority 1 to 6 AMS(R)S traffic. The technical and operational requirements for achieving such transfer of AMS(R)S spectrum resources would have to be developed by ICAO and the MSS system operators, and then implemented by MSS operators according to agreed upon specifications. Only MSS systems compliant with these requirements should have access to the 10 MHz identified in S5.357A of paired generic MSS spectrum to ensure the availability of this spectrum to satisfy AMS(R)S priority 1 to 6 communications.

The proposed Resolution is intended to replace Resolution 218 and calls for ITU-R to study and develop the technical and operational requirements and specifications for intra-system and inter-system prioritization and pre-emption methods.

MOD IAP/14/112

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 535-1 559	MOBILE-SATELLITE (space-to-Earth) S5.341 S5.351 MOD S5.353A S5.354 S5.355 S5.356 S5.357 MOD S5.357A S5.359 S5.362A	

MOD IAP/14/113

1 610-1 660 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 626.5-1 660	MOBILE-SATELLITE (Earth-to-space) S5.341 S5.351 MOD S5.353A S5.354 S5.355 MOD S5.357A S5.359 S5.362A S5.374 S5.375 S5.376	

MOD IAP/14/114

S5.353A In applying the procedures of No. **S9.11A** to the mobile-satellite service in the bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz, priority shall be given to accommodating the spectrum requirements for distress, urgency and safety communications of the Global Maritime Distress and Safety System (GMDSS). Maritime mobile-satellite distress, urgency and safety communications shall have priority access and immediate availability over all other mobile satellite communications operating within a network. (See also Resolution **XXX (WRC-2000)**.) Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, distress, urgency and safety communications of the GMDSS. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. ~~(See Resolution **218 (WRC-97)**.)~~

Reasons: Resolution XXX (WRC-2000) is intended to replace Resolution 218.

MOD IAP/14/115

S5.357A In applying the procedures of No. **S9.11A** to the mobile-satellite service in the bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz, priority shall be given to accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service providing transmission of messages with priority 1 to 6 in Article **S44**. Aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **S44** shall have priority access and immediate availability, by pre-emption if necessary, over all other mobile-satellite communications operating within a network. (See also Resolution **XXX (WRC-2000)**.) Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **S44**. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. ~~(See Resolution **218 (WRC-97)**.)~~

Reasons: Resolution XXX (WRC-2000) is intended to replace Resolution 218.

SUP IAP/14/116

RESOLUTION 218 (WRC-97)

Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service

Reasons: Consequential to adding Resolution XXX (WRC-2000).

ADD IAP/14/117

RESOLUTION XXX (WRC-2000)

Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-97 allocated the bands 1 525-1 559 MHz (space-to-Earth) and 1 626.5-1 660.5 MHz (Earth-to-space) to the mobile-satellite service (MSS) to facilitate the assignment of spectrum to multiple mobile-satellite systems in a flexible and efficient manner;

b) that prior to WRC-97 there was a generic allocation by footnote provisions in some countries for the use of the bands 1 530-1 544 MHz and 1 631.5-1 645.5 MHz by the MSS, on condition that maritime mobile-satellite distress and safety communications have priority access over all other communications;

c) that in the bands 1 525-1 559 MHz (space-to-Earth) and 1 626.5-1 660.5 MHz (Earth-to-space) allocated to the mobile-satellite service (MSS), footnotes **S5.353A** and **S5.357A** give priority to the spectrum requirements for distress, urgency and safety communications of GMDSS and for transmission of messages with priority 1 to 6 of Article **S44** of AMS(R)S and provides protection to GMDSS and AMS(R)S from harmful interference by other mobile-satellite services;

d) that the results of the studies conducted by ITU-R pursuant to WRC-97 Resolution **218** provide for spectrum estimates for the requirement of AMS(R)S traffic;

e) that the spectrum prioritization and pre-emption methods identified in the ITU-R studies can provide for the long-term spectrum requirements of GMDSS and AMS(R)S;

f) that the technical standards which would provide for prioritization and real-time pre-emptive capabilities in future MSS systems in order to meet the long-term requirements of GMDSS and AMS(R)S services need to be developed by ITU-R;

g) that technical considerations for sharing satellite network resources between MSS (other than the aeronautical mobile-satellite (R) service) and the aeronautical mobile-satellite (R) service have been developed by and are included in ITU-R Recommendation ITU-R M.1233;

h) that global and regional mobile-satellite systems are being multilaterally coordinated in the bands 1 525-1 559 MHz (space-to-Earth) and 1 626.5-1 660.5 MHz (Earth-to-space) and that the ITU Radio Regulations provide the international framework for multilateral agreements,

further considering

i) that the Convention on International Civil Aviation requires that stations of the aeronautical mobile-satellite (R) service shall be in compliance with the internationally agreed Standards and Recommended Practices and Procedures for Air Navigation Services;

j) that the ICAO has developed a global Air Traffic Management system which requires interoperability between stations operating in accordance with the ICAO Convention for those mobile-satellite systems providing aeronautical mobile-satellite (R) service communications with the priority message structure of Article **S44**;

k) that WRC-97 modified provisions for the operational use of the GMDSS which is fully defined in the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended (see MOD No. **S30.1**);

l) that in these bands GSO satellite system operators presently use a capacity planning approach at multilateral coordination meetings, with the guidance and support of their administrations, to periodically coordinate access to the spectrum needed to accommodate their requirements. However, outside the multilateral process, coordination problems have occurred in some cases;

m) that in the bands to which RR Nos. **S5.353A** or **S5.357A** applies, the capacity planning approach, and other methods such as intra- and inter-system prioritization, pre-emption and interoperability may assist to accommodate the expanding spectrum requirements of GMDSS and AMS(R)S;

n) that the feasibility of prioritization, real-time pre-emptive access and interoperability between different mobile-satellite systems and systems providing GMDSS and AMS(R)S has yet to be adequately determined,

recognizing

a) that Table **S15-2** of Appendix **S15** identifies the bands 1 530-1 544 MHz (space-to-Earth) and 1 626.5-1 645.5 MHz (Earth-to-space) for distress and safety purposes in the maritime MSS as well as for routine non-safety purposes;

b) that the coordination process currently allows for the orderly development of MSS systems and applications while meeting the requirements for distress, urgency and safety communications of GMDSS and for the transmission of messages with priority 1 to 6 of Article **S44** of AMS(R)S;

c) that in the future there may be a need for more flexible sharing methodologies to accommodate more systems and applications, and that ITU-R has identified two possible sharing methodologies;

d) that such methodologies shall comply with the safety and regularity of flight requirements of ICAO and the safety at sea requirements of IMO,

resolves

that technical and operational standards be developed to allow prioritization and real-time pre-emptive access both within a single MSS system offering AMS(R)S communications, and between MSS systems which may or may not offer AMS(R)S communications,

requests ITU-R

to develop the technical standards which would enable the use of prioritization and real-time pre-emption, within a single system and pre-emption between MSS systems, in order to achieve the most flexible and practical use of the MSS allocation, *requests the next [competent] world radiocommunication conference*

to take into account the outcome of ITU-R studies and take appropriate action on this subject,

invites

ICAO, IMO, IATA and administrations concerned to participate in the studies identified in *requests ITU-R*.

Reasons: This Resolution calls for ITU-R to study and develop the technical and operational requirements and specifications for intra-system and inter-system prioritization and pre-emption methods.

WRC-2000 agenda item 1.13.1 - to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

Resolution 131 (WRC-97) - Power flux-density limits applicable to non-GSO FSS systems for protection of terrestrial services in the bands 10.7-12.75 GHz and 17.7-19.3 GHz

Background information

WRC-97 provisionally adopted pfd limits to be applied to non-GSO FSS systems operating in these bands. In the 10.7-12.75 GHz band, WRC-97 applied the existing limits to both GSO and non-GSO systems, subject to further study by ITU-R under Resolution 131 (WRC-97). In the 17.7-19.3 GHz band, WRC-97 adopted more stringent pfd limits for non-GSO FSS systems with more than 100 satellites.

Many studies were performed in Working Party 4-9S and by the Joint Task Group 4-9-11 to determine the appropriate pfd limits to be applied to non-GSO FSS systems in the aforementioned bands. The intent was to find suitable pfd limits that would ensure protection of the fixed service without unduly constraining the development of either service.

At the most recent meeting of the Joint Task Group 4-9-11, the experts present agreed to limits for both frequency bands.

In the 10.7-12.75 GHz range, the JTG concluded that the current limits in Article S21 are sufficient to protect the FS on the basis of the assumptions used in the studies. The JTG also recommended the use of a 1 MHz reference bandwidth for non-GSO system. The conclusions of the JTG 4-9-11 are summarized below.

The current RR Article S21 per satellite pfd limits, as defined below and as discussed more fully in draft new Recommendation ITU-R SF.[Doc. 4-9S/AI] (submitted to RA-2000 for approval), are adequate for the protection of the FS in the 10.7-12.75 GHz band from aggregate interference from three assumed non-homogeneous, non-GSO FSS systems. Moreover, the contribution of GSO interference to the sharing has been shown as not being significant. Studies support and validate this conclusion. These results would remain valid if the number of non-GSO FSS systems were in the range 3 to 5.

- in the 10.7-11.7 GHz band:

–126	dB(W/m^2) per 1 MHz	for $0° \le \delta < 5°$
–126 + (δ-5)/2	dB(W/m^2) per 1 MHz	for $5° \le \delta < 25°$
–116	dB(W/m^2) per 1 MHz	for $25° \le \delta < 90°$

where δ is the angle of arrival above the horizontal plane.

- in the 11.7-12.75 GHz band:

–124	dB(W/m^2) per 1 MHz	for $0° \le \delta < 5°$
–124 + (δ-5)/2	dB(W/m^2) per 1 MHz	for $5° \le \delta < 25°$
–114	dB(W/m^2) per 1 MHz	for $25° \le \delta < 90°$

where δ is the angle of arrival above the horizontal plane.

In the 17.7-19.3 GHz range, the conclusion of the JTG was that a tightening of the original Article S21 pfd limits for non-GSO FSS with large constellations (over 50 satellites) would ensure protection of the fixed service while not unduly constraining the development of non-GSO FSS systems. The JTG conclusion was:

The following per satellite pfd limits (also described in draft new Recommendation ITU-R SF.[Doc. 4-9S/TEMP/94]) (submitted to RA-2000 for approval) are adequate for the protection of the FS in the 17.7-19.3 GHz band from aggregate interference from three assumed non-homogeneous non-GSO FSS systems. Moreover, the contribution of GSO interference to the sharing has been shown as not being significant. Studies support and validate this conclusion. These results would remain valid if the number of non-GSO FSS systems were in the range 3 to 5.

–115 - X	dB(W/m^2) per MHz	for $0° \le \delta < 5°$
–115 - X +((10 + X)/20)(δ-5)	dB(W/m^2) per MHz	for $5° \le \delta < 25°$
–105	dB(W/m^2) per MHz	for $25° \le \delta < 90°$

where δ is the angle of arrival above the horizontal plane and X is defined as a function of the number of satellites in the non-GSO FSS constellation, N, as follows:

– for $N \le 50$ $X = 0$ (dB)

– for $50 < N \le 288$ $X = \frac{5}{119}(N - 50)$ (dB)

– for $N > 288$ $X = \frac{1}{69}(N + 402)$ (dB)

The scaling function, X, was developed on the basis of non-GSO FSS constellations with 96, 288 and 840 satellites. Further simulations with different non-GSO FSS constellations comprising a wide range in the number of satellites (63, 126, 189, 252 and 504 satellites) and using the conservative pfd mask simulation method have confirmed the adequacy of this scaling function.

Further studies by some CITEL Administrations have shown that the interference levels obtained using the simple pfd mask methodologies used in the ITU-R studies are higher than those obtained using a more realistic modelling of the pfd entries. CITEL Administrations support the above pfd limits while noting that because of the operational characteristics of the non-GSO networks, interference margins will be present.

CITEL objective

CITEL's objective is to ensure that the pfd limits in the bands 10.7-12.75 GHz and 17.8-19.3 GHz will provide adequate protection of the terrestrial services while not unduly constraining the design of non-GSO FSS networks. Since the studies conducted in ITU-R indicate that both objectives have been achieved with the masks proposed by the JTG 4-9-11, these limits should be adopted in Article S21 of the Radio Regulations.

Proposals

1) It is proposed to retain the current S21 pfd limits in the 10.7-12.75 GHz range, but scaling to a 1 MHz reference bandwidth for non-GSO systems and remove references to further studies.

2) It is proposed to adopt the compromise S21 pfd limits in the 17.7-19.3 GHz band agreed to by the JTG 4-9-11 and remove references to further studies.

3) As a consequence, it is proposed to delete Resolution 131 (WRC-97).

4) Changes in the frequency band column referring to S5.494 and S5.496 is required because the FS is allocated in all countries of Region 3.

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TABLE **S21-4** *(continued)*

NOTE - Only the portions of the table that were changed were reproduced.

Frequency band	Service*	Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	–150~~[14]~~	$-150 + 0.5(\delta - 5)$~~[14]~~	–140~~[14]~~	4 kHz
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	–126	$-126 + 0.5(\delta - 5)$	–116	1 MHz
11.7-12.5 GHz (Region 1) 12.5-12.75 GHz (Region 1 countries listed in Nos. **S5.494** and **S5.496**) 11.7-12.~~2~~7 GHz (Region 2) 11.7-12.~~2~~75 GHz (Region 3) ~~12.2-12.7 GHz (Region 2)~~	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	~~–148[15]~~ –124	~~–148 + 0.5(δ – 5)[15]~~ $-124 + 0.5(\delta - 5)$	~~–138[15]~~ –114	~~4 kHz~~ 1 MHz
12.2-12.~~5~~75 GHz[7] (Region 3) 12.5-12.75 GHz[7] (Region 1 ~~and Region 3~~ countries listed in Nos. **S5.494** and **S5.496**)	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	–148[14]	$-148 + 0.5(\delta - 5)$[14]	–138[14]	4 kHz
15.43-15.63 GHz	Fixed-satellite (space-to-Earth)	–127	5°-20°: –127 20°-25°: $-127 + 0.56(\delta - 20)^2$	25°-29°: –113 29°-31°: $-136.9 + 25 \log (\delta - 20)$ 31°-90°: –111	1 MHz
17.7-19.3 GHz[7, 8]	Fixed-satellite (space-to-Earth) Meteorological-satellite (space-to-Earth)	–115[12*bis*] or ~~–125~~ –115 – X[12]	$-115 + 0.5(\delta - 5)$[12*bis*] or ~~–125 + (δ – 5)~~ $-115 - X + ((10 + X)/20)(\delta - 5)$[12]	–105[12*bis*] or –105[12]	1 MHz

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[12] **S21.16.6** ~~These values shall apply provisionally only to emissions of space stations on non-geostationary satellites in networks operating with a large number of satellites, that is systems operating with more than 100 satellites (see Resolution **131 (WRC-97)**).~~The function X is defined as a function of the number, N, of satellites in the non-GSO FSS constellation as follows:

– for N ≤ 50 $X = 0$ (dB)

– for 50 < N ≤ 288 $X = \frac{5}{119}(N - 50)$ (dB)

– for N > 288 $X = \frac{1}{69}(N + 402)$ (dB)

In the band 18.8-19.3 GHz, these limits apply to emissions of a space station on a non-geostationary FSS satellite for which complete coordination or notification information, as appropriate, has been received by the Radiocommunication Bureau after 17 November 1995, and which were not operational by that date.

Reasons: The above regulatory text (as contained in the CPM Report) maintains the original limits for non-GSO FSS systems in the band 18.8-19.3 GHz that were notified or operational prior to the end of WRC-95 per the decisions in Resolution 131 (WRC-97). In the band 17.7-18.8 GHz, the new limits would apply to all non-GSO systems irrespective of the date of receipt of information or date of bringing into operation.

ADD IAP/14/119

[12*bis*] **S21.16.6*bis*** These limits apply to emissions of a space station on a meteorological-satellite and on a geostationary FSS satellite. These limits also apply to emissions of a space station on a non-geostationary FSS satellite in the band 18.8-19.3 GHz for which complete coordination or notification information has been received by the Radiocommunication Bureau by 17 November 1995, or are in operation by that date.

Reasons: The above regulatory text (as contained in the CPM Report) reflects the date-specific provisions currently in Resolution 131.

SUP IAP/14/121

[14] **S21.16.8**

SUP IAP/14/122

[15] **S21.16.9**

SUP IAP/14/123

RESOLUTION 131 (WRC-97)

Power flux-density limits applicable to non-geostationary fixed-satellite service systems for protection of terrestrial services in the bands 10.7-12.75 GHz and 17.7-19.3 GHz

Reasons: Replaces the provisional pfd limits in Table S21-4 with the values that, as a result of extensive ITU-R studies, were agreed by Working Party 4-9S and JTG 4-9-11. ADD [12*bis*].

S21.16.6*bis*, and a corresponding change in MOD [12] S21.16.6, specify the dates of application of the pfd limits in conformance with the dates established in Resolution 131. Footnotes S21.16.8, S21.16.9 and Resolution 131 are no longer required.

WRC-2000 agenda item 1.13.2 - to consider the inclusion in other frequency bands of similar limits in Articles S21 and S22, or other regulatory approaches to be applied in relation to sharing situations

IAP/14/124

There have been no technical studies carried out in frequency bands other than those considered under agenda item 1.13.1. Consequently, there should not be any limits adopted in Article S22 for frequency bands other than those identified in Resolutions 130 (WRC-97) and 538 (WRC-97) per agenda item 1.13.1.

WRC-2000 agenda item 1.15.1 - to consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments

Proposal for RNSS allocation (space-to-Earth) in the upper part of the band 960-1 215 MHz

Background information

Additional radionavigation-satellite service (RNSS) signals will greatly enhance the accuracy, reliability and robustness of the civil Global Positioning System (GPS) by enabling more effective corrections to be made for the time delay effects of the ionosphere on the signals from space. The International Civil Aviation Organization (ICAO) has stated the requirement for an additional civil signal to support Global Navigation Satellite System (GNSS) requirements and for space-based augmentation systems. A requirement for aeronautical users is to have the protected signal operate within radio spectrum allocated to the Aeronautical Radionavigation Service (ARNS), which would also include the possibility of terrestrial augmentation systems.

However, studies show that airborne RNSS receivers at altitudes of 10 000 feet and above may not be compatible with the existing environment in certain geographic areas. The band 1 151-1 215 MHz has been identified to accommodate additional spectrum for an international civil aviation safety-of-life service. The DME/TACAN constitutes the primary source of interference, but because of its importance to civil aviation navigation it must be protected for continued use for the foreseeable future. Recoordination of some DME/TACAN could be considered, if required, in order for GPS to be used in North America for civil aviation safety-of-life services.

Sharing of the same spectrum by two or three different RNSS networks would require compatible power levels and signal types in the design and operation of the different networks. Use of independent spectrum by each RNSS network would decrease the chance of a single interference incident affecting more than one network. Therefore, the allocation should accommodate the spectrum requirement of two or three different RNSS systems.

CITEL supports a new allocation to RNSS in the band 1 164-1 212 MHz with appropriate regulatory measures to protect the current use and the development of airborne electronic aids to air navigation and any directly associated ground-based facilities.

CITEL Members States recognize that discussions continue regarding the total amount of spectrum required to support several RNSS systems.

MOD IAP/14/125

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
960-1 215	AERONAUTICAL RADIONAVIGATION MOD S5.328	

MOD IAP/14/126

S5.328 The band 960-1 215 MHz is reserved on a worldwide basis for the use and development of airborne electronic aids to air navigation and any directly associated ground-based and satellite-borne (1 164-1 212 MHz only) facilities. The band 1 164-1 212 MHz is also allocated to the radionavigation-satellite service (space-to-Earth) on a primary basis. Stations of the radionavigation-satellite service shall not cause harmful interference to nor claim protection from stations of the aeronautical radionavigation service.

Reasons: Radionavigation-satellite service systems will be provided with adequate spectrum while giving priority to the aeronautical radionavigation service.

WRC-2000 agenda item 1.15.1 - to consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments

Proposal for RNSS allocation (space-to-Earth) in the upper part of the band 1 260-1 300 MHz

Background information

The band 1 260-1 300 MHz is allocated on a primary basis to the radiolocation, to the Earth exploration-satellite (active) and to the space research (active) services. Domestic footnotes allocate this band on a primary basis in several countries to the fixed and mobile services and to the radionavigation service. In Canada and the United States, the band 1 240-1 300 MHz is also allocated to the aeronautical radionavigation service on a primary basis. The band 1 260-1 300 MHz is also allocated to the amateur service on a secondary basis.

Footnote S5.282 allows the use of the amateur-satellite service (Earth-to-space) on a non-protection no-interference basis with respect to other services operating in this band in accordance with the table (see No. S5.43). The usage of this band by the amateur-satellite service is expected to increase.

Similar to the band 1 215-1 260 MHz, the band 1 260-1 300 MHz is used by radars. Furthermore, this band is used for high-power wind profiler radars. It is not suitable for safety-of-life applications, similar to the RNSS usage in the band 1 215 to 1 260 MHz.

CITEL supports a new allocation in the band 1 260-1 300 MHz (space-to-Earth) for RNSS non-safety-of-life applications.

CITEL Members States recognize that discussions continue regarding the total amount of spectrum required to support several RNSS systems.

MOD IAP/14/127

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 260-1 300	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) ADD S5.329A SPACE RESEARCH (active) Amateur S5.282 S5.330 S5.331 S5.332 S5.334 S5.335	

ADD IAP/14/128

S5.329A Use of the radionavigation-satellite service in the band 1 260-1 300 MHz shall be subject to the condition that no harmful interference is caused to and no protection is claimed from the radionavigation service authorized under **S5.331**.

Reasons: RNSS will be provided with adequate spectrum for non-safety-of-life applications while safeguarding the development and protection of the radionavigation services.

WRC-2000 agenda item 1.15.1 - to consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments

Proposal for RNSS (Earth-to-space) 5 000-5 010 MHz and (space-to-Earth) 5 010-5 030 MHz

Background information

In accordance with the ITU Radio Regulations, the band 5 000-5 250 MHz is allocated on a primary basis to the aeronautical radionavigation service in all three ITU Regions. The band 5 000-5 030 MHz is not used nor intended to be used for the international standard MLS system.

Results of ITU-R studies show that with the 10 MHz of separation and the use of adequate and existing filter technology by the RNSS, the protection requirements of the RAS as contained in Recommendation ITU-R RA.769-1 are met.

The use of RNSS (space-to-Earth) is compatible with the MLS operations in the band 5 030-5 150 MHz if the pfd at the surface of the Earth does not exceed –124.5 dB(W/m^2), in a 150 kHz band, as specified by ICAO. The use of RNSS (Earth-to-space) is compatible with the MLS operations through careful location of the radiobeacons.

The usage of the band 5 010-5 030 MHz by RNSS (space-to-Earth) and (Earth-to-space) are mutually exclusive. If the allocation to the RNSS (space-to-Earth) in the band 5 010 to 5 030 MHz is not implemented, then the allocation to the RNSS (Earth-to-space) could be extended to the band 5 030 MHz.

CITEL supports the allocation to RNSS in the band 5 010-5 030 MHz (space-to-Earth), and the allocation to RNSS in the band 5 000-5 010 MHz (Earth-to-space).

MOD IAP/14/129

4 800-5 830 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 000-5 150	AERONAUTICAL RADIONAVIGATION S5.367 MOD S5.444 S5.444A ADD S5.444B	

MOD IAP/14/130

S5.444 The band ~~5 000~~5 030-5 150 MHz is to be used for the operation of the international standard system (microwave landing system) for precision approach and landing. The requirements of this system shall take precedence over other uses of this band. For the use of this band, see No. **S5.444A** and Resolution **114 (Rev.WRC-~~95~~2000)** ~~apply~~.

Reasons: To indicate that the 5 000-5 030 MHz band is no longer intended to be used for MLS.

ADD IAP/14/131

S5.444B *Additional allocation:* the band 5 010–5 030 MHz is also allocated to the radionavigation-satellite service (space-to-Earth) on a primary basis. The band 5 000-5 010 MHz is also allocated to the radionavigation-satellite service (Earth-to-space) on a primary basis. Harmful interference shall not be caused to stations of the radio astronomy service using the band 4 990-5 000 MHz by stations of the radionavigation-satellite service (see No. **S29.13**).

Reasons: To enable RNSS uplink and downlink operations while protecting radio astronomy observations.

WRC-2000 agenda item 1.15.1 - to consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments

Proposal for RNSS (Earth-to-space) in the band 1 300-1 350 MHz

Background information

The band 1 300-1 350 MHz is allocated worldwide on a primary basis to the aeronautical radionavigation service and on a secondary basis to the radiolocation service. New allocations for RNSS are required to support developments and some proposed RNSS systems would require a limited number of terrestrial radio beacons for synchronization. Footnote S5.149 indicates spectral line observations by the radio astronomy service and that precautions should be taken to protect the RA service from harmful interference.

Careful location of the radio beacons should protect the radio astronomy service.

Results of ITU-R studies show that the required separation distance between radars and terrestrial beacons would be less than 60 km to protect the radars.

By making the radiolocation allocation primary, equal status would be given to both the RNSS (Earth-to-space) and the radiolocation radars, which would need to be coordinated. A footnote would preserve the higher status of the aeronautical radionavigation service.

CITEL supports the allocation to RNSS (Earth-to-space) in the band 1 300-1 350 MHz.

MOD IAP/14/132

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 300-1 350	AERONAUTICAL RADIONAVIGATION S5.337 RADIONAVIGATION-SATELLITE (Earth-to-space) RADIOLOCATION ~~Radiolocation~~ S5.149 ADD S5.337A	

ADD IAP/14/133

S5.337A The use of the band 1 300-1 350 MHz by the radionavigation-satellite service earth stations and stations of the radiolocation service shall not cause harmful interference to, nor constrain, the development of the aeronautical radionavigation service.

Reasons: To enable use of the band for RNSS uplinks, while protecting other aeronautical radionavigation services.

WRC-2000 agenda item 1.15.2 - to consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the bands 1 215-1 260 MHz and 1 559-1 610 MHz

Background information

Radionavigation-satellite service (RNSS) systems such as the Global Positioning System and Global Navigation Satellite System are primarily being used in the space-to-Earth direction to provide service to terrestrial users. These systems are, however, also increasingly being used in the space-to-space direction by spaceborne users for such applications as spacecraft three-dimensional positioning and velocity determination; three-axis attitude control; precise time synchronization; precision orbit determination, and atmospheric science. The use of RNSS signals is presently protected only through a space-to-Earth allocation in the 1 215-1 260 MHz and 1 559-1 610 MHz bands. Recognizing current and future operational usage of spaceborne RNSS receivers for scientific and commercial applications, it is important to add the space-to-space direction to the existing RNSS allocations so that these uses can be taken into consideration when changes to the use of these bands are contemplated.

Interference studies have been conducted to assess the sensitivity of spaceborne RNSS receivers to interference from radiolocation, Earth exploration-satellite (active), space research (active), fixed, mobile and aeronautical radionavigation services in the 1 215-1 260 MHz band; from the aeronautical radionavigation and fixed services in the 1 559-1 610 MHz band; and also their sensitivity to intra-service interference between radionavigation-satellite service systems in these two bands.

ITU-R has concluded that the addition of a space-to-space direction to the 1 215-1 260 MHz and 1 559-1 610 MHz RNSS bands will not cause any additional interference to other services since it involves no change to the space-to-Earth transmissions.

Studies demonstrate that RNSS spaceborne receivers can operate satisfactorily in the presence of interference caused by systems in other services as well as other RNSS systems. Potential interference from services in adjacent bands was also examined.

Existing coordination procedures are adequate for space-to-space operations and no additional protection will be required.

MOD IAP/14/134

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 215-1 240	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) SPACE RESEARCH (active) S5.329 S5.330 S5.331 S5.332	
1 240-1 260	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) SPACE RESEARCH (active) Amateur S5.329 S5.330 S5.331 S5.332 S5.334 S5.335	

Reasons: Provide an allocation for space-to-space use for RNSS, which will ensure the protection of space-based RNSS receivers.

MOD IAP/14/135

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 559-1 610	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) S5.341 S5.355 S5.359 S5.363	

Reasons: Provide an allocation for space-to-space use for RNSS, which will ensure the protection of space-based RNSS receivers.

WRC-2000 agenda item 1.16 - to consider allocations of frequency bands above 71 GHz to the Earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution 723 (WRC-97)

Proposal to modify the allocations above 71 GHz

Background information

The following proposals modify many of the allocation tables above 71 GHz to accommodate the requirements of the radio astronomy and Earth exploration-satellite (passive) services, while giving consideration to the needs of other services. The modifications to the allocation tables maintain the aggregate amount of spectrum allocated to the displaced services (including the fixed-satellite service), provide frequency blocks 5-9 GHz wide to accommodate future wideband multimedia systems while taking into account differences in atmospheric attenuation, and provide appropriate separation between services.

Resolutions XXX (WRC-2000) and YYY (WRC-2000) address the need for future study between co-allocated active services and between active and passive services at such a time when the technical characteristics of the active services become known.

MOD IAP/14/136

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
71-74	FIXED FIXED-SATELLITE ~~(Earth-to-space)~~(space-to-Earth) MOBILE MOBILE-SATELLITE ~~(Earth-to-space)~~(space-to-Earth) ~~S5.149 S5.556~~	

Reasons: MSS and FSS uplinks and downlinks in 71-74 GHz and 81-84 GHz bands have been interchanged to avoid satellite downlinks in bands needed by RAS. Atmospheric absorption is only slightly higher in the 71-74 GHz band than in the 81-84 GHz band. The RAS footnotes S5.149 and S5.556 have been deleted in favour of allocations above 76 GHz. The reference to the 72.77-72.91 GHz band in footnotes S5.149 and S5.556 has been deleted.

MOD IAP/14/137

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
74-75.5	FIXED FIXED-SATELLITE ~~(Earth-to-space)~~(space-to-Earth) MOBILE BROADCASTING-SATELLITE Space research (space-to-Earth) MOD S5.561	

MOD IAP/14/138

75.5-76	~~AMATEUR~~ ~~AMATEUR-SATELLITE~~ FIXED FIXED-SATELLITE (space-to-Earth) MOBILE BROADCASTING-SATELLITE Space research (space-to-Earth) MOD S5.561 ADD S5.EEE

Reasons: BSS, which is currently allocated to the 84-86 GHz band, has been relocated to this band to protect RAS above 76 GHz. Atmospheric absorption is only slightly higher in the 74-76 GHz band than in the 84-86 GHz band. Amateur and amateur-satellite allocations have been shifted to 80.5-81 GHz. The new footnote S5.EEE protects existing amateur and amateur-satellite operations in the 75.5-76 GHz band until the year 200[X]. The FSS (Earth-to-space) allocation has been moved to the 84-86 GHz band. The proposed allocations in the 74-84 GHz range preserve a contiguous 10 GHz space research downlink (secondary), which is required for space VLBI purposes. Footnote S5.561 has been modified to recognize the change in BSS allocation.

MOD IAP/14/139

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
76-~~81~~77.5	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth) ~~S5.560~~MOD S5.149	

MOD IAP/14/140

77.5-78	AMATEUR AMATEUR-SATELLITE ~~RADIOLOCATION~~ ~~Amateur~~ ~~Amateur-satellite~~ Radio astronomy Space research (space-to-Earth) ~~S5.560~~MOD S5.149

MOD IAP/14/141

78-81	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth) S5.560 MOD S5.149	

Reasons: The existing 76-81 GHz band has been divided into three sub-bands. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide in both the 76-77.5 GHz and 78-81 GHz bands. Radio astronomy is added as a secondary allocation in the 77.5-78 GHz band. Amateur and amateur-satellite services are shifted by 0.5 GHz, to accommodate BS, FSS and MSS downlinks at the lower portion of atmospheric window, and to avoid sharing with vehicular radars, which some administrations have authorized to operate in the 76-77 GHz band. There is no change in sharing between services, except for introduction of RAS allocation in the upper and lower sub-bands. These bands have been added to those listed under S5.149. Footnote S5.560 is deleted from the 76-77.5 and 77-78 GHz sub-bands, where it does not apply.

MOD IAP/14/142

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
81-84	FIXED FIXED-SATELLITE ~~(space-to-Earth)~~(Earth-to-space) MOBILE MOBILE-SATELLITE ~~(space-to-Earth)~~(Earth-to-space) RADIO ASTRONOMY Space research (space-to-Earth) MOD S5.149 ADD S5.DDD	

Reasons: The directions of MSS and FSS downlinks have been reversed to allow radio astronomy observations. The uplinks are paired with the 71-74 GHz downlinks. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. Footnote S5.DDD has been added to maintain the current amount of secondary amateur and amateur-satellite spectrum. This band has been added to footnote S5.149.

MOD IAP/14/143

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
84-86	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE BROADCASTING ~~BROADCASTING-SATELLITE~~ RADIO ASTRONOMY ~~S5.561~~MOD S5.149	

Reasons: The broadcasting-satellite allocation has been relocated to the 74-76 GHz band. The direction of satellite downlinks has been reversed to allow radio astronomy observations. The uplink has been paired with the 74-76 GHz downlink. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. This band has been added to footnote S5.149. The S5.561 footnote is no longer relevant to this band; appropriately modified it now applies to the 74-75.5 GHz and 75.5-76 GHz bands.

NOC IAP/14/144

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
86-92	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340	

Reasons: This band is of crucial importance to the RAS, SR (passive) and EES (passive) services; it is the window for the band around 118.75 GHz. No active services are acceptable in this band and no change in current allocations is feasible.

MOD IAP/14/145

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
92-94	FIXED ~~FIXED-SATELLITE (Earth-to-space)~~ MOBILE RADIO ASTRONOMY RADIOLOCATION MOD S5.149 ~~S5.556~~	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. Previously, radio astronomy interest was recognized via footnote S5.556. The FSS (Earth-to-space) allocation no longer needed to balance the 102-105 GHz allocation, has been relocated to the 71-76 GHz band. This band has been added to those listed under S5.149. Footnote S5.556 has been deleted from this band, as it is no longer necessary.

MOD IAP/14/146

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
94-94.1	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) Radio astronomy S5.562	

Reasons: The radio astronomy service is secondary to the active services. No change in sharing between services is proposed, except for introduction of the RAS allocation in this band.

MOD IAP/14/147

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
94.1-95	FIXED ~~FIXED-SATELLITE (Earth-to-space)~~ MOBILE RADIO ASTRONOMY RADIOLOCATION MOD S5.149	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. No change in sharing between existing services, except for the introduction of RAS allocation in band. The FSS (Earth-to-space) allocation, no longer needed to balance 102-105 GHz, has been relocated to the 71-76 GHz band. This band has been added to those listed under S5.149.

MOD IAP/14/148

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
95-100	FIXED MOBILE ~~MOBILE-SATELLITE~~ RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE ~~Radiolocation~~ MOD S5.149 MOD S5.553 MOD S5.554 ~~S5.555~~	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. Radiolocation has been upgraded to primary, consequential to the addition of radio astronomy as a primary service. The mobile-satellite service is deleted, as it cannot share with the radiolocation service. This band has been added to those listed under S5.149. Footnote S5.555, which allocates the 97.88-98.08 GHz sub-band to the RAS on a primary basis, has been deleted, and the band has been deleted from footnote S5.555. Footnote S5.553 has been modified to include stations in the fixed service.

MOD IAP/14/149

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
100-102	EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.149 S5.341	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. There is no change in sharing between services, except for the introduction of RAS allocation in band. This band is used by EES (passive) for limb sounding of atmospheric constituents (NO line at 100.49 GHz). This band is added to those listed under S5.149.

MOD IAP/14/150

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
102-105	FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY MOD S5.149 S5.341	

Reasons: The FSS allocation has been moved to the 74-76 GHz band, to eliminate downlinks in the middle of the atmospheric window needed for radio astronomy observations. Atmospheric absorption in these two windows is similar. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. This band has been added to those listed under S5.149.

MOD IAP/14/151

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
105-~~116~~109.5	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ~~S5.340~~ S5.341	

Reasons: The 105-116 GHz range has been divided into four sub-bands to make additional spectrum available for other services and to adjust other passive allocations to areas of the spectrum that are more appropriate to meet scientific needs. Passive sensors have no known use for, and do not need the band 105-109.5 GHz, so they have been deleted. Fixed and mobile services have been added, relocated from the 116-122.5 GHz band, where deletion of these services is needed to protect essential passive sensor operations. Since this band is no longer passive in nature, footnote S5.340 should be deleted. This band is added to those included under S5.149, to reflect the need to protect radio astronomy in a band that is no longer passive. Footnote S5.CCC is added to limit space research (passive) allocation to space-based radio astronomy in this band.

MOD IAP/14/152

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
109.5-111.8	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341	

Reasons: It is essential to maintain this passive band. The MOD refers to the band limits only; no change (NOC) is proposed to the allocations within this sub-band. This band contains an ozone line at 110.8 GHz, which is used for microwave limb sounding. The entire band is of vital importance to radio astronomy for observations of the CO lines at 109.8 and 110.2 GHz, and continuum observations.

MOD IAP/14/153

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
111.8-114.25	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ~~S5.340~~ S5.341	

Reasons: Passive sensors do not need the band 111.8-114.25 GHz and have been deleted. Fixed and mobile services are added to this band; they were relocated from the 116-122.5 GHz band where deletion of these services is needed to protect essential passive sensor operations. This band is added to those included under S5.149 to reflect the need to protect radio astronomy in a band that is no longer passive. The addition of the new footnote S5.CCC limits the space research (passive) allocation to space-based radio astronomy in this band.

MOD IAP/14/154

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
114.25-116	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341	

Reasons: It is essential to maintain this passive band. The MOD refers to the band limits only; no change (NOC) is proposed to the allocations within this sub-band. The band 114.25-116 GHz is of vital importance to radio astronomy for observations of the 115.3 GHz CO line and is the first portion of the 114.25-122.25 GHz oxygen absorption band which is required for remote sensing, with a peak at 118.75 GHz.

MOD IAP/14/155

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
116-119.98	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.XXX ~~MOBILE S5.558~~ SPACE RESEARCH (passive) S5.341	

MOD IAP/14/156

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
119.98-120.02	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.XXX ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~Amateur~~ S5.341	

MOD IAP/14/157

120.02-~~126~~122.25	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.XXX ~~MOBILE S5.558~~ SPACE RESEARCH (passive) S5.138

Reasons: This band is of crucial importance for passive sensing, as it is comprised of the majority of the necessary 114.25-122.25 GHz band, the oxygen absorption band, with its peak at 118.75 GHz. The fixed and mobile services have been moved down to 105-109.5 GHz and 111.8-114.25 GHz, as sharing with passive sensors would severely restrict these services in this portion of the spectrum. The inter-satellite service needs to be limited by footnote S5.XXX to links between GSO satellites only, with pfd limits as specified in sharing studies in order to share the band 116-122.25 GHz with passive sensors. The secondary allocation to amateur services in the band 119.98-120.02 GHz is also moved to the 122.5-123 GHz band to avoid interference to passive sensors.

MOD IAP/14/158

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
122.25-123	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED INTER-SATELLITE ADD S5.XXX MOBILE MOD S5.558 ~~SPACE RESEARCH (passive)~~ Amateur S5.138	

Reasons: The passive sensor allocations have been deleted from this band, as they are not needed for remote sensing applications. A secondary amateur service allocation has been added to compensate for the deletion of their allocation in the 119.98-120.02 GHz band.

MOD IAP/14/159

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
123-126	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE ~~SPACE RESEARCH (passive)~~ Radio astronomy ~~S5.138~~	

Reasons: This band is not required for passive sensor operations and those allocations have been deleted. Satellite downlinks from the 141-153 GHz band have been moved to the 123-130 GHz band to avoid interference to the radio astronomy service. The radio astronomy service is added on a secondary basis, for possible use in wideband continuum observations. Sharing conditions between the ISS and the FSS, MSS, RNS and RNSS services need to be developed, but no imminent use of the band by these services is contemplated. The MSS directional indicator has been left undefined. Footnote S5.138 does not apply to this band due to changed band limit and is consequentially deleted.

MOD IAP/14/160

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
126-~~134~~130	~~FIXED~~ FIXED-SATELLITE (space-to-Earth) ~~INTER-SATELLITE~~ ~~MOBILE S5.558~~ MOBILE-SATELLITE ~~RADIOLOCATION S5.559~~ RADIONAVIGATION RADIONAVIGATION-SATELLITE Radio astronomy MOD S5.554	

Reasons: Satellite downlinks from the 141-153 GHz band have been moved to the 123-130 GHz band to avoid interference to the radio astronomy service. The radio astronomy service is added on a secondary basis for spectral line and wideband continuum observations. The fixed, mobile, inter-satellite and radiolocation allocations have been relocated to improve sharing situations. Sharing conditions between the FSS, MSS, RNS and RNSS services need to be developed, but no imminent use of the band by these services is contemplated. The MSS directional indicator has been left undefined. Footnote S5.554 has been modified to include this band.

MOD IAP/14/161

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
130-134	FIXED INTER-SATELLITE MOBILE MOD S5.558 RADIO ASTRONOMY ~~RADIOLOCATION S5.559~~ MOD S5.149	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. Sharing conditions between the RAS and the ISS need to be developed. Footnote S5.558 is modified to reflect the new mobile service band limit. The radiolocation service has been relocated to improve sharing conditions.

MOD IAP/14/162

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
134-~~142~~136	AMATEUR AMATEUR-SATELLITE ~~MOBILE S5.553~~ ~~MOBILE-SATELLITE~~ ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ Radio astronomy ~~Radiolocation~~ ~~S5.149 S5.340 S5.554 S5.555~~	

Reasons: The amateur and amateur-satellite services are moved here from the 142-144 GHz band to avoid interference to radio astronomy at higher frequencies. Radio astronomy is added as a secondary service. All footnotes are deleted, as they no longer apply to this band.

MOD IAP/14/163

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
136-141	~~MOBILE S5.553~~ ~~MOBILE-SATELLITE~~ RADIO ASTRONOMY RADIOLOCATION ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ Amateur Amateur-satellite ~~Radiolocation~~ MOD S5.149 ~~S5.340 S5.554 S5.555~~	

Reasons: Services currently allocated to the 144-149 GHz band are moved to this band to facilitate realignment. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. This band is added to those listed under S5.149. Since this band is no longer passive, it is removed from S5.340. Footnote S5.554 no longer applies to this band and is deleted. Footnote S5.555 no longer needed, as the radio astronomy service is allocated on a primary basis in the entire 136-141 GHz band.

MOD IAP/14/164

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
141-142	FIXED MOBILE ~~S5.553~~ ~~MOBILE-SATELLITE~~ RADIO ASTRONOMY RADIOLOCATION ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ ~~Radiolocation~~ MOD S5.149 ~~S5.340 S5.554 S5.555~~	

MOD IAP/14/165

142-144	~~AMATEUR~~ ~~AMATEUR-SATELLITE~~ FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION MOD S5.149	

MOD IAP/14/166

144-~~149~~148.5	FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION ~~Amateur~~ ~~Amateur-satellite~~ MOD S5.149 ~~S5.555~~	

Reasons: Allocations are transferred to the 141-148.5 GHz band from the 126-134 GHz band to allow for radio astronomy allocations in this band. The bandwidth has been reduced to 7.5 GHz to accommodate EES (passive) and SR (passive) requirements in the 148.5-151.5 GHz band. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. Since the 141-142 GHz sub-band is no longer passive, S5.340 is deleted from that band and modified accordingly. All sub-bands are added to those listed under S5.149. Footnotes S5.554 and S5.555 no longer apply to any portion of this band and are deleted and modified accordingly.

MOD IAP/14/167

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
148.5-149	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY ~~RADIOLOCATION~~ ~~Amateur~~ ~~Amateur-satellite~~ ~~S5.149~~MOD S5.340 S5.555	

MOD IAP/14/168

149-150	EARTH EXPLORATION-SATELLITE (passive ~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340	

MOD IAP/14/169

150-151	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) ~~S5.149~~ MOD S5.340 ~~S5.385~~	

MOD IAP/14/170

151-~~156~~151.5	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340	

Reasons: The current passive allocation of 150-151 GHz has insufficient bandwidth for remote sensing observations and is not adequately protected from potential interference. The scientific requirement is for a 3 GHz band centred at 150 GHz for use in conjunction with water vapour observations around 183 GHz. Also, the 150.74 GHz nitrous oxide line is required for microwave limb sounding applications. All active services are relocated from this band to meet these requirements. Since the 148.5-151.5 GHz band is now purely passive, it is added to those listed under S5.340. For the same reason, there is no need to include the band 150-151 GHz in S5.149, and it is deleted from this footnote. Footnotes S5.385 (150-151 GHz band) and S5.555 (148.5-149 GHz band) are no longer needed and are deleted from these bands.

MOD IAP/14/171

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
151.5-155.5	FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY RADIOLOCATION MOD S5.149	

Reasons: The FSS downlink allocation is incompatible with radio astronomy requirements in this band and is relocated elsewhere. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. This band is added to those listed under footnote S5.149. The additional radiolocation allocation compensates for removal from the 126-134 GHz band.

MOD IAP/14/172

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
155.5-156	EARTH EXPLORATION-SATELLITE (passive) ADD S5.AAA FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ADD S5.BBB	

MOD IAP/14/173

156-158	EARTH EXPLORATION-SATELLITE (passive) ADD S5.AAA FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ADD S5.BBB	

MOD IAP/14/174

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
158-~~164~~158.5	EARTH EXPLORATION-SATELLITE (passive) ADD S5.AAA FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ADD S5.BBB	

Reasons: The scientific requirement is for a 3 GHz band centred at 157 GHz for use in conjunction with water vapour observations around 183 GHz. This allocation is only required until 2018 since current planned and operational instruments are already in this band. By 2018, all of these applications will have transitioned to the 148.5-151.5 GHz band. The FSS downlink allocation is incompatible with radio astronomy requirements and is relocated. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. These sub-bands are added to those listed under S5.149. EES operations in the band 155.5-158.5 GHz need to be protected until 1 January 2018. After this date the fixed and mobile services need to coordinate with radio astronomy sites only. The space research (passive) allocation is limited to space-based radio astronomy in this band.

MOD IAP/14/175

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
158.5-164	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth)	

Reasons: Mobile-satellite allocation has been added to partially compensate for the loss of the 134-142 GHz band.

MOD IAP/14/176

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
164-~~168~~167	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340	

Reasons: Passive sensors require only this 3 GHz band from the current 164-168 GHz passive allocation. It is essential to maintain the 164-167 GHz portion of the band passive. The MOD refers to the band limits and addition of the band to footnote S5.340 only, no change (NOC) is proposed to the allocations within this sub-band. This band, along with the band 148.5-151.5 GHz will become the harmonized reference window for passive sensor observations of the 183.31 GHz water vapour line. The band is also used for microwave limb sounding of the 164.38 GHz ClO line. This passive band has been added to those listed under S5.340; the 164-168 GHz band had been omitted from S5.340.

MOD IAP/14/177

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
167-168	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558 ~~RADIO ASTRONOMY~~ ~~SPACE RESEARCH (passive)~~	

MOD IAP/14/178

168-170	FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558	

MOD IAP/14/179

170-174.5	FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558 ~~S5.149 S5.385~~	

MOD IAP/14/180

174.5-~~176.5~~174.8	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED INTER-SATELLITE MOBILE MOD S5.558 ~~SPACE RESEARCH (passive)~~ ~~S5.149 S5.385~~	

Reasons: Passive services do not need the 167-168 GHz band and this band is yielded to displaced active services. Fixed, mobile and inter-satellite services are added to the 167-174.8 GHz band as well as fixed-satellite downlinks to the 167-174.5 GHz band to compensate for deletions in other bands. Passive sensor allocations are deleted from the 174.5-174.8 GHz band to properly adjust the band edge for the 183.3 GHz remote sensing requirement. Footnotes S5.149 and S5.385 are deleted from these bands and are appropriately modified. Footnote S5.558 is added next to mobile allocations in this band and the footnote is modified to include the 167-174.8 GHz band due to sharing with the inter-satellite service.

MOD IAP/14/181

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
174.8-176.5	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.YYY ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~S5.149 S5.385~~	

MOD IAP/14/182

176.5-182	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.YYY ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~S5.149 S5.385~~	

MOD IAP/14/183

182-185	EARTH EXPLORATION-SATELLITE (passive) ~~RADIO ASTRONOMY~~ SPACE RESEARCH (passive) MOD S5.340 S5.563	

MOD IAP/14/184

185-190	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.YYY ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~S5.149 S5.385~~	

MOD IAP/14/185

190-~~200~~191.8	EARTH EXPLORATION-SATELLITE (passive) ~~MOBILE S5.553~~ ~~MOBILE-SATELLITE~~ ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ ~~S5.341 S5.554~~MOD S5.340

Reasons: The band 174.8-191.8 GHz is of crucial importance for passive sensing of the water vapour absorption line whose peak is at 183.31 GHz. Sharing with fixed and mobile services is not practical, so these services are relocated. The inter-satellite service needs to be limited to links between GSO satellites and to a pfd limit as specified in sharing studies. Footnote S5.YYY is added to reflect this requirement. The entire band is deleted from those listed under S5.149, S5.385 (secondary radio astronomy allocation). All applicable footnotes are appropriately modified. Since no terrestrial radio astronomy use of the band 182-185 GHz is possible due to high atmospheric absorption, the radio astronomy allocation is deleted. Active services are moved from the 190-191.8 GHz band to make room for the addition of passive sensor allocations. Footnote S5.554 is deleted from this band, to reflect removal of active services, and modified to reflect this change. S5.341 does not apply to this band and is deleted. Footnote S5.340 has been modified to include this band.

MOD IAP/14/186

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
191.8-200	FIXED INTER-SATELLITE MOBILE MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE S5.341 MOD S5.553 MOD S5.554	

Reasons: Inter-satellite and fixed service allocations were added to compensate for deletions from other bands. Footnotes S5.553 and S5.554 were modified to reflect deletion of terrestrial services from the 190.0-191.8 GHz band, and to include stations in the fixed service, allocated to the 191.8-200 GHz band.

MOD IAP/14/187

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
200-202	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341	

MOD IAP/14/188

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
202-~~217~~209	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (Earth-to-space)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341	

Reasons: This band is the optimum band for microwave limb sounding of water vapour and other atmospheric constituents in the low troposphere. Fixed and mobile services as well as the fixed-satellite uplink in the 202-209 GHz band are all relocated to meet this requirement. Footnote S5.340 is consequentially modified to include this band. A radio astronomy allocation has been added to satisfy the requirement for radio astronomy spectral line and wideband continuum observations.

MOD IAP/14/189

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
209-217	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY MOD S5.149 S5.341	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. This band has been added to those listed under S5.149.

MOD IAP/14/190

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
217-~~231~~226	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ~~S5.340~~ S5.341	

Reasons: Passive sensors do not need this band and the EESS allocation is deleted. Fixed and mobile services and fixed-satellite uplinks are moved to this band from other locations. This band is no longer passive; consequentially it now needs to be listed under footnote S5.149. This band has been removed from footnote S5.340 and footnote S5.340 has been deleted from this band.

MOD IAP/14/191

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
~~217~~226-231	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 ~~S5.341~~	

MOD IAP/14/192

231-~~235~~231.5	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) ~~Radiolocation~~ MOD S5.340	

Reasons: It is essential to maintain the 226-231.5 GHz band passive. The MOD refers to the band limits only; no change (NOC) is proposed to the allocations within this sub-band. Passive sensors require exclusive use of only the 226-231.5 GHz portion of the 217-231 GHz band for microwave limb sounding of atmospheric constituents. In addition, this band contains a 4 GHz reference window for higher frequency water vapour measurements. This band is of vital importance to the radio astronomy service for observations of the 230.5 GHz CO line. Footnote S5.340 is modified to take into account that the 217-226 GHz band is no longer passive, while adding the 231-231.5 GHz band. The fixed and mobile services, as well as the fixed-satellite downlinks, have been deleted from the 231-231.5 GHz portion to allow passive observations in this band.

MOD IAP/14/193

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
231.5-235	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Radiolocation	

Reasons: The only required change in this band is the 500 MHz upward adjustment of the lower band edge (see the previous modification).

MOD IAP/14/194

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
235-238	EARTH EXPLORATION-SATELLITE (passive) FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive)	

Reasons: Passive sensors are limited to microwave limb sounding in the band 235-238 GHz and can share with terrestrial services due to the absorption characteristics of this band. The fixed-satellite downlink is not compatible with the radio astronomy requirement for this band and is reallocated elsewhere. The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide.

MOD IAP/14/195

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
238-241	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE ~~Radiolocation~~	

Reasons: Additional allocations to the radiolocation, radionavigation and radionavigation-satellite services, to compensate for allocation changes in the 150-160 GHz frequency range.

MOD IAP/14/196

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
241-248	RADIOLOCATION RADIO ASTRONOMY Amateur Amateur-satellite S5.138 MOD S5.149	

Reasons: The addition of a radio astronomy allocation and RES RAS satisfies the requirements for radio astronomy spectral line and wideband continuum observations from remote locations worldwide. This band is added to those listed under footnote S5.149. There is no change in sharing between existing services, except for the introduction of the radio astronomy service allocation in band.

MOD IAP/14/197

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
248-250	AMATEUR AMATEUR-SATELLITE Radio astronomy	

Reasons: The radio astronomy service allocation is added on a secondary basis.

MOD IAP/14/198

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
250-252	EARTH EXPLORATION-SATELLITE (passive) SPACE RESEARCH (passive) RADIO ASTRONOMY ~~S5.149 S5.555~~MOD S5.340	

Reasons: Microwave limb sounding of nitrous oxide near 251 GHz defines the passive-sensing requirement for this band. Radio astronomy is added to the other passive services. The addition of another passive service does not alter sharing scenario. Footnotes S5.149 and S5.555 are consequentially deleted and band lists in these footnotes are appropriately modified. Footnote S5.340 is added to reflect the passive nature of the band.

MOD IAP/14/199

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
252-265	FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) RADIONAVIGATION RADIONAVIGATION-SATELLITE RADIO ASTRONOMY MOD S5.149 ~~S5.385~~ MOD S5.553 S5.554 ~~S5.555 S5.564~~	

Reasons: The fixed service is relocated to this band due to other allocation actions in other bands. The addition of a radio astronomy allocation, along with RES RAS, satisfies requirements for radio astronomy spectral line (current secondary allocation to radio astronomy at 257.5-258 GHz deleted) and wideband continuum observations from remote locations worldwide. The directional indicator added to mobile-satellite service allocation, which is paired with the allocation in the 190-200 GHz band. Atmospheric absorption in the 252-265 GHz band is relatively constant and somewhat higher than in the paired downlink band. This entire band is added to those listed under footnote S5.149, and the band is deleted from S5.385 and S5.555. Footnotes S5.385 and S5.555 have been modified to reflect the changes. Footnote S5.564 is no longer needed in this band due to the worldwide nature of the radio astronomy allocation.

MOD IAP/14/200

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
265-275	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY MOD S5.149	

MOD IAP/14/201

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
275-~~400~~1 000	(Not allocated) MOD S5.565	

Reasons: The change of the upper limit for applicability of footnote MOD S5.565 is to account for various passive service needs above 275 GHz that have been identified by administrations. Many lines and windows required for radio astronomy observations and passive remote sensing of the Earth exist above 275 GHz.

MOD IAP/14/202

S5.149 In making assignments to stations of other services to which the bands:

13 360-13 410 kHz,	22.21-22.5 GHz,	111.8-114.25 GHz,
25 550-25 670 kHz,	22.81-22.86 GHz*,	140.69-140.98 GHz*,
37.5-38.25 MHz,	23.07-23.12 GHz*,	141-148.5 GHz,
73-74.6 MHz in Regions 1 and 3,	31.2-31.3 GHz,	148.5-151.5 GHz,
150.05-153 MHz in Region 1,	31.5-31.8 GHz in Regions 1 and 3,	~~144.68-144.98 GHz*,~~
322-328.6 MHz*,	36.43-36.5 GHz*,	~~145.45-145.75 GHz*,~~
406.1-410 MHz,	42.5-43.5 GHz,	~~146.82-147.12 GHz*,~~
608-614 MHz in Regions 1 and 3,	42.77-42.87 GHz*,	~~150-151 GHz*,~~
1 330-1 400 MHz*,	43.07-43.17 GHz*,	174.42-175.02 GHz*,
1 610.6-1 613.8 MHz*,	43.37-43.47 GHz*,	177-177.4 GHz*,
1 660-1 670 MHz,	48.94-49.04 GHz*,	178.2-178.6 GHz*,
1 718.8-1 722.2 MHz*,	~~72.77-72.91 GHz*,~~	181-181.46 GHz*,
2 655-2 690 MHz,	76.5-81.5 GHz,	~~186.2-186.6 GHz*,~~
3 260-3 267 MHz*,	81.5-84.5 GHz,	290-226 GHz,
3 332-3 339 MHz*,	84.5-86 GHz,	~~250-251 GHz*,~~
3 345.8-3 352.5 MHz*,	~~93.07-93.27 GHz*,~~	~~257.5-258 GHz*,~~
4 825-4 835 MHz*,	92-94 GHz,	~~261-265 GHz,~~
4 950-4 990 MHz,	94.1-95 GHz,	~~262.24-262.76 GHz*,~~
4 990-5 000 MHz,	95-100 GHz,	252-265 GHz,
6 650-6 675.2 MHz*,	~~97.88-98.08 GHz*,~~	265-275 GHz,
10.6-10.68 GHz,	100-102 GHz,	~~265.64-266.16 GHz*,~~
14.47-14.5 GHz*,	102-105 GHz,	~~267.34-267.86 GHz*,~~
22.01-22.21 GHz*,	105-109.5 GHz,	~~271.74-272.26 GHz*~~

are allocated (* indicates radio astronomy use for spectral line observations), administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference. Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. **S4.5** and **S4.6** and Article **S29**).

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD IAP/14/203

S5.340 All emissions are prohibited in the following bands:

1 400-1 427 MHz,	
2 690-2 700 MHz,	except those provided for by Nos. S5.421 and S5.422,
10.68-10.7 GHz,	except those provided for by No. S5.483,
15.35-15.4 GHz,	except those provided for by No. S5.511,
23.6-24 GHz,	
31.3-31.5 GHz,	
31.5-31.8 GHz,	in Region 2,
48.94-49.04 GHz,	from airborne stations,

50.2-50.4 GHz[2], except those provided for by No. S5.555A,

52.6-54.25 GHz,

86-92 GHz,

~~105-116 GHz,~~

109.5-111.8 GHz,

114.25-116 GHz,

~~140.69-140.98 GHz, from airborne stations and from space stations in the space-to-Earth direction,~~

148.5-151.5 GHz,

164-167 GHz,

182-185 GHz, except those provided for by No. **S5.563**,

190-191.8 GHz,

200-202 GHz

202-209 GHz

~~217-231 GHz.~~

226-231.5 GHz,

250-252 GHz.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

NOC IAP/14/204

S5.341 In the bands 1 400-1 727 MHz, 101-120 GHz and 197-220 GHz, passive research is being conducted by some countries in a programme for the search for intentional emissions of extraterrestrial origin.

Reasons: This informational footnote is still accurate.

MOD IAP/14/205

S5.385 *Additional allocation:* the band~~s~~ 1 718.8-1 722.2 MHz~~, 150-151 GHz, 174.42-175.02 GHz, 177-177.4 GHz, 178.2-178.6 GHz, 181-181.46 GHz, 186.2-186.6 GHz and 257.5-258 GHz are~~ is also allocated to the radio astronomy service on a secondary basis for spectral line observations.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD IAP/14/206

S5.553 In the bands 43.5-47 GHz, 66-71 GHz, 95-100 GHz, ~~134-142 GHz, 190~~191.8-200 GHz and 252-265 GHz, stations in the fixed and land mobile service may be operated subject to not causing harmful interference to the space radiocommunication services to which these bands are allocated (see No. **S5.43**).

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD IAP/14/207

S5.554 In the bands 43.5-47 GHz, 66-71 GHz, 95-100 GHz, ~~134-142~~126-134 GHz, 190-200 GHz and 252-265 GHz, satellite links connecting land stations at specified fixed points are also authorized when used in conjunction with the mobile-satellite service or the radionavigation-satellite service.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD IAP/14/208

S5.555 *Additional allocation:* the band~~s~~ 48.94-49.04 GHz~~, 97.88-98.08 GHz, 140.69-140.98 GHz, 144.68-144.98 GHz, 145.45-145.75 GHz, 146.82-147.12 GHz, 250-251 GHz and 262.24-262.76 GHz are~~ is also allocated to the radio astronomy service on a primary basis.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD IAP/14/209

S5.556 In the bands 51.4-54.25 GHz, 58.2-59 GHz~~,~~ and 64-65 GHz, ~~72.77-72.91 GHz and 93.07-93.27 GHz,~~ radio astronomy observations may be carried out under national arrangements.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD IAP/14/210

S5.558 In the bands 55.78-58.2 GHz, 59-64 GHz, 66-71 GHz, ~~116-134 GHz,~~125-126 GHz, ~~170-182~~167-174.8 GHz and 185-190 GHz, stations in the aeronautical mobile service may be operated subject to not causing harmful interference to the inter-satellite service (see No. **S5.43**).

Reasons: The changes to this footnote are consequential to the changes made to the related allocation.

MOD IAP/14/211

S5.559 In the band~~s~~ 59-64 GHz ~~and 126-134 GHz,~~ airborne radars in the radiolocation service may be operated subject to not causing harmful interference to the inter-satellite service (see No. **S5.43**).

Reasons: The changes to this footnote are consequential to the changes made to the related allocation. The radiolocation and inter-satellite services are no longer co-allocated in this spectral region.

NOC IAP/14/212

S5.560 In the band 78-79 GHz radars located on space stations may be operated on a primary basis in the Earth exploration-satellite service and in the space research service.

Reasons: No change is required to this footnote.

MOD IAP/14/213

S5.561 In the band ~~84-86~~74-76 GHz, stations in the fixed~~,~~ and mobile ~~and broadcasting~~ services shall not cause harmful interference to broadcasting-satellite stations operating in accordance with the decisions of the appropriate frequency assignment planning conference for the broadcasting-satellite service.

Reasons: The broadcasting-satellite allocation has been transferred to the 74-76 GHz band and the broadcasting and broadcasting-satellite services are no longer co-allocated.

NOC IAP/14/214

S5.562 The use of the band 94-94.1 GHz by the Earth exploration-satellite (active) and space research (active) services is limited to spaceborne cloud radars.

Reasons: This footnote was the result of allocation decisions made at WRC-97 and no change is needed.

SUP IAP/14/215

S5.564

Reasons: The radio astronomy allocation is now worldwide in the 261-265 GHz band, therefore a country footnote is no longer needed.

MOD IAP/14/216

S5.565 The frequency band 275-~~400~~1 000 GHz may be used by administrations for experimentation with, and development of, various active and passive services. In this band a need has been identified for the following spectral line measurements for passive services:

- radio astronomy service: ~~278-280 GHz and 343-348 GHz~~275-323 GHz, 327-371 GHz, 388-434 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz and 795-909 GHz;
- Earth exploration-satellite service (passive) and space research service (passive): 275-277 GHz, ~~300~~294-30~~2~~6 GHz, 3~~24~~16-3~~26~~34 GHz, 34~~5~~2-34~~7~~9 GHz, 363-365 GHz, ~~and~~ 37~~9~~1-38~~1~~9 GHz, 416-434 GHz, 442-444 GHz 496-506 GHz, 546-568 GHz, 624-629 GHz, 634-654 GHz, 659-661 GHz, 684-692 GHz, 730-732 GHz, 851-853 GHz and 951-956 GHz.

Future research in this largely unexplored spectral region may yield additional spectral lines and continuum bands of interest to the passive services. Administrations are urged to take all practicable steps to protect these passive services from harmful interference until the next competent world radiocommunication conference.

Reasons: These additional bands have been identified by various administrations as bands that will also be used for radio astronomy observations and spaceborne passive remote sensing.

ADD IAP/14/217

S5.AAA In the band 155.5-158.5 GHz, the allocation to the Earth exploration-satellite (passive) and space research (passive) services shall terminate on 1 January 2018.

Reasons: This allocation will not be needed by passive sensors after the termination date. By the termination date, all passive sensors will have transitioned to the 148.5-151.5 GHz band.

ADD IAP/14/218

S5.BBB The date of entry for the allocation to the fixed and mobile services in the band 155.5-158.5 GHz shall be 1 January 2018.

Reasons: Passive sensors require the use of this band until 1 January 2018.

ADD IAP/14/219

S5.CCC Use of this allocation is limited to space-based radio astronomy only.

Reasons: This band is a likely candidate for a future space-based radio astronomy mission. No other space research use is contemplated.

ADD IAP/14/220

S5.DDD The 81-81.5 GHz band is also allocated to the amateur and amateur-satellite services on a secondary basis.

Reasons: Amateur allocation.

ADD IAP/14/221

S5.EEE The band 75.5-76 GHz is also allocated to the amateur and amateur-satellite services on a primary basis until the year 200[6].

Reasons: Amateur allocation.

ADD IAP/14/222

S5.YYY Use of the band 174.5-182 GHz by the inter-satellite service is limited to satellites in the geostationary-satellite orbit. The single-entry power flux-density, at all altitudes from 0 km to 1 000 km above the Earth's surface and in the vicinity of all geostationary orbital positions occupied by passive sensors, produced by a station in the inter-satellite service, for all conditions and for all methods of modulation, shall not exceed –144 dBW/m^2/MHz for all angles of arrival.

Reasons: This footnote is required to protect passive sensors operating in this band.

ADD IAP/14/223

S5.XXX Use of the band 116-123 GHz by the inter-satellite service is limited to satellites in the geostationary-satellite orbit. The single-entry power flux-density, at all altitudes from 0 km to 1 000 km above the Earth's surface and in the vicinity of all geostationary orbital positions occupied by passive sensors, produced by a station in the inter-satellite service, for all conditions and for all methods of modulation, shall not exceed –148 dBW/m^2/MHz for all angles of arrival.

Reasons: This footnote is required to protect passive sensors operating in this band.

ADD IAP/14/224

RESOLUTION RAS (WRC-2000)

Use of the bands [ ] by the radio astronomy service

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that a large number of spectral lines of astrophysical interest above 71 GHz provide unique information about cosmic processes, such as the chemistry of the interstellar medium and the formation of stars and planets, and that this information cannot be obtained from any other source;

b) that Doppler shifted lines, which are also of great interest for astronomical studies, are found far removed from the rest frequency of some spectral lines and that highly Doppler shifted lines may offer the only means to obtain information about the very early Universe and the formation of galaxies;

c) that mm-wave radio astronomy receivers are designed to cover substantial portions of the atmospheric windows above 70 GHz to take advantage of the information contained in spectral lines, as well as in continuum radiation;

d) that several administrations operate mm-wave radio astronomy observatories and that some are building or are planning to build a limited number of large new facilities to exploit the most advanced technologies; and that these facilities are intended to serve the needs of the worldwide scientific community;

e) that mm-wave observatories must be located on high mountain tops or plateaus to take advantage of the driest possible atmospheric conditions necessary to obtain high-quality observations; and require substantial investments on behalf of the scientific communities concerned, and that therefore their number will remain low,

noting

that sharing between the radio astronomy service and other terrestrial services operating in bands above 71 GHz is facilitated by the natural attenuation provided by atmospheric gases, and that it can be further facilitated by adequate geographic separation,

urges

administrations to establish coordination zones around mm-wave radio astronomy sites operating in bands above 71 GHz. Coordination zone radii should be determined following the procedure outlined in Recommendation ITU-R RA.1031-1, separately for ground-based transmitters, airborne transmitters and transmitters that may be located on high altitude platforms (HAPS),

resolves

1 that in the frequency bands referred to in this Resolution, co-primary status of the radio astronomy service shall be recognized within coordination zones established by administrations. No coordination requirements should be imposed upon terrestrial services outside established coordination zones;

2 that in the bands referred to in this Resolution, co-primary services operating stations within a coordination zone should coordinate their operations with affected radio astronomy stations within five years of the date of notification of the radio astronomy site to the Radiocommunication Bureau.

Annex 1 lists the radio astronomy sites that operate, or plan to operate in the bands referred to in this Resolution as of [8 June 2000]. Observatories that operate only up to 92 GHz are identified with *** under the SITE column.

ADD IAP/14/225

ANNEX 1

List of radio astronomical observatories operating in bands above 71 GHz

REGION 1

Country	Site	Long. o	'	"	Lat. o	'	"	Alt. (m)	Diam. (m)	Remarks
Finland	Metsahovi	24	23	17	60	13	04	61	13.7	
France	Bordeaux	–00	31	37	44	50	10	73	2.5	
	Plateau de Bure[1]	05	54	26	44	38	01	2 552	15	
Germany	Effelsberg	06	53	00	50	31	32	369	100	
Italy	Medicina***	11	38	43	44	31	14	44	32	EVLBI
	Noto***	15	03	00	36	31	48			EVLBI
	Sardinia	–09	14	40	39	29	50	585	64	
Russia	Zelenchukskaya	41	26	30	43	39	12	2 100		
Spain	Pico Veleta	–03	23	34	37	03	58	2 870	30	
	Robledo	–04	14	57	40	25	38	761		
	Yepes	–03	06	00	40	31	30	931		
Turkey	Gebse-Kocaeli	29	26	52	40	47	06	200		

REGION 2

Country	Site	Long. o	'	"	Lat. o	'	"	Alt. (m)	Diam. (m)	Remarks
Argentina	El Leoncito (SJ)	69	18	07	31	47	57	2 552	1.5	Solar telescope Sub mm
Chile	San Pedro de Atacama	67	44	00	–23	02		5 000		MMA (planned)[2]
	La Silla	70	44	04	–29	15	34	2 300	15	
	Las Campanas	70	41	10	–29	01	43	2 440	4	SEST
	Pampa La Bola	67	42	00	–22	58	00	4 800		LMSA (planned)[3]
Mexico	Sierra Negra	97	18	00	18	59	00	4 500	50	Large Millimeter Telescope (LMT-under construction)

1 The Observatoire de Plateau de Bure interferometer consists of three antennas of 15 m diameter.

2 The US MMA (MilliMeter Array) will consist of 40 antennas of 8 m diameter, on a ring configuration. The diameter of the ring will be capable of variation, ranging from 80 m to 10 km across.

3 The Japanese LMSA (Large Southern Millimeter Array) will consist of 50 antennas of 10 m diameter.

Country	**Site**	**Long.** o	'	"	**Lat.** o	'	"	**Alt. (m)**	**Diam. (m)**	**Remarks**
USA	Green Bank, WVA***	79	50	24	38	25	59	946	100	NRAO-GBT
	Socorro, NM***	107	37	06	34	04	44	2 155	25	NRAO-VLA[4]
	……………………	…..	…	…	…	…	…	…….	…….	……………………
	St. Croix, VI***	64	35	01	17	45	24	46	25	NRAO VLBA[5]
	Hancock, NH***	71	59	12	42	56	01	340	25	NRAO VLBA
	North Liberty, IO***	91	34	27	41	46	17	272	25	NRAO VLBA
	Ft. Davis, TX***	103	56	41	30	38	06	1 646	25	NRAO VLBA
	Los Alamos, NM***	106	14	44	35	46	31	1 997	25	NRAO VLBA
	Pie Town, NM***	108	07	09	34	18	04	2 402	25	NRAO VLBA
	Kitt Peak, AZ***	111	36	45	31	57	23	1 946	25	NRAO VLBA
	Owens Valley, CA***	118	16	37	37	13	54	1 237	25	NRAO VLBA
	Brewster, WA***	119	41	00	48	07	52	286	25	NRAO VLBA
	Mauna Kea, HI***	155	27	19	19	48	05	3 751	25	NRAO VLBA
	………………………	…	…	…	…..	…	…	…….	………	……………………
	Kitt Peak, AZ	111	36	50	31	57	10	1 930	12	NRAO 12 m
	Amherst, MA	72	20	40	42	23	33	314	13.7	FCRAO (Five Colleges Obs.)
	Owens Valley, CA	118	17	36	37	13	54	1 236	10.4	Caltech[6]
	Hat Creek, CA	121	28	24	40	49	04	1 042	6.1	BIMA[7]
	Westford, MA	71	29	19	42	37	23	122	36	Haystack Obs.
	Mauna Kea, HI	155	28	20	19	49	33	4 000	10.4	J.C. Maxwell Tel. CSO

[4] The VLA consists of 27 antennas of 25 m diameter, arranged in a Y pattern up to 36 km across.

[5] The VLBA consists of ten antennas of 25 m diameter, distributed across the continental United States, Hawaii and the US Virgin Islands.

[6] The Caltech interferometer consists of three antennas of 10.4 m diameter.

[7] The BIMA (Berkeley-Illinois-Maryland Array) currently consists of nine antennas of 6.1 m diameter. The final configuration will consist of 11 antennas.

REGION 3

Country	**Site**	**Long.** o	'	"	**Lat.** o	'	"	**Alt. (m)**	**Diam. (m)**	**Remarks**
Australia	Parkes	148	15	44	–33	00	00	60	64	
	Mopra	149	05	58	–31	16	04			
	Narrabri, NSW	149	32	56	–30	59	52			Austr. Tel. Compact Array
China	Delingha	97	43	75	37	22	43	3 200	13.7	
Japan	Nobeyama[8]	138	28	32	35	56	29	1 350	45	
	Kashima	140	39	46	35	57	15	50	34	Comm. Res. Lab.
	Mizusawa	141	08	09	39	08	00	87	10	
	Nagoya	136	58	24	35	08	55	70	4	
	Mt. Fuji	138	45	06	35	21	30	3 776	1.2	Only >300 GHz
	Kagoshima	130	26	32	31	44	52	520	20	VERA (planned)
Korea	Taejon	127	22	18	36	23	54	120	13.7	

Other

Country	**Site**	**Long.** o	'	"	**Lat.** o	'	"	**Alt. (m)**	**Diam. (m)**	**Remarks**
	Antarctica				–90	00	00			

Reasons: RES RAS sets out the details of the limitation on the radio astronomy service. Annex 1 lists the observatories that operate in the radio astronomy service in bands shared with terrestrial services above 71 GHz at the time of WRC-2000.

[8] The Nobeyama site includes a 45 m diameter telescope, an interferometer that consists of six antennas of 10 m diameter, and a 60 cm diameter submillimeter telescope.

ADD IAP/14/226

RESOLUTION XXX (WRC-2000)

Consideration by a future world radiocommunication conference of issues dealing with sharing between passive and active services above 71 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the changes made to the Table of Frequency Allocations by **WRC-2000** in bands above 71 GHz were based on the requirements known at the time of the Conference;

b) that the passive service spectrum requirements above 71 GHz are based on physical phenomenon and therefore are well known. These requirements are reflected in the changes made to the Table of Frequency Allocations by **WRC-2000**;

c) that several bands above 71 GHz are already used by EESS (passive) and SR (passive) because they are unique bands to measure specific atmospheric parameters;

d) that currently there is only limited knowledge of requirements and implementation plans for the active services to operate in bands above 71 GHz;

e) that in the past, technological developments have led to viable communication systems operating at increasingly higher frequencies and this can be expected to continue so as to make communication technology available in the future for the frequency bands above 71 GHz;

f) that in the future, there should be accommodation of alternative spectrum needs of the active and passive services when the new technologies become available;

g) that, following the revisions to the Table of Frequency Allocations by **WRC-2000**, sharing studies may be required for services in some bands above 71 GHz;

h) that interference criteria for passive sensors have been developed and are given in Recommendation ITU-R SA.1029-1;

i) that sharing criteria for active and passive services in bands above 71 GHz have not yet fully developed within ITU-R;

j) that, in order to ensure the protection of passive services above 71 GHz, **WRC-2000** avoided co-allocations of active and passive services to prevent potential sharing problems,

recognizing

that to the extent practicable, the burden of sharing among active and passive services should be equitably distributed amongst the allocated services,

invites ITU-R

1 to continue its studies to determine if sharing is possible between active and passive services in the bands above 71 GHz;

2 to take into account the principles of burden sharing to the extent practicable in their studies;

3 to complete the necessary studies, as soon as the technical characteristics of the active services in these bands are known;

4 to develop Recommendations specifying sharing criteria for those bands where sharing is feasible,

resolves

that a future competent conference should consider the results of ITU-R studies with a view to revise as appropriate the Radio Regulations in order to accommodate the emerging requirements of the active services taking into account the requirements of the passive services, in bands above 71 GHz,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

ADD IAP/14/227

RESOLUTION YYY (WRC-2000)

Consideration by a future competent world radiocommunication conference of issues dealing with sharing between active services above 71 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that **WRC-2000** made changes to the Table of Frequency Allocations above 71 GHz, following consideration of science service issues;

b) that there are several co-primary active services in some bands above 71 GHz in the Table of Frequency Allocations as revised by **WRC-2000**;

c) that there is limited knowledge of characteristics of active services that may be developed to operate in bands above 71 GHz;

d) that sharing criteria for sharing between active services in bands above 71 GHz have not yet been fully developed within ITU-R;

e) that sharing between multiple co-primary active services may hinder the development of each active service in bands above 71 GHz;

f) that the technology for some active services may be commercially available earlier than for some other active services;

g) that adequate spectrum should be available for the active services for which the technology is available at a later time,

noting

that sharing criteria need to be developed, to be used by a future conference, for determining to what extent sharing between multiple co-primary active services is possible in each of the bands,

resolves

1 that appropriate measures should be taken to fulfil the spectrum requirements for active services for which the technology is commercially available at a later time;

2 that sharing criteria be developed for co-primary active services in bands above 71 GHz;

3 that the sharing criteria developed should form a basis for a review of active service allocations above 71 GHz at a future conference, if necessary,

requests ITU-R

to complete the necessary studies with a view to presenting, at the appropriate time, the technical information likely to be required as a basis for the work of a future competent conference,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

Reasons: There is no consensus whether sharing between the passive services and the active services is feasible in many of the bands above 71 GHz. This is because there is a lack of information available on these active services in this frequency range. New Resolution XXX (WRC-2000) has been added which calls for ITU-R studies on sharing between active and passive services in bands above 71 GHz. Similarly, sharing conditions between many of the relocated active services above 71 GHz are not known and need to be developed and Resolution YYY (WRC-2000) calls for studies that can develop sharing criteria and should form a basis for a review of active service allocations above 71 GHz at a future conference, if necessary.

ADD IAP/14/228

S4.XXX Regarding frequency bands above 71 GHz, administrations should consider Resolutions **XXX (WRC-2000)** and **YYY (WRC-2000)** in the development of domestic policies and regulation which would open specific bands for use by an allocated radio service. Administrations should note the possibility of changes to Article **S5** to accommodate emerging requirements of active services, as indicated in Resolutions **XXX (WRC-2000)** and **YYY (WRC-2000)**.

Reasons: Article S4 provides guidance to administrations on the assignments and use of frequencies given in the Table of Frequency Allocations in Article S5. Additional footnote S4.XXX will draw the attention of administrations to Resolutions XXX (WRC-2000) and YYY (WRC-2000) regarding frequency allocations above 71 GHz.

WRC-2000 agenda item 1.19 - to consider the report of the inter-conference representative group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system

Ensuring the protection of other radiocommunication services and Region 2 BSS against interference from any revisions to the Regions 1 and 3 Plan, and not requiring these services to provide greater protection to Regions 1 and 3 BSS than at present

Background information

WRC-97 updated the Regions 1 and 3 BSS and feeder-link Plans, including the relevant technical criteria, and provided assignments for all new countries. However, there was general dissatisfaction with the number of channels assigned (five for Region 1 and four for Region 3). The new replanning is intended to provide for each Region 1 and 3 country an amount of spectrum that permits the economical development of BSS systems.

To prepare for this, WRC-97 adopted Resolution 532 which created the IRG (Inter-conference Representative Group) and the associated GTE (Group of Technical Experts). The same Resolution specified in Annex 1 the principles that will govern the studies of the IRG and GTE. The IRG and GTE studied the feasibility of increasing to around ten the number of 27-MHz channels per country provided in the WRC-97 Plan for Regions 1 and 3. Under agenda item 1.19 as originally adopted at WRC-97, WRC-99 (now WRC-2000) would then use the results of the IRG/GTE studies to decide whether or not a subsequent WRC should revise the WRC-97 Plan.

However, the 1998 meeting of ITU Council amended agenda item 1.19 to its present form. The goal of ”around ten channels” was replaced by “an amount of spectrum that permits the development of an economical BSS system.” And the purpose of the IRG/GTE studies was changed from determining the feasibility of the goal, to providing the basis for a subsequent conference to construct a new plan. Nonetheless, the IRG/GTE planning studies are still constrained to observe the eight “principles” set forth in Annex 1 to Resolution 532, including those intended to ensure compatibility with other services and to preserve the integrity of the Region 2 Plan.

These guiding principles (see Annex 1 to Resolution 532) include the following:

“7 Ensure that the integrity of the Region 2 Plan and its associated provisions is preserved, by providing the same protection to the assignments contained in those Plans as is now received under the relevant provisions of the Radio Regulations, and by not requiring more protection from assignments in the Region 2 Plan than that currently provided under the Radio Regulations.

8 Ensure compatibility between the BSS in Regions 1 and 3 and services having allocations in the planned bands in all three Regions.”

At the final IRG meeting a report was prepared on the results of the technical, planning feasibility and regulatory studies. This report will be submitted by the Director, BR, to WRC-2000.

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CITEL supports the objective of increasing the capacity assigned to each country of Regions 1 and 3 sufficiently to permit the economic development of BSS systems (to around ten channels). Any replanning studies, or actual replanning, must protect FSS, terrestrial services and Region 2 BSS in accordance with Principles 7 and 8 of Resolution 532 (WRC-97), Annex 1. Further, FSS, terrestrial services and Region 2 BSS must not be required to provide greater protection to the Regions 1 and 3 Plan than at present. This leads to the following:

a) Assignments in the Region 2 BSS Plan (including Article 4 modifications) shall be protected to the level received under the current provisions of the Radio Regulations. Also, such assignments shall not be required to provide more protection than is provided under the current provisions.

b) FSS and terrestrial systems, for which appropriate coordination procedures have been initiated, should be protected from revisions to the Regions 1 and 3 Plans to the level received under the current provisions of the Radio Regulations. Also such systems should not be required to provide more protection than is provided under the current provisions.

c) As part of this protection, the preservation of the orbital arc 37WL to 10EL, as delineated in Annex 7 of Appendix S30, and ensuring Region 2 FSS access to it, is essential (see separate IAP on this subject for details).

d) *concerning a)* and *b),* BR must determine which FSS, terrestrial and Region 2 BSS systems are affected by revisions of the Regions 1 and 3 Plans. For any such assignments in the Regions 1 and 3 Plans, a note in the revised Plan should specify that before implementation, the agreement of the affected administration must be secured. Similarly for any Regions 1 and 3 assignment in the revised Plan that might be potentially affected by an FSS, terrestrial or Region 2 BSS system, a note should be added to the Regions 1 and 3 Plan assignment specifying that it cannot seek protection from the potentially “affecting” system.

Reasons: Any revision of the Regions 1 and 3 Plans, or replanning studies, must protect other services and Region 2 BSS in accordance with the current criteria of Appendices S30 and S30A, and must not introduce additional constraints upon those services, in accordance with Principles 7 and 8 of Annex 1 to Resolution 532 (WRC-97). Systems that have initiated the coordination procedure should be protected by any revisions of the Regions 1 and 3 Plans. Similarly, in the other direction, systems that have initiated the coordination procedure should not have to protect new assignments in the Regions 1 and 3 Plans. As envisioned by Principles 7 and 8 of Resolution 532, these other services that are currently undergoing coordination under the Radio Regulations should not be subject to new, retroactive requirements.

WRC-2000 agenda item 1.19*bis* - in accordance with Article S14, to consider objections expressed by administrations with respect to the Radio Regulations Board's Rules of Procedure relating to the application of RR 2674/S23.13 in order for the Bureau to modify its findings in accordance with the conclusions of the Conference

Background information

No. S23.13 (RR 2674) states that, "in devising the characteristics of a space station in the broadcasting-satellite service, all technical means available shall be used to reduce, to the maximum, the radiation over the territory of other countries unless an agreement has been previously reached with such countries." No. S23.13 (RR 2674) was adopted at WARC-71. It was intended as a statement of good engineering practice to reduce BSS interference with the terrestrial services outside of the intended service area.

At WRC-95, however, some countries sought to have the interpretation of No. S23.13 (RR 2674) revised to require, as a condition for registration, the approval of other countries within the service area of a BSS system proposed as a plan modification. After thorough debate, WRC-95 instructed the RRB to revise its Rules of Procedures to reflect the results of its debate. The decision reached by WRC-95 reflected a difficult compromise on the parts of all parties involved. The RRB made the revisions, but further concerns were raised at WRC-97. These concerns led WRC-97 to adopt Resolution 536 which resolves that: "in addition to observing No. S23.13/2674, and before providing satellite broadcasting services to other administrations, administrations originating the services should obtain the agreement of those other administrations."

Still dissatisfied after a review of the RRB Rules for RR S23.13 under the "review of finding" procedures of Article S14, the concerned countries persuaded the 1998 meeting of ITU Council to adopt new agenda item 1.19*bis*.

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Therefore, CITEL is of the view that there is no need to repeat the work and discussion of WRC-95 and WRC-97, and that Resolution 536 (WRC-97) and RR S23.13 are sufficient. CITEL proposes that WRC-2000 not revise the present Rule of Procedure for RR S23.13/2674 to apply it retroactively, i.e. to BSS filings (under Article 4 of Appendix S30 or under Resolution 33 (Rev.WRC-97) or under Article S9) made prior to 18 November 1995. CITEL also supports the existing separation of Article 4 of Appendix S30 and the Rule of Procedure for RR S23.13/2674.

Reasons: Agenda item 1.19*bis* has the effect of reopening an issue that was resolved after much discussion first at WRC-95, and then at WRC-97 by the adoption of Resolution 536.

WRC-2000 agenda item 1.20 - to consider the issues related to the application of Nos. S9.8, S9.9 and S9.17 and the corresponding parts of Appendix S5 with respect to Appendices S30 and S30A, with a view to possible deletion of Articles 6 and 7 of Appendices S30 and S30A, also taking into consideration Recommendation 35 (WRC-95)

pfd limits in Annex 1 to Appendix S30 (Sections 5 *b)* and 5 *c)*)

Background information

Annex 1 to Appendix S30 of the Radio Regulations specifies limits for determining whether a service is affected by a proposed modification to the BSS Plan (i.e. when it is necessary to seek the agreement of any other administration). Section 5 of Annex 1 specifies limits to the change in the pfd to protect the terrestrial services of administrations in Regions 1 and 3 from modifications to the Region 2 Plan. In particular, Section 5 *c)* specifies the pfd limits for administrations in Region 1 east of longitude 30° E. Further, through Section 8 *a)*, the pfd limits in Section 5 *b)* of Annex 1 apply to protect terrestrial services in Regions 1 and 3 from modifications to the Regions 1 and 3 BSS Plan.

This pfd limit is very stringent at low angles of elevation. For example, in order to meet this pfd limit the BSS spacecraft power must be significantly lower in remote areas of a Region as compared to other areas in the centre of the Region. As a result, the provision of BSS service to these areas requires larger BSS receive dishes, in some cases as large as 2.4 m.

A relaxation in the pfd limit in Section 5 *c)* of Annex 1 of Appendix S30, as proposed below, would allow the use of 60 cm BSS receive dishes in these areas for BSS service. ITU-R studied possible modifications to the limits in Sections 5 *b)* and 5 *c)* of Annex 1. Section 5.2.3.5 of the CPM Report contains a proposed change to these limits. Consistent with the CPM Report, the following changes to Section 5 of Annex 1 of Appendix S30 are proposed. As a result of these modifications to Sections 5 *b)* and 5 *c)*, Table 3 of Article 10 of Appendix S30 should be reviewed and revised appropriately.

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APPENDIX S30

ANNEX 1

5 Limits to the change in the power flux-density to protect the terrestrial services of administrations in Regions 1 and 3[16]

With respect to § 4.3.3.4 of Article 4, an administration in Region 1 or 3 shall be considered as being affected if the proposed modification to the Region 2 Plan would result in the following power flux-density limits being exceeded:

a) in the frequency band 12.2-12.7 GHz for all the territories of administrations in Regions 1[17] and 3 and for any arrival angle γ:

–125 dB(W/m^2/4 kHz) for broadcasting-satellite space stations using circular polarization;

[16] See § 3.18 of Annex 5.

[17] In the band 12.5-12.7 GHz in Region 1, these limits are applicable only to the territory of administrations mentioned in Nos. **S5.494** and **S5.496**.

–128 dB(W/m^2/4 kHz) for broadcasting-satellite space stations using linear polarization;

b) in the frequency band 12.2-12.~~5~~7 GHz for territories of administrations in Regions 1[17] and 3 ~~and those in the western part of Region 1, west of longitude 30° E~~[18]:

–148~~132~~ dB(W/m^2/~~5 M~~4 kHz) for $0° \le \gamma < $ ~~10~~5°;

–~~132~~148 + 0.5~~4.2~~ (γ – ~~10~~5) dB(W/m^2/~~5 M~~4 kHz) for ~~10~~5° $\le \gamma <$ ~~15~~25°;

–138~~111~~ dB(W/m^2/~~5 M~~4 kHz) for ~~15~~25° $\le \gamma < 90°$;

~~*c)* in the frequency band 12.2-12.7 GHz for territories of administrations in Region 1[17], east of longitude 30° E:~~

~~–134 dB(W/m^2/5 MHz) for $\gamma = 0°$;~~

~~–134 + 4.6975 γ^2 dB(W/m^2/5 MHz) for $0° < \gamma \le 0.8°$;~~

~~–128.5 + 25 log γ dB(W/m^2/5 MHz) for $\gamma > 0.8°$;~~

~~d~~c) in the frequency band 12.5-12.7 GHz for all the territories of administrations of Regions 1[17] and 3:

–148 dB(W/m^2/4 kHz) for $\gamma = 0°$;

–148 + 4.6975 γ^2 dB(W/m^2/4 kHz) for $0° < \gamma \le 0.8°$;

–142.5 + 25 log γ dB(W/m^2/4 kHz) for $\gamma > 0.8°$;

where γ is the angle of arrival of the incident wave above the horizontal plane, in degrees.

Reasons: The proposed modification to the pfd limit in Section 5 *c)* of Annex 1 of Appendix S30 would allow the use of much smaller BSS receive earth station antennas, for instance, on the order 60 cm diameter, in these areas for BSS service. This proposal is consistent with the CPM Report.

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[17] In the band 12.5-12.7 GHz in Region 1, these limits are applicable only to the territory of administrations mentioned in Nos. **S5.494** and **S5.496**.

[18] See Resolution **34**.

WRC-2000 agenda item 2 - to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations in accordance with Resolution 28 (WRC-95); and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution 27 (Rev.WRC-97)

Proposals to modify Resolution 27 (Rev.WRC-97) and Resolution 28 (WRC-95)

Background information

Certain provisions of the Radio Regulations make specific reference to ITU-R Recommendations. As the ITU-R Recommendations are updated, it is necessary to determine if such references should be continued, suppressed, or updated citing the revised version of the applicable ITU-R Recommendation.

Although the principle of Incorporation by Reference is widely supported by ITU members, its implementation in practice leads to various difficulties. It is important that administrations are aware of which Recommendations could be candidates for incorporation by reference into the Radio Regulations. Also, administrations need to know of any ITU-R Recommendation currently incorporated by reference, which are being (or have been) revised during the current study period. Administrations would benefit greatly by being advised of such recommendations well in advance of a WRC. Therefore, a mechanism for the early identification should be established.

In order to allow administrations as much time as possible to consult their experts and to consider the implications of updating references in the Radio Regulations, to reflect changes to Recommendations which are currently incorporated by reference, the approach outlined in 1) below is proposed. Similarly, to facilitate the work of administrations in their preparation for the possible introduction of new instances where Recommendations may be incorporated by reference into the Radio Regulations, the approach outlined in 2) below is proposed.

1) Rather than have only the Radiocommunication Assembly (RA) communicate to the WRC a list of the ITU-R Recommendations currently incorporated by reference in the Radio Regulations which have been revised and approved during the elapsed study period, the Director of the Radiocommunication Bureau should provide a report to the Conference Preparatory Meeting. This report would also include a listing of those ITU-R Recommendations currently incorporated by reference which are being revised in preparation for the Radiocommunication Assembly. This report would be for information only and would not confer any special status on the Recommendations listed.

2) If a Recommendation is not currently incorporated by reference into the Radio Regulations, it could only be considered for incorporation by reference if it is in response to a WRC agenda item.

MOD IAP/14/232

RESOLUTION 27 (Rev.WRC-~~97~~2000)

References to ITU-R and ITU-T Recommendations in the Radio Regulations

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that the principles of incorporation by reference were adopted by the WRC-95 and have been revised by this Conference (see Annex 1 to this Resolution);

b) that there are provisions of the Radio Regulations which employ mandatory incorporation by reference but fail to make explicit reference to the ITU-R or ITU-T Recommendations incorporated;

c) that the 199~~7~~9 Conference Preparatory Meeting (CPM-~~97~~99) for this Conference urged administrations to give further consideration to the status of material incorporated by reference:

– using the initial assessment provided by the Radiocommunication Bureau in the CPM-99 Report and the set of principles given in Annex 1 to this Resolution;

– noting that mandatory references shall be explicit and use the appropriate regulatory language;

– taking into account the factors set out in Annex 2 to this Resolution;

d) that the Director of the Radiocommunication Bureau has drawn up a list (see Annex 1 to the CPM-99 Report to this Conference) of the provisions of the Radio Regulations using incorporation by reference, which provides an initial assessment of the status of each reference and forms the basis for the work on appropriate referencing, examples of which are contained in Annex 3 to this Resolution;

e) that the Bureau has drawn up a list, contained in Annex 4 to this Resolution, of the ITU-R Recommendations to which explicit reference is made in the Radio Regulations,

resolves

that ITU-R and ITU-T Recommendations incorporated or proposed for incorporation by reference in the provisions of the Radio Regulations be identified and examined at WRC-~~99~~[03], with a view to establishing the correct method of reference in accordance with the principles set out in Annex 1 to this Resolution and taking into account the factors listed in Annex 2 to this Resolution, in order to complete the simplification of the Radio Regulations in respect of incorporation by reference,

further resolves

that, in the case of ITU-R Recommendations which are not currently referenced in the Radio Regulations, only those Recommendations which are in response to a WRC agenda item can be considered for incorporation by reference,

instructs the Director of the Radiocommunication Bureau

to arrange for a review of the provisions of the Radio Regulations containing references to ITU-R or ITU-T Recommendations and propose suitable recommendations to the CPM-~~99~~[02] for inclusion in its Report to WRC-~~99~~[03], using the list of provisions contained in Annex 3 to this Resolution together with the guidance contained in Annexes 1 and 2 to this Resolution, and taking into account the list of ITU-R Recommendations contained in Annex 4 to this Resolution,

urges administrations

to use the CPM Report to WRC-~~99~~[03] in order to prepare their proposals on incorporation by reference to that Conference.

ANNEX 1 TO RESOLUTION 27 (Rev.WRC-~~97~~2000)

Principles of incorporation by reference

1 Where references are non-mandatory, it is not necessary to establish specific conditions in applying the texts quoted. In such cases, reference could, for example, be made to "the latest version" of a Recommendation.

2 Mandatory references to Resolutions or Recommendations of a world radiocommunication conference (WRC) are acceptable without restriction, since such texts will have been agreed by a WRC.

3 Where mandatory references are suggested, and the relevant texts are brief, the referenced material should be incorporated in the body of the Radio Regulations.

4 If, on a case-by-case basis, it is decided to incorporate material by reference on a mandatory basis, then the following provisions shall apply:

4.1 the referenced text shall have the same treaty status as the Radio Regulations themselves;

4.2 the reference must be explicit, specifying the specific part of the text (if appropriate) and the version or issue number;

4.3 the referenced text must be adopted by the Plenary of a competent WRC, but should not be part of the Final Acts;

4.4 all texts incorporated by reference must be readily available, by being published in a separate volume;

4.5 if, between WRCs, a referenced text (e.g. an ITU-R Recommendation) is updated, the reference in the Radio Regulations shall continue to apply to the original version until such time as a competent WRC agrees to incorporate the new version of the reference. The mechanism for considering such a step is given in Resolution **28 (Rev.WRC-~~95~~2000)**.

ANNEX 2 TO RESOLUTION 27 (Rev.WRC-~~97~~2000)

Factors to be considered for the further application of incorporation by reference

In reviewing the provisions of the Radio Regulations employing references to other texts, administrations and study groups should address the following factors:

1 whether each reference is of mandatory~~, i.e. incorporated by reference,~~ or non-mandatory character;

2 whether in existing non-mandatory references, or mandatory references which are determined to be of non-mandatory character, appropriate linking language is used, e.g. the words “should” or “may”;

3 whether in existing mandatory references, or other types of reference which are determined to be of mandatory character, clear mandatory linking language is used, e.g. the word “shall”;

4 whether the incorporated ITU-R or ITU-T Recommendation(s) are explicitly identified;

5 where referenced ITU-R or ITU-T Recommendations are not explicitly identified, determine which ones should be identified;

6 whether text incorporated from ITU-R or ITU-T Recommendations should be placed directly in the Radio Regulations instead of using incorporation by reference;

7 if the ITU-R or ITU-T Recommendation to be incorporated is, as a whole, unsuitable as treaty status text, whether to limit the reference to those portions of the ITU-R or ITU-T Recommendation which are of a suitable nature or to place the mandatory portion directly in the Radio Regulations.

Reasons: To clarify that, in the case of ITU-R Recommendations which are not currently referenced in the Radio Regulations, only those Recommendations which are in response to a WRC agenda item can be considered for incorporation by reference. Also, minor consequential editorial changes have also been identified.

MOD IAP/14/233

RESOLUTION 28 (Rev.WRC-~~95~~2000)

Revision of references to ITU-R Recommendations incorporated by reference in the Radio Regulations

The World Radiocommunication Conference (~~Geneva, 1995~~Istanbul, 2000),

considering

a) that the Voluntary Group of Experts on simplification of the Radio Regulations (VGE) proposed the transfer of certain texts of the Radio Regulations to other documents, especially to ITU-R Recommendations, using the incorporation by reference procedure;

b) that, in some cases, the provisions of the Radio Regulations imply an obligation on Member States ‡ to conform to the criteria or specifications incorporated by reference;

c) that references to incorporated texts shall be explicit and shall refer to a precisely identified provision;

d) that, taking into account the rapid evolution of technology, ITU-R may revise the Recommendations incorporated by reference at short intervals;

e) that revised and approved Recommendations will not have the same legal force as the initial Recommendations, incorporated by reference until a competent world radiocommunication conference has so decided;

f) that it would be desirable to ensure, in the cases provided for in the Radio Regulations, that the provisions reflect the most recent technical developments,

noting

that Member States would benefit greatly from being advised, as early as possible, of which Recommendations have been revised and approved during the study period,

resolves

1 that each Radiocommunication Assembly shall communicate to the following world radiocommunication conference a list of the ITU-R Recommendations incorporated by reference in the Radio Regulations which have been revised and approved during the elapsed study period;

2 that, on this basis, the WRC shall examine those revised Recommendations, and decide whether or not to update the corresponding references in the Radio Regulations;

3 that, if the WRC decides not to update the corresponding references, ITU-R shall continue publishing the ITU-R Recommendations currently referenced in the Radio Regulations;

4 that WRCs shall place the examination of Recommendations in conformity with *resolves* 1 and *resolves* 2 of this Resolution on the agenda of future WRCs,

further resolves

5 to instruct the Director of the Radiocommunication Bureau to report to the CPM immediately preceding the WRC those ITU-R Recommendations already incorporated by reference in the Radio Regulations which have been revised and approved since the previous WRC, or which may be revised in time for the Radiocommunication Assembly;

6 that, in the case of ITU-R Recommendations which are not currently referenced in the Radio Regulations, only those Recommendations which are in response to a WRC agenda item can be considered for incorporation by reference,

urges administrations

to participate actively in the work of the Radiocommunication Study Groups and the Radiocommunication Assembly in the revision of those Recommendations to which mandatory references are made in the Radio Regulations.

Reasons: To establish a procedure to advise administrations, well in advance of a WRC, of those ITU-R Recommendations already incorporated by reference in the Radio Regulations which have been revised and approved since the previous WRC, or which may be revised in time for the Radiocommunication Assembly. Also to clarify that, in the case of ITU-R Recommendations which are not currently referenced in the Radio Regulations, only those Recommendations which are in response to a WRC agenda item can be considered for incorporation by reference. Minor consequential editorial changes have also been identified.

WRC-2000 agenda item 4 - in accordance with Resolution 95 (WRC-97), to review the Resolutions and Recommendations of previous conferences with a view to their possible revision, replacement or abrogation

Suppression of Resolution 63

Background information

A proposal for the suppression of Resolution 63, this Resolution is being suppressed because the work of Task Group 1/2 related to this Resolution has been completed.

SUP IAP/14/234

RESOLUTION 63

Relating to the protection of radiocommunication services against interference caused by radiation from industrial, scientific and medical (ISM) equipment[1]

Reasons: Task Group 1/2 completed its work related to Resolution 63.

Application of RR No. S5.488 - a procedural matter related to clarification of provision No. S5.488 (formerly No. 839) was brought to the attention of the CPM

Footnote S5.488

Background information

A procedural matter related to clarification of provision No. S5.488 (formerly No. 839) was brought to the attention of the CPM.

Former Radio Regulations provision RR839 included the requirement for agreement under Article 14 for FSS in the frequency band 11.7-12.2 GHz in Region 2. This provision was modified by WRC-95 to become S5.488. WRC-97 did not introduce any change to that provision.

The RRB revised the Rules of Procedure relating to S5.488 at its 13th meeting 6-14 July 1998, Geneva, which became effective as from 1 January 1999. This revision was based on the understanding that the new wording of S5.488, with no explicit reference to S9.21, means that there is no longer a need for the specific procedures of S9.21 to be applied to FSS networks in the band 11.7-12.2 GHz in Region 2. The use of the frequency band 11.7-12.2 GHz, for FSS GSO in Region 2, was subject to the application of Article 14 until 1 January 1999.

Since there are now no hard pfd limits applicable to geostationary FSS in this band, the revised Rule removes the only regulatory mechanism available to terrestrial services for their protection from GSO FSS service. It is worth mentioning that terrestrial services are protected from non-GSO FSS systems through provisional pfd levels contained in Resolution 131 (WRC-97), and in S21.16. All other intra- and inter-service relations in this band are not affected by the modified Rule since, for them, there are other regulatory mechanisms that apply.

In order to bridge the apparent regulatory gap, there is a need to establish an appropriate regulatory mechanism by which the terrestrial service sharing the same frequency band with the space service, on an equal basis, are to be adequately protected.

Considering that there is a need to ensure protection of the fixed service operating in the band 11.7-12.2 GHz, and that the simplest and safest way for this purpose is to adopt Approach 1, as described in section 7.6.3.1 of the CPM Report administrations propose to introduce in Article S21 hard pfd limits for geostationary fixed-satellite networks of Region 2 similar to those currently in Article S21 (S21.16) for non-GSO FSS systems operating in this frequency band. A consequential change of S5.488 is also proposed.

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S5.488 The use of the bands 11.7-12.2 GHz by geostationary-satellite networks in the fixed-satellite service in Region 2 and 12.2-12.7 GHz by the broadcasting-satellite service in Region 2 is limited to national and subregional systems. ~~The use of the band 11.7-12.2 GHz by the fixed-satellite service in Region 2 is subject to previous agreement between the administrations concerned and those having services, operating or planned to operate in accordance with the Table, which may be affected (see Articles **S9** and **S11**).~~ For the use of the band 12.2-12.7 GHz by the broadcasting-satellite service in Region 2, see Appendix **S30**.

Reasons: The hard limits proposed for inclusion in Article S21 ensure full protection of terrestrial services, hence there is no need for specific additional provisions.

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TABLE **S21-4** *(continued)*

Frequency band	Service*	Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
10.7-11.7 GHz	Fixed-satellite (space-to-Earth)	–150 [14]	$-150 + 0.5(\delta - 5)$ [14]	–140 [14]	4 kHz
11.7-12.2 GHz (Region 2)	Fixed-satellite (space-to-Earth) geostationary-satellite orbit	–148	$-148 + 0.5(\delta - 5)$	–138	4 kHz
11.7-12.5 GHz (Region 1) 11.7-12.2 GHz (Region 2) 11.7-12.2 GHz (Region 3) 12.2-12.7 GHz (Region 2)	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	–148 [15]	$-148 + 0.5(\delta - 5)$ [15]	–138 [15]	4 kHz

WRC-2000 agenda item 1.11 - to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions 214 (Rev.WRC-97) and 219 (WRC-97)

Background information

A number of studies have been carried out since MSS allocations for non-GSO satellite systems were first agreed at WARC-92. These have led to ITU-R Recommendations which indicate the sharing techniques which are being used by those systems to share with each other and other co-primary services.

The table below (Non-GSO MSS sharing summary) from Recommendation ITU-R M.[YA] "Methods for achieving coordinated use of multiple non-GSO MSS systems below 1 GHz and sharing with other services in existing MSS allocations" summarizes the techniques and Recommendations applied to existing MSS allocations. Many of these techniques are being employed in practice successfully.

Non-GSO MSS sharing summary

	Narrow band	**Wideband**
Fixed and mobile (148-149.9 MHz) (455-456 MHz and 459-460 MHz in Region 2) (454-455 MHz by footnotes)	Combination: – Dynamic channel avoidance (Rec. ITU-R M.1039) – Low duty cycle – Brief message duration (Rec. ITU-R M.1185)	Combination: – Low output power density – Brief message duration – Low data rate – Filtering at satellite – Geographical separation
Fixed and mobile (137-138 MHz) (400.15-401 MHz)	Ground level pfd per RR **S5.208**	Ground level pfd per RR **S5.208**
Meteorological satellites (137-138 MHz) (400.15-401 MHz)	Assignment separation	Combination: – Low pfd at ground level – Cross polarization discrimination – Adaptive filter at satellite
Space operations Space research (137-138 MHz)	Channel avoidance	Combination: – Low pfd – Cross polarization discrimination
Space research (400.15-401 MHz)	Channel avoidance	Combination: – Low pfd – Cross polarization discrimination
Meteorological aids (400.15-401 MHz)	Channel avoidance	Combination: – Low pfd – Cross polarization discrimination

The constraints on existing allocations are reflected in the footnotes to the allocations, and in the Annex 1 to Appendix S5. These have evolved to their present form since WARC-92, and now reflect a balance with regard to sharing criteria among the primary services concerned.

These constraints have served to provide a basis for implementing non-GSO MSS systems in these bands and at the same time provide protection to other space and terrestrial services. Therefore in respect to the constraints of the MSS in existing allocations below 1 GHz, no further modifications are needed.

NOC IAP/14/237

S9.11A *e)* for a station for which the requirement to coordinate is included in a footnote of the Table of Frequency Allocations referring to this provision:

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz as found in No S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

APPENDIX S5

ANNEX 1

1 Coordination thresholds for sharing between MSS (space-to-Earth) and terrestrial services in the same frequency bands and between non-GSO MSS feeder links (space-to-Earth) and terrestrial services in the same frequency bands

1.1 Below 1 GHz*

NOC IAP/14/238

1.1.1 In the bands 137-138 MHz and 400.15-401 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to terrestrial services (except aeronautical mobile (OR) service networks operated by the administrations listed in Nos. **S5.204** and **S5.206** as of 1 November 1996) is required only if the pfd produced by this space station exceeds –125 dB (W/m^2/4 kHz) at the Earth's surface.

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

NOC IAP/14/239

1.1.2 In the band 137-138 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to the aeronautical mobile (OR) service is required only if the pfd produced by this space station at the Earth's surface exceeds:

– –125 dB (W/m^2/4 kHz) for networks for which complete Appendix **3** coordination information has been received by the Bureau prior to 1 November 1996;

– –140 dB (W/m^2/4 kHz) for networks for which complete Appendix **S4**/**3** coordination information has been received by the Bureau after 1 November 1996 for the administrations referred to in § 1.1.1 above.

* These provisions apply only to the MSS.

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

NOC IAP/14/240

1.1.3 In the band 137-138 MHz, coordination is also required for a space station on a replacement satellite of a MSS network for which complete Appendix **3** coordination information has been received by the Bureau prior to 1 November 1996 and the pfd exceeds -125 dB(W/m^2/4 kHz) at the Earth's surface for the administrations referred to in § 1.1.1 above.

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

3.2 General considerations

NOC IAP/14/241

TABLE 1

Earth stations operating at frequencies below 1 GHz

Frequency sharing situation		**Coordination distance (in sharing situations involving services allocated with equal rights) (km)**
Frequency band and earth station for which coordination area is determined	**Other service or station**	
148-149.9 MHz ground-based (mobile)	Ground-based stations	As determined using Equation (1) and Fig. 1 of Recommendation ITU-R M.1185 In this case, the coordination distance is calculated by the administration of the terrestrial station using the parameters of its terrestrial stations and the most up-to-date relevant parameters published by the Bureau for the earth station.
149.9-150.05 MHz ground-based (mobile) 399.9-400.05 MHz ground-based (mobile)	Radionavigation-satellite service	The coordination distance is calculated by the administration of the MSS earth station using the parameters of its earth stations and the most up-to-date relevant parameters published by the Bureau for the radionavigation-satellite service earth station
400.15-401 MHz ground-based	Meteorological aids (radiosonde)	580

TABLE 1 (*end*)

Frequency sharing situation		**Coordination distance (in sharing situations involving services allocated with equal rights) (km)**
Frequency band and earth station for which coordination area is determined	**Other service or station**	
All bands below 1 GHz ground-based	Mobile (aircraft)	500
All bands below 1 GHz aircraft (mobile)	Ground-based stations	500
400.15-401 MHz aircraft (mobile)	Meteorological aids (radiosonde)	1 080
All bands below 1 GHz aircraft (mobile)	Mobile (aircraft)	1 000
454-456 MHz 459-460 MHz ground-based	Ground-based stations	500

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for use by non-GSO systems below 1 GHz, as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

WRC-2000 agenda item 1.13.1 - to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

Modifications to Section II of Article S22 in relation to the sharing conditions among non-GSO FSS, FSS and GSO BSS services

Background information

Resolution 130 (WRC-97) and Resolution 538 (WRC-97) each requested ITU-R to conduct a) “appropriate technical, operational and regulatory studies” to review the regulatory conditions relating to the coexistence of non-GSO FSS and GSO FSS and GSO BSS systems, in order to ensure that undue constraints are not placed on the development of non-GSO FSS, GSO FSS and GSO BSS systems, and b) the development of a methodology for calculating the power levels produced by non-GSO FSS systems and the compliance of these levels with the applicable limits established pursuant to Resolutions 130 and 538. Joint Task Group 4-9-11 was established by ITU-R to pursue these mandates and to determine the necessary technical bases.

At (CPM99-2), a compromise was reached on a number of the key technical criteria that would provide adequate protection to GSO FSS and GSO BSS systems without unduly constraining non-GSO FSS systems. Many of the elements of this compromise are reflected in Chapter 3 of the CPM Report, and are reproduced in the following proposals. The CPM Report recognizes, however, that there are other essential elements of the compromise package which have yet to be developed. CITEL is making proposals to address these other essential elements. Taking into account the work of ITU-R and CPM-99 on this matter, the following is proposed:

ARTICLE S22

Space services[1]

Section II – Control of interference to geostationary-satellite systems

NOC IAP/14/242

S22.2

to

S22.5A

SUP IAP/14/243

S22.5B

MOD IAP/14/244

S22.5C § 5 1) The equivalent power flux-density[2], epfd$_{down}$ at any point on the Earth's surface visible from the geostationary-satellite orbit, produced by emissions from all the space stations of a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Tables ~~**S22-1**~~, **S22-1A** to **S22-1D**, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the limits given in Tables ~~**S22-1**~~**S22-1A** to **S22-1D**, for the given percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions, into a reference antenna and in the reference bandwidth specified in Tables ~~**S22-1**~~**S22-1A** to **S22-ID**, for all pointing directions towards the geostationary-satellite orbit.

MOD IAP/14/245

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2 **S22.5C.1, D.1, F.1** The equivalent power flux-density is defined as the sum of the power flux-densities produced at a GSO receive station~~point~~ on the Earth's surface or in the geostationary orbit, as appropriate, by all the transmit~~space~~ stations within a non-geostationary-satellite system, taking into account the off-axis discrimination of a reference receiving antenna assumed to be pointing ~~towards the geostationary-satellite orbit~~in its nominal direction. The equivalent power flux-density is calculated using the following formula:

$$\cancel{epfd = 10 \cdot \log_{10}\left[\sum_{i=1}^{N_s} 10^{pfd_i/10} \cdot \frac{G_r(\theta_i)}{G_{max}}\right]}$$

$$epfd = 10 \cdot \log_{10}\left[\sum_{i=1}^{N_a} 10^{\frac{P_i}{10}} \cdot \frac{G_t(\theta_i)}{4.\pi d_i^2} \cdot \frac{G_r(\phi_i)}{G_{r,max}}\right]$$

~~where:~~

~~N_s: number of non-geostationary space stations visible from the point considered at the Earth's surface, within an elevation angle greater than or equal to 0°;~~

~~i: index of the non-geostationary space station considered;~~

~~pfd_i: power flux-density produced at the point considered on the Earth's surface in dB(W/m^2) in the reference bandwidth;~~

~~θ_i: angle between the direction considered towards the geostationary-satellite orbit and the direction of the interfering space station in the non-geostationary-satellite system;~~

~~$G_r(\theta_i)$: gain (as a ratio) of the receive reference antenna to be considered as part of a geostationary-satellite network;~~

~~G_{max}: maximum gain (as a ratio) of the above receive reference antenna;~~

~~$epfd$: computed equivalent power flux-density in dB(W/m^2) in the reference bandwidth.~~

where:

N_a: is the number of transmit stations in the non-geostationary-satellite systems that are visible from the GSO receive station considered on the Earth's surface or in the geostationary orbit, as appropriate;

i: is the index of the transmit station considered in the non-geostationary-satellite system;

P_i: is the RF power at the input of the antenna of the transmit station, considered in the non-geostationary-satellite system in dBW in the reference bandwidth;

θ_i: is the off-axis angle between the boresight of the transmit station considered in the non-geostationary-satellite system and the direction of the GSO receive station;

$G_t(\theta_i)$: is the transmit antenna gain (as a ratio) of the station considered in the non-geostationary-satellite system in the direction of the GSO receive station;

d_i: is the distance in metres between the transmit station considered in the non-geostationary-satellite system and the GSO receive station;

ϕ_i: is the off-axis angle between the boresight of the antenna of the GSO receive station and the direction of the ith transmit station considered in the non-geostationary-satellite system;

$G_r(\phi_i)$: is the receive antenna gain (as a ratio) of the GSO receive station in the direction of the ith transmit station considered in the non-geostationary-satellite system;

$G_{r,max}$: is the maximum gain (as a ratio) of the antenna of the GSO receive station;

epfd: is the computed equivalent power flux-density in dB(W/m^2) in the reference bandwidth.

SUP IAP/14/246

TABLE **S22-1**

ADD IAP/14/247

TABLE **S22-1A**[3, 5]

Limits to the epfd$_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	epfd$_{down}$ dB(W/m^2)	Percentage of time during which epfd$_{down}$ level may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[4]
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3	–175.4 –174.0 –170.8 –165.3 –160.4 –160.0 –160.0	0 90 99 99.73 99.991 99.997 100	40	60 cm Recommendation ITU-R S.[4/57]
	–181.9 –178.4 –173.4 –173.0 –164.0 –161.6 –161.4 –160.8 –160.5 –160.0 –160.0	0 99.5 99.74 99.857 99.954 99.984 99.991 99.997 99.997 99.9993 100	40	1.2 m Recommendation ITU-R S.[4/57]

	–190.45 –189.45 –187.45 –182.4 –182 –168 –164 –162 –160 –160	0.00 90.00 99.50 99.70 99.855 99.971 99.988 99.995 99.999 100.000	40	3 m Recommendation ITU-R S.[4/57]
	–195.45 –195.45 –190.00 –190 –172.5 –160 –160	0.00 99.00 99.65 99.71 99.99 99.998 100.000	40	10 m Recommendation ITU-R S.[4/57]

3 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

4 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

5 In addition to the limits shown in Table **S22-1A**, the following single-entry $epfd_{down}$ limits apply to all antenna sizes greater than 60 cm in the frequency bands listed in Table **S22-1A**.

100% of the time $epfd_{down}$ dB(W/(m^2·40 kHz))	**Latitude (north or south) (°)**
-160	0 < |Latitude| ≤ 57.5
-160 + 3.4(57.5 - |Latitude|)/4	57.5 < |Latitude| ≤ 63.75
-165.3	63.75 ≤ |Latitude|

Reasons: The limits proposed above for the 60 cm and 1.2 m antennas were agreed within ITU-R. The limits proposed for the 3 m and 10 m antennas represent a compromise agreed upon at the CPM-99 meeting. The compromise package agreed upon consists of the following:

i) “validation” $epfd_{down}$ masks for reference GSO FSS earth station antenna diameters of 60 cm, 1.2 m, 3 m, and 10 m;

ii) “operational” $epfd_{down}$ limits for all antenna diameters between 3 m and 18 m;

iii) “additional operational” $epfd_{down}$ limits for antenna diameters of 3 m and 10 m; and

iv) “validation” $epfd_{down}$ limits for antenna diameters exceeding 60 cm located at high latitudes.

CPM-99 agreed that “validation” masks, in conjunction with “operational” and “additional operational” limits, as appropriate, would adequately protect GSO FSS systems using 60 cm, 1.2 m, 3 m and 10 m antennas. Table S22-1A above contains the limits referred to in items i) and iv) of the compromise package.

ADD IAP/14/248

TABLE **S22-1B**[6]

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$epfd_{down}$ dB(W/m^2)	Percentage of time during which $epfd_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference pattern[7]
17.8-18.6	–175.4 –175.4 –172.5 –167 –164 –164	0 90 99 99.714 99.971 100	40	1 m Recommendation ITU-R S.[4/57]
	–161.4 –161.4 –158.5 –153 –150 –150	0 90 99 99.714 99.971 100	1 000	
17.8-18.6	–178.4 –178.4 –171.4 –170.5 –166 –164 –164	0 99.4 99.9 99.913 99.971 99.977 100	40	2 m Recommendation ITU-R S.[4/57]
	–164.4 –164.4 –157.4 –156.5 –152 –150 –150	0 99.4 99.9 99.913 99.971 99.977 100	1 000	
17.8-18.6	–185.4 –185.4 –180 –180 –172 –164 –164	0 99.8 99.8 99.943 99.943 99.998 100	40	5 m Recommendation ITU-R S.[4/57]
	–171.4 –171.4 –166 –166 –158 –150 –150	0 99.8 99.8 99.943 99.943 99.998 100	1 000	

[6] For certain receive earth stations see also ADD **S9.7A** and ADD **S9.7B**.

[7] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

Reasons: The $epfd_{down}$ limits proposed above for the 17.8-18.6 GHz band were agreed within ITU-R. CPM-99 agreed that the $epfd_{down}$ validation limits proposed above in conjunction with the operational limits contained in Table S22-4B would adequately protect GSO FSS operations. Specification of the $epfd_{down}$ limits in both a 40 kHz and a 1 MHz reference bandwidth is needed to ensure protection of GSO FSS operations from varying types of non-GSO FSS emissions.

ADD IAP/14/249

TABLE **S22-1C**[8]

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$epfd_{down}$ dB(W/m^2)**	**Percentage of time during which $epfd_{down}$ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference pattern**[9]
19.7-20.2	–187.4 –182 –172 –154 –154	0 71.429 97.143 99.983 100	40	70 cm Recommendation ITU-R S.[4/57]
	–173.4 –168 –158 –140 –140	0 71.429 97.143 99.983 100	1 000	
19.7-20.2	–190.4 –181.4 –170.4 –168.6 –165 –160 –154 –154	0 91 99.8 99.8 99.943 99.943 99.997 100	40	90 cm Recommendation ITU-R S.[4/57]
	–176.4 –167.4 –156.4 –154.6 –151 –146 –140 –140	0 91 99.8 99.8 99.943 99.943 99.997 100	1 000	
19.7-20.2	–196.4 –162 –154 –154	0 99.98 99.99943 100	40	2.5 m Recommendation ITU-R S.[4/57]
	–182.4 –148 –140 –140	0 99.98 99.99943 100	1 000	

19.7-20.2	–200.4 –189.4 –187.8 –184 –175 –164.2 –154.6 –154 –154	0 90 94 97.143 99.886 99.99 99.999 99.9992 100	40	5 m Recommendation ITU-R S.[4/57]
	–186.4 –175.4 –173.8 –170 –161 –150.2 –140.6 –140 –140	0 90 94 97.143 99.886 99.99 99.999 99.9992 100	1 000	

8 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

9 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

Reasons: The $epfd_{down}$ limits proposed above for the 70 cm and 90 cm antennas were agreed within ITU-R. For the 2.5 m and 5 m antennas, CPM-99 agreed that the $epfd_{down}$ validation limits proposed above in conjunction with the operational limits contained in Table S22-4B would adequately protect GSO FSS operations. Specification of the $epfd_{down}$ limits in both a 40 kHz and a 1 MHz reference bandwidth is needed to ensure protection of GSO FSS operations from varying types of non-GSO FSS emissions.

ADD IAP/14/250

TABLE **S22-1D**[11, 12]

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands
30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm and 300 cm BSS antennas

Frequency band (GHz)	$epfd_{down}$ dB(W/m^2)	Percentage of time during which $epfd_{down}$ level may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[10]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–165.841 –165.541 –164.041 –158.600 –158.600 –158.330 –158.330	0.000 25.000 96.000 98.857 99.429 99.429 100.000	40	30 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–175.441 –172.441 –169.441 –164.000 –160.750 –160.000 –160.000	0.000 66.000 97.750 99.357 99.809 99.986 100.000	40	45 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–176.441 –173.191 –167.750 –162.000 –161.000 –160.200 –160.000 –160.000	0.000 97.800 99.371 99.886 99.943 99.971 99.997 100.000	40	60 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–178.94 –178.44 –176.44 –171.00 –165.50 –163.00 –161.00 –160.00 –160.00	0.000 33.000 98.000 99.429 99.714 99.857 99.943 99.991 100.000	40	90 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–182.440 –180.690 –179.190 –178.440 –174.940 –173.750 –173.000 –169.500 –167.800 –164.000 –161.900 –161.000 –160.400 –160.000	0.000 90.000 98.900 98.900 99.500 99.680 99.680 99.850 99.915 99.940 99.970 99.990 99.998 100	40	120 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz in Region 1 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3 12.2-12.7 GHz in Region 2	–184.941 –184.101 –181.691 –176.250 –163.250 –161.500 –160.350 –160.000 –160.000	0.000 33.000 98.500 99.571 99.946 99.974 99.993 99.999 100.000	40	180 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz in Region 1 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3 12.2-12.7 GHz in Region 2	–187.441 –186.341 –183.441 –178.000 –164.400 –161.900 –160.500 –160.000 –160.000	0.000 33.000 99.250 99.786 99.957 99.983 99.994 99.999 100.000	40	240 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–191.941 –189.441 –185.941 –180.500 –173.000 –167.000 –162.000 –160.000 –160.000	0.000 33.000 99.500 99.857 99.914 99.951 99.983 99.991 100.000	40	300 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

10 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO BSS systems.

11 For BSS antenna diameters 180 cm, 240 cm and 300 cm, in addition to the single-entry limits shown in Table **S22-1D**, the following single-entry 100% of the time $epfd_{down}$ limit also applies in the frequency bands listed in Table **S22-1D**:

100% of the time $epfd_{down}$ dB(W/(m^2·40 kHz))	**Latitude (north or south) (°)**
-160.0	0 < │Latitude│ ≤ 57.5
–160.0 + 3.4 * (57.5 - │Latitude│)/4	57.5 < │Latitude│ ≤ 63.75
–165.3	63.75 ≤ │Latitude│

12 For BSS antenna diameter 240 cm, in addition to the single-entry 100% of the time $epfd_{down}$ limit specified in footnote 11 of this table, a –167 dB(W/(m^2·40 kHz)) single-entry 100% of the time operational $epfd_{down}$ limit also applies to receive antennas located in Region 2, west of 140° W, north of 60° N, pointing toward GSO BSS satellites at 91° W, 101° W, 110° W, 119° W and 148° W with elevation angles greater than 5°. [This limit is implemented during a transition period of [15] years.]*

Reasons: The limits proposed above represent a compromise agreed upon at the CPM-99 meeting consisting of the following:

i) "validation" $epfd_{down}$ masks for reference GSO BSS earth station antenna diameters of 30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm, and 300 cm;

ii) latitude dependent validation 100% of the time $epfd_{down}$ limits for 180 cm, 240 cm, and 300 cm BSS earth station antennas; and

iii) "operational" 100% of the time single-entry $epfd_{down}$ limits for 240 cm BSS antenna diameters in a certain northern high latitude area of Region 2.

Table S22-1D above contains the limits referred to in items i), ii) and iii) of the compromise package. The limit in item iii) is required because the power of BSS transmissions that can be radiated toward a certain northern high latitude area of Region 2 is limited by the existing pfd limits contained in section 5 *c*) of Annex 1 to Appendix S30. This leads to the use of larger BSS earth station antennas in this geographical area and more sensitive links. The square brackets around the last sentence in footnote 12 can be removed only if the pfd limits in section 5 *c)* of Annex 1 to Appendix S30 are sufficiently relaxed as described in section 5.2.3.5 of the CPM Report.

The compromise package includes the following elements which have yet to be developed.

* This transitional regime would be applicable only if the pfd limits in section 5 *c)* of Annex 1 to Appendix **S30** are sufficiently relaxed.

With regard to the operational $epfd_{down}$ limits in iii), there is a need for regulatory procedures to implement operational limits which: identifies non-GSO systems exceeding the operational limits; and ensures immediate reduction of the interference level to the operational limits by any non-GSO system exceeding those limits. There is a need for a resolution calling for ITU-R to develop, as a matter of urgency, recommendations to permit administrations to check compliance with the operational limits.

MOD IAP/14/251

S22.5D 2) The ~~aggregate~~equivalent power flux-density~~23~~, $epfd_{up}$, produced at any point in the geostationary-satellite orbit by emissions from all the earth stations in a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Table **S22-2**, for all conditions and for all methods of modulation, shall not exceed the limits given in Table **S22-2** for the specified percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions, into a reference antenna and in the reference bandwidth specified in Table **S22-2**, for all pointing directions towards the Earth's surface visible from any given location in the geostationary-satellite orbit.

SUP IAP/14/253

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3 **S22.5D.1**

SUP IAP/14/252

TABLE **S22-2**

ADD IAP/14/254

TABLE **S22-2**

Limits to the $epfd_{up}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$epfd_{up}$ dB(W/m^2)**	**Percentage of time during which $epfd_{up}$ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna beamwidth and reference radiation pattern**
12.50-12.75 12.75-13.25 13.75-14.5	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20[13]
17.3-17.8 Region 1 and Region 3[14] 17.8-18.1	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20[13]
27.5-28.6	–162	100	40	1.55 degrees Rec. ITU-R S.672, Ls = –10[13]
29.5-30.0	–162	100	40	1.55 degrees Rec. ITU-R S.672, Ls = –10[13]

13 For the case of Ls = –10, the values a = 1.83 and b = 6.32 should be used in the equations in Annex 1 of Recommendation ITU-R S.672 for single-feed circular beams. In all cases of Ls, the parabolic main beam equation should start at zero.

14 This epfdup level also applies to the frequency band 17.3-17.8 GHz to protect BSS feeder links in Region 2 from non-GSO FSS Earth-to-space transmissions in Regions 1 and 3.

SUP IAP/14/255

S22.5E 3)

SUP IAP/14/256

TABLE **S22-3**

PART A

SUP IAP/14/256*bis*

TABLE **S22-3**

PART B

MOD IAP/14/257

S22.5F 4) The ~~aggregate~~equivalent power flux-density~~[25]~~, epfd$_{is}$, produced at any point in the geostationary-satellite orbit by emissions from all the ~~earth~~space stations in a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Table **S22-3**, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the limits given in Table **S22-43** for the specified ~~any~~ percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions into a ~~the~~ reference antenna and in the reference bandwidth specified in Table **S22-43**, for all pointing directions towards the Earth's surface visible from any given location in the geostationary-satellite orbit.

ADD IAP/14/258

TABLE **S22-3**

Limits to the epfd$_{is}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**epfd$_{is}$ dB(W/m^2)**	**Percentage of time epfd$_{is}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna beamwidth and reference radiation pattern[15]**
10.7-11.7 (Region 1) 12.5-12.75 (Region 1) 12.7-12.75 (Region 2)	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20
17.8-18.4	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20

[15] Under this section, this reference pattern is to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

SUP IAP/14/259

TABLE **S22-4**

PART A

SUP IAP/14/260

TABLE **S22-4**

PART B

MOD IAP/14/261

S22.5~~G~~CA The limits given in Tables **S22-1A to S22-1D~~ and S22-3~~** may be exceeded on the territory of any country whose administration has so agreed.

(SUP) IAP/14/262

S22.5G

ADD IAP/14/263

S22.5H The limits specified in Nos. **S22.5C**, **S22.5D** and **S22.5F** apply to non-GSO FSS systems for which complete coordination or notification information, as appropriate, has been received by the Bureau after 22 November 1997. The limits in No. **S22.5G** do not apply to non-GSO FSS systems for which complete notification information has been received by the Bureau before 22 November 1997.

Reasons: Reflect the "*instructs the Radiocommunication Bureau*" in Resolutions 130 (WRC-97) and 538 (WRC-97), and *resolves* 2 of Resolution 130 (WRC-97). Review of the findings by the Bureau under "*instructs the Radiocommunication Bureau*" in Resolution 130 (WRC-97) and Resolution 538 (WRC-97) should be kept in an updated version of these Resolutions to cover transitional aspects. It was noted that no notification was received prior to 22 November 1997 for non-GSO FSS systems (Earth-to-space) in the bands 17.3-18.1 GHz (Regions 1 and 3) and 17.8-18.1 GHz (Region 2).

ADD IAP/14/264

S22.5I An administration operating a non-GSO FSS system which is in compliance with the limits in Nos. **S22.5C**, **S22.5D** and **S22.5F** (see also Resolution **WWW (WRC-2000)**) shall be considered as having fulfilled its obligations under No. **S22.2** with respect to any GSO network, irrespective of the dates of receipt by the Bureau of the complete coordination or notification information, as appropriate, for the non-GSO system and of the complete coordination information for the GSO network, provided that the $epfd_{down}$ radiated by the non-GSO FSS system into any operating GSO FSS earth station does not exceed the operational limits given in footnote 12 of Table **S22-1D** or the operational limits given in Tables **S22-4A** and **S22-4B**, when the diameter of the earth station is equal to the values given in Table **S22-4A** or the gain of the earth station is equal to or greater than the values given in Table **S22-4B** for the corresponding orbital inclination of the GSO FSS satellite. Except as otherwise agreed between concerned administrations, an administration operating a non-GSO FSS system that is subject to the limits in Nos. **S22.5B, S22.5C and S22.5D** and which radiates $epfd_{down}$ into any operating GSO FSS earth station at levels in excess of the operational limits given in footnote 12 of Table **S22-1D** or the operational limits given in Tables **S22-4A** and **S22-4B**, when the diameter of the earth station is equal to the values given in Table **S22-4A** or the gain of the earth station is equal to or greater than the values given in Table **S22-4B** for the corresponding orbital inclination of the GSO FSS satellite, shall be considered in violation of its obligations under No. **S22.2**.

Reasons: Reflects *resolves* 4 and 1.4 of Resolutions 130 (WRC-97) and 538 (WRC-97), and the principles provided in section 3.1.2.1.4.2 *c)*. Other additions to the provision correct the language, and make explicit the intention that any non-GSO FSS system that exceeds the validation, operational or additional operational limits, as applicable, shall, except otherwise agreed between concerned administrations, be deemed to be in violation of its obligations under No. S22.2.

ADD IAP/14/265

TABLE **S22-4A**[16, 18]

Operational limits to the epfd_{down} radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	epfd_{down} dB(W/m^2)	Percentage of time during which epfd_{down} may not be exceeded	Reference bandwidth (kHz)	Receive GSO earth station antenna diameter [17] (m)	Orbital inclination of GSO satellite (degrees)
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3 (prior to 31 December 2005)	–163 –166 –167.5 –169.5	100	40	3 6 9 ≥18	≤2.5
	–160 –163 –164.5 –166.5	100	40	3 6 9 ≥18	≤4.5
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; and 12.5-12.75 in Regions 1 and 3 (after 31 December 2005)	–161.25 –164 –165.5 –167.5	100	40	3 6 9 ≥18	≤2.5
	–158.25 –161 –162.5 –164.5	100	40	3 6 9 ≥18	≤4.5

16 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

17 Linear interpolation of epfd levels in decibels should be performed for other intermediate antenna diameters using a logarithmic scale for the antenna diameter.

18 In addition to the operational limits shown in Table **S22-4A**, the additional operational limits in Table **S22-4A1** apply to certain GSO FSS earth station antenna sizes in the frequency bands listed in Table **S22-4A**. A method of assessing interference levels for intermediate antenna sizes should also be developed within ITU-R.

ADD IAP/14/265*bis*

TABLE **S22-4A1**

Additional operational limits to the $epfd_{down}$ radiated by non-GSO FSS systems into 3 m and 10 m GSO FSS earth station antennas

$epfd_{down}$ (dB(W/(m^2/40 kHz)))	Percentage of time during which $epfd_{down}$ may be exceeded	Receive GSO earth station antenna diameter (m)
–182 –179 –176 –171 –168 –165 –163 –161.25 –161.25	0.1 0.06 0.03 0.02 0.016 0.007 0.001 0.00025 0	3
–185 –183 –179 –175 –171 –168 –166 –166	0.03 0.02 0.01 0.004 0.002 0.001 0.0002 0	10

Reasons: The operational limits proposed for antennas equal to or greater than 3 m in diameter represent a compromise agreed upon at the CPM-99 meeting. The compromise package agreed upon consists of the following:

i) “validation” $epfd_{down}$ masks for reference GSO FSS earth station antenna diameters of 60 cm, 1.2 m, 3 m, and 10 m;

ii) “operational” $epfd_{down}$ limits for all antenna diameters between 3 m and 18 m;

iii) “additional operational” $epfd_{down}$ limits for antenna diameters of 3 m and 10 m; and

iv) “validation” $epfd_{down}$ limits for antenna diameters exceeding 60 cm located at high latitudes.

CPM-99 agreed that “validation” masks, in conjunction with “operational” and “additional operational” limits, as appropriate, would adequately protect GSO FSS systems using 60 cm, 1.2 m, 3 m and 10 m antennas. Tables S22-4A and S22-4A1 contain the limits referred to in items ii) and iii) of the compromise package.

ADD IAP/14/266

TABLE **S22-4B**[19]

Operational limits to the epfd$_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	epfd$_{down}$ dB(W/m^2)	Percentage of time during which epfd$_{down}$ may not be exceeded	Reference bandwidth (kHz)	Receive GSO earth station antenna Gain (dBi)	Orbital inclination of GSO satellite (degrees)
19.7-20.2	–157 –157 –155	100 100 100	40 40 40	≥49 ≥43[20] ≥49	≤2.5 ≤2.5 >2.5 and ≤4.5
19.7-20.2	–143 –143 –141	100 100 100	1 000 1 000 1 000	≥49 ≥43[20] ≥49	≤2.5 ≤2.5 >2.5 and ≤4.5
17.8-18.6	–164 –162	100 100	40 40	≥49 ≥49	≤2.5 >2.5 and ≤4.5
17.8-18.6	–150 –148	100 100	1 000 1 000	≥49 ≥49	≤2.5 >2.5 and ≤4.5

19 For certain receive earth stations, see also ADD S9.7A and ADD S9.7B.

20 The operational limit applies to non-GSO systems operating at altitudes of 7 000 km or above in order to protect GSO FSS systems employing adaptive coding.

Reasons: The operational limits proposed for antennas with a gain equal to or greater than 49 dBi represent a compromise agreed upon at the CPM-99 meeting. CPM-99 agreed that the “operational” limits contained in Table S22-4B above in conjunction with epfd$_{down}$ “validation” masks would adequately protect GSO FSS systems with an antenna gain equal to or greater than 49 dBi.

ADD IAP/14/267

S22.5J In case of *force majeure*, telecommand and ranging carriers transmitted to non-geostationary satellites in the fixed-satellite service are not subject to the limits given in Table S22-2.

Reasons: Specific provision needed to cover emergency situations.

ADD IAP/14/268

S22.5K Administrations operating or planning to operate non-GSO FSS systems in the bands listed in Tables **S22-1A** through **S22-1D** of No. **S22.5B** will apply the provisions of Resolution **WWW (WRC-2000)** to ensure that the actual aggregate interference into GSO FSS and GSO BSS networks caused by such systems operating co-frequency in these frequency bands does not exceed the aggregate power levels shown in Annex 1 of Resolution **WWW (WRC-2000)**. In the event that an administration operating a GSO network in conformity with the Radio Regulations identifies epfd levels from non-GSO FSS systems which may be in excess of the aggregate limits contained in Annex 1 of Resolution **WWW (WRC-2000)**, the administrations responsible for the non-GSO FSS systems will apply the provisions contained in *resolves* 2 of Resolution **WWW (WRC-2000)**.

WRC-2000 agenda item 1.13.1 - to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

Proposed modifications to APS4

Background information

CPM-99, to facilitate introduction of non-GSO FSS systems while affording protection to GSO FSS and BSS, agreed to three types of $epfd_{down}$ limits. These are: validation limits, to be verified by the Radiocommunication Bureau using an agreed software tool; operational limits, to provide operational GSO earth stations protection from synchronization loss; and additional operational limits to ensure protection to operational 3 m and 10 m GSO FSS earth stations operating in the 10.7-12.75 GHz bands. The operational limits, which are single values for 100 per cent of the time, provide an opportunity for development of regulatory procedures to be implemented by the BR which would afford GSO systems a means of redress in the event such limits are exceeded by non-GSO FSS systems. The additional operational limits are specified values associated with periods of time. Such limits, as with the operational limits, must be met in practice, by each non-GSO FSS system. With regard to the additional operational $epfd_{down}$ limits, an administration proposing a non-GSO FSS system would have to commit that the proposed system will meet these additional operational limits. The Administrations propose that this requirement be met by the inclusion of an additional data entry in Appendix S4.

APPENDIX S4

Consolidated list and tables of characteristics for use in the application of the procedures of Chapter SIII

ANNEX 2A

Characteristics of satellite networks or earth or radio astronomy stations[2]

A General characteristics to be provided for the satellite network or the earth or radio astronomy station

ADD IAP/14/269

A.14 Commitment regarding compliance with additional operational epfd$_{down}$ limits

For non-geostationary satellite systems operating in the fixed-satellite service in the bands 10.7-11.7 GHz (in all Regions), 11.7-12.2 GHz (Region 2), 12.2-12.5 GHz (Region 3), and 12.5-12.75 GHz (Regions 1 and 3), a commitment that the filed for system will meet the additional operational epfd$_{down}$ limits that are specified in Table **S22-4A** under No. **S22.5G**.

NOC

2

MOD IAP/14/270

ANNEX 2B

Table of characteristics to be submitted for space and radio astronomy services

A – General characteristics of the satellite network or the earth station

Items in Appendix	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article S9	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article S9	Notification or coordination of a geostationary-satellite network (including Appendix S30B)	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station	Notice for space stations in the broadcasting-satellite service under Appendix S30 *	Notice for feeder-link stations under Appendix S30A *	Notice for stations in the fixed-satellite service under Appendix S30B	Items in Appendix	Radio astronomy
A.1.a	X	X	X	X	X		X	X	X	A.1.a	
A.1.b							X			A.1.b	
A.1.c								X		A.1.c	
A.1.d									X	A.1.d	
A.1.e.1						X				A.1.e.1	
A.1.e.2						X				A.1.e.2	X
A.1.e.3						X				A.1.e.3	
A.1.e.4										A.1.e.4	X
A.1.f	X	X	X	X	X	X	X	X	X	A.1.f	X
A.2.a	X	X	X	X	X	X	X	X	X	A.2.a	
A.2.b	X			X						A.2.b	
A.2.c										A.2.c	X
A.3			X	X	X	X	X	X		A.3	X
A.4.a.1	X			X			X	X	X	A.4.a.1	
A.4.a.2				X			X	X		A.4.a.2	
A.4.a.3				X						A.4.a.3	
A.4.a.4				X						A.4.a.4	
A.4.a.5				X						A.4.a.5	
A.4.b.1		X	X		X					A.4.b.1	
A.4.b.2		X	X		X					A.4.b.2	
A.4.b.3		X	X		X					A.4.b.3	
A.4.b.4		X	X		X					A.4.b.4	
A.4.b.5					X					A.4.b.5	
A.4.c						X				A.4.c	
A.5				X	X	X	X	X	X	A.5	
A.6				X	X	X	X	X	X	A.6	
A.7.a						X		X		A.7.a	
A.7.b						X		X		A.7.b	
A.7.c						X				A.7.c	
A.7.d						X		X		A.7.d	
A.8							X			A.8	

X Mandatory information O Optional information C This information need only be furnished when it has been used as a basis to effect coordination with another administration

* The application of this column is suspended pending the decision of WRC-99.

A – General characteristics of the satellite network or the earth station *(end)*

Items in Appendix	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article S9	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article S9	Notification or coordination of a geostationary-satellite network (including Appendix S30B)	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station	Notice for space stations in the broadcasting-satellite service under Appendix S30 *	Notice for feeder-link stations under Appendix S30A *	Notice for stations in the fixed-satellite service under Appendix S30B	Items in Appendix	Radio astronomy
A.9							X			A.9	
A.10						X				A.10	
A.11							X	X		A.11	
A.12								X		A.12	
A.13				X	X	X				A.13	
A.14					X					A.14	

Reasons: To satisfy an aspect of the compromise package relating to additional $epfd_{down}$ limits that is included in section 3.1.2.4.8 of the CPM Report.

WRC-2000 agenda item 1.13.1 - to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

Revisions to Articles S9, S11 and Appendix S5 for non-GSO systems which are subject to S22.2

a) Proposals for advanced publication under Article S9

Background information

In order to provide for the advanced publication of information for non-GSO systems, a new footnote is required for Article S9, sub-section IB, and a reference point for this footnote added to No. S9.5B.

MOD IAP/14/271

S9.5B If, upon receipt of the Weekly Circular containing information published under No. **S9.2B**, any administration considers its existing or planned satellite systems[7bis] or networks[7bis] or terrestrial stations[7] to be affected, it may send its comments to the publishing administration, so that the latter may take those comments into consideration when initiating the coordination procedure. A copy of these comments shall also be sent to the Bureau. Thereafter, both administrations shall endeavour to cooperate in joint efforts to resolve any difficulties, with the assistance of the Bureau, if so requested by either of the parties, and shall exchange any additional relevant information that may be available.

ADD IAP/14/272

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72 [7bis] **S9.5B.2** When the advanced publication of information is for a satellite network or satellite system using a non-geostationary-satellite orbit in a frequency band for which the requirement to coordinate is included in a footnote of the Table of Frequency Allocations referring to MOD **S9.10**, the only stations to be taken into account are those for which the requirement to coordinate was also under MOD **S9.10** or under **S9.12** for which advanced publication information was received between 22 November 1997 and 2 June 2000.

Reasons: These two revisions of Article S9, sub-section IB, provide for the advance publication of information for non-GSO satellites which are subject to MOD S9.10 and No. S22.2.

b) Procedure for effecting coordination in Article S9

Background information

The current use of the reference to No. S9.12 in the CPM Report is inappropriate for non-GSO FSS systems where No. S22.2 applies because the other provisions under No. S9.11A (formerly Resolution 46) do not apply. Therefore, a new entry is required to Section II of Article S9. This could be MOD S9.10 which is well placed for this purpose and is currently unused.

MOD IAP/14/273

S9.10 *cbis)* for a station in a satellite network using a non-geostationary-satellite orbit, in respect of any other satellite network using a non-geostationary-satellite orbit, with the exception of coordination between earth stations operating in the opposite direction of transmission, for which the requirement to coordinate is included in a footnote of the Table of Frequency Allocations referring to this provision;~~Not used.~~

Reasons: This is a more appropriate entry to Article S9, Section II, than S9.12.

c) Proposal for Article S11 to limit the application of the Bureau's examination

Background information

The CPM-99 agreed on validation limits, operational limits and additional operational limits to be included in Article S22 of the Radio Regulations. However, only the validation limits are to be verified by the Bureau in its examination of a non-GSO FSS filing. Since No. S11.31 applies generally, it is essential to limit its application to the validation limits.

MOD IAP/14/274

S11.31 *a)* with respect to its conformity with the Table of Frequency Allocations[7] and the other provisions[8],[8*bis*] of these Regulations, except those relating to conformity with the procedures for obtaining coordination or the probability of harmful interference, or those relating to conformity with a plan, as appropriate, which are the subject of the following sub-paragraphs;[9]

ADD IAP/14/275

[8*bis*] **S11.31.2*bis*** When examining the conformity of the notice with respect to Article **S22**, the Bureau shall limit its examination to **S22.5**, **S22.5A**, MOD **S22.5C**, MOD **S22.5D** and MOD **S22.5F** and shall take into account that, under MOD **S22.5G**, the limits contained in Tables **S22-1A** to **S22-1D** may be exceeded on the territories of countries whose administrations have so agreed.

Reasons: There are power-limit tables proposed for Article S22 other than those containing the validation limits. In Article S22, however, only the Tables containing the validation limits will be taken into account by the Bureau when a notice for a non-GSO system is being examined for its conformity to the Radio Regulations.

d) Modifications to Appendix S5 that are consequential to the modifications to Article S9

Background information

Consequential to the modifications to Article S9, the references to Resolutions 130 and 538 in Appendix S5 must be replaced with references to Article S9.

ADD IAP/14/276

APPENDIX S5

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.10** Non-GSO/ non-GSO	A station in a satellite network using a non-geostationary-satellite orbit in the frequency bands for which a footnote refers to MOD S9.10 in respect of any other satellite using a non-geostationary-satellite orbit, with the exception of coordination between earth stations operating in the opposite direction of transmission	10.7-11.7 GHz 11.7-12.2 GHz (Region 2) 12.2-12.5 GHz (Region 3) 12.5-12.75 GHz 12.75-13.25 GHz 13.75-14.5 GHz 17.3-18.1 GHz (Region 1, Region 3) 17.8-18.6 GHz 19.7-20.2 GHz 27.5-28.6 GHz 29.5-30 GHz	Condition: bandwidths overlap	Check by using the assigned frequencies and bandwidths	

Reasons: These modifications to Appendix S5 are to replace the references to Resolutions 130 and 538 with references to No. S9.10 in Article S9. Note, there are consequential revisions to Table S5-1A in Appendix S5 to delete the frequency bands which are referred to in column 3 above.

WRC-2000 agenda item 1.13.1 - to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

Additions and/or modifications to Articles S9, S11, S22 and Appendices S4 and S5 to require coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antenna

Background information

WRC-97 adopted provisional power flux-density limits in certain frequency bands which would apply to non-GSO FSS systems to protect GSO FSS networks, and GSO BSS networks. Resolution 130 (WRC-97), *Use of non-geostationary systems in the fixed-satellite service in certain frequency bands*, and Article S22 of the Radio Regulations contain limits corresponding to an interference level caused by one non-GSO system in the frequency bands 10.7-12.75 GHz, 17.8-18.6 GHz, and 19.7-20.2 GHz. Studies demonstrate that neither the WRC-97 provisional $epfd_{down}$ limits and associated percentages of time nor the proposed modifications agreed during ITU-R studies adequately protect existing GSO FSS networks with very large earth station antennas. Section 3.1.2 of the CPM Report for WRC-2000 concludes that transmissions to earth stations with very large antennas need to be protected and that an additional regulatory procedure would be necessary. Coordination triggers based on the characteristics of the satellite network using the GSO were agreed by the ITU-R and confirmed by CPM-99. In addition to the GSO network triggers, it was decided to include the condition of the $epfd_{down}$ radiated by the non-GSO FSS system. CPM-99-2 decided that two values would be needed in each band and that exceeding either $epfd_{down}$ value would trigger coordination. WP 4A completed the studies on the $epfd_{down}$ thresholds to trigger coordination. Annex 3 to Chapter 3 of the CPM Report contains example regulatory and procedural text and the coordination triggers agreed by WP 4A. Building on the CPM Report text, this proposal includes additions and/or modifications to Articles S9, S11 and S22 and Appendices S4 and S5 to require coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large earth station antennas.

ARTICLE S9

Sub-Section IIA – Requirement and request for coordination

ADD IAP/14/277

S9.7A *a1)* [11bis, 11ter] for a specific earth station within a geostationary-satellite network in the fixed-satellite service in certain frequency bands in respect of a non-geostationary-satellite system in the fixed-satellite service;

ADD IAP/14/278

S9.7B *a2)* [11bis, 11ter] for a non-geostationary-satellite system in the fixed-satellite service in certain frequency bands in respect of a specific earth station within a geostationary-satellite network in the fixed-satellite service;

ADD IAP/14/279

[11bis] **S9.7A.1** and **S9.7B.1** The coordination of a specific earth station under **S9.7A** or **S9.7B** shall remain within the authority of the administration having this station located on its territory.

ADD IAP/14/280

[11ter] **S9.7A.2** and **S9.7B.2** Coordination information relating to a specific earth station received by the Bureau prior to [date to be established by WRC-2000] is considered as complete **S9.7A** or **S9.7B** information from the date of receipt of complete information of the associated satellite network under **S9.7** provided that the characteristics of the specific earth stations are within the parameters of any typical earth station included in the GSO FSS network coordination request.

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[12] **S9.8.1** and **S9.9.1** Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending a decision of WRC-~~99~~2000 on the revision of these two Appendices.

Reasons: GSO FSS earth stations with very large antennas are not adequately protected by the $epfd_{down}$ limits contained in Tables ADD S22-1A to S22-1C and case-by-case coordination of systems operating co-frequency, co-directional links in the space-to-Earth direction would then be required. The proposed ADD S9.7A and ADD S9.7B would require coordination between non-GSO FSS transmit satellites and GSO FSS receive earth stations with very large antennas. Proposals IAP/14/60, 61, 62, 76, and 77 include footnotes referencing ADD S9.7A and ADD S9.7B to Tables S22-1A, S22-1B, S22-1C, S22-4A, S22-4B, respectively. By referring to coordination provisions under S9.7A and S9.7B, the request for coordination would be sent by the requesting administration to the Bureau under S9.30. The Bureau would act under S9.34 to identify administrations with which coordination may need to be effected and publish the information in the Weekly Circular. Since coordination between a non-GSO FSS space station and very large GSO FSS earth stations is a new type of coordination that does not currently exist in Article S9, it is necessary to add two new entry points in Article S9:

- One entry point to enable the non-GSO space station administration to request coordination with administrations having specific very large earth station antennas located on their territory.

- Another entry point to enable the reciprocal coordination to take place, i.e. the possibility for an administration planning to implement a specific very large GSO earth station stations located on their territory to request coordination with administrations having non-GSO FSS transmit space stations.

ARTICLE S11

Notification and recording of frequency assignments[1, 2, 3]

Section II – Examination of notices and recording of frequency assignments in the Master Register

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S11.32A *c)* with respect to the probability of harmful interference that may be caused to or by assignments recorded with a favourable finding under Nos. **S11.36** and **S11.37** or **S11.38**, or recorded in application of No. **S11.41**, or published under Nos. **S9.38** or **S9.58** but not yet notified, as appropriate, for those cases for which the notifying administration states that the procedure for coordination under Nos. **S9.7, S9.7A** or **S9.7B** could not be successfully completed (see also No. **S9.65**);[10] or

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[10] **S11.32A.1** The examination of such notices with respect to any other frequency assignment for which a request for coordination under Nos. **S9.7, S9.7A** or **S9.7B** has been published under No. **S9.38** but not yet notified shall be effected by the Bureau in the order of their publication under the same number using the most recent information available.

Reasons: The insertion of a coordination trigger related to $epfd_{down}$ level radiated by the non-GSO FSS system into the earth station employing the very large antenna considered when this earth station is pointed to the wanted GSO satellite provides a mechanism to examine the notice with respect to the probability of harmful interference that may be caused to or by above-listed assignments, and therefore S11.38 and S11.41 are applicable.

MODIFICATIONS TO APPENDIX **S4**

ANNEX 2B

Table of characteristics to be submitted for space and radio astronomy services

The required characteristics for coordinating specific very large GSO earth stations with non-GSO FSS transmit space stations could be items for “Notification or coordination of a geostationary-satellite network (including Appendix **S30B**)” or “Notification or coordination of an earth station”.

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C – Characteristics to be provided for each group of frequency assignments for a satellite antenna beam or an earth station antenna

Items in Appendix	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article S9	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article S9	Notification or coordination of a geostationary-satellite network (including Appendix S30B)	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station	Notice for space stations in the broadcasting-satellite service under Appendix S30 *	Notice for feeder-link stations under Appendix S30A *	Notice for stations in the fixed-satellite service under Appendix S30B	Items in Appendix	Radio astronomy
C.1	X	X	X						X	C.1	
C.2.a				X	X	X	X	X		C.2.a	
C.2.b										C.2.b	X
C.3.a				X	X	X		X		C.3.a	
C.3.b										C.3.b	X
C.4	X	X	X	X	X	X	X	X		C.4	X
C.5.a			X	X	X			X	X	C.5.a	
C.5.b						X				C.5.b	
C.5.c										C.5.c	X
C.6			X	X	X	X	X	X		C.6	
C.7.a			O	X[9]	X	X[9]	X	X		C.7.a	
C.7.b			O	C[9]	C	C[9]				C.7.b	
C.7.c			O	C[9]	C	C[9]				C.7.c	
C.7.d			O	C	C	C				C.7.d	
C.8.a			X[1, 7]	X[7]	X[7]	C[8]				C.8.a	
C.8.b			X[1, 7]	X[7]	X[7]	X[7]				C.8.b	
C.8.c			O	X[6]	X[6]	X[6]				C.8.c	
C.8.d				X[2]	X[2]					C.8.d	
C.8.e			O	X[6]	X[6]	X[6]				C.8.e	
C.8.f			X[3]							C.8.f	
C.8.g				C[4]	C[4]	C[4, 5]				C.8.g	
C.8.h							X			C.8.h	
C.8.i								X		C.8.i	
C.8.j									X	C.8.j	

X Mandatory information O Optional information C This information need only be furnished when it has been used as a basis to effect coordination with another administration

1 Only the value of maximum power density is mandatory.

2 For transmission from the space station only.

3 For space-to-space relay only.

4 For transmission from the earth station only.

5 Not required for coordination under Nos. **S9.15**, **S9.17** or **S9.17A**.

6 Required, if applicable, for the type of transmission. If not applicable, a reason why it is not applicable is required.

7 One or the other of C.8.a or C.8.b is mandatory, but not both.

8 Only the value of total peak envelope power is required for coordination under Nos. **S9.15**, **S9.17** or **S9.17A**.

9 Information mandatory for coordination under No. ADD **S9.7A**.

NOTE – Additional characteristics to be provided may include A.4.c, A.1.e.1, A.1.e.2, C.4, B.5 and C.5.b. As a result of decisions that may be made at WRC-2000, these additional characteristics may replace C.10.a, C.10.b, C.10.c.1, C.10.c.2 and C.10.c.5 in the notification or coordination of an earth station column.

* The application of this column is suspended pending the decision of WRC-99.

C – Characteristics to be provided for each group of frequency assignments for a satellite antenna beam or an earth station antenna *(end)*

Items in Appendix	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article S9	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article S9	Notification or coordination of a geostationary-satellite network (including Appendix S30B)	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station	Notice for space stations in the broadcasting-satellite service under Appendix S30 *	Notice for feeder-link stations under Appendix S30A *	Notice for stations in the fixed-satellite service under Appendix S30B	Items in Appendix	Radio astronomy
C.9.a			O	C	C					C.9.a	
C.9.b							X	X		C.9.b	
C.9.c			X		X					C.9.c	
C.10.a			X	X[9]	X	C[9]				C.10.a	
C.10.b			X	X[9]	X	C[9]		X		C.10.b	
C.10.c.1			X	X[9]	X	C[9]		X	X	C.10.c.1	
C.10.c.2			X	X[9]	X	C[9]		X	X	C.10.c.2	
C.10.c.3			O	X	X			X	X	C.10.c.3	
C.10.c.4			X	X	X			X	X	C.10.c.4	
C.10.c.5			X	X[9]	X	C[9]			X	C.10.c.5	
C.10.c.6								X		C.10.c.6	
C.11.a	X[10]	X[10]	X	X	X					C.11.a	
C.11.b								X		C.11.b	
C.11.c							X		X	C.11.c	
C.11.d					X					C.11.d	
C.12									X	C.12	
C.13										C.13	X
C.14							X			C.14	

X Mandatory information O Optional information C This information need only be furnished when it has been used as a basis to effect coordination with another administration

[9] Information mandatory for coordination under No. ADD **S9.7A**.

NOTE – Additional characteristics to be provided may include A.4.c, A.1.e.1, A.1.e.2, C.4, B.5 and C.5.b. As a result of decisions that may be made at WRC-2000, these additional characteristics may replace C.10.a, C.10.b, C.10.c.1, C.10.c.2 and C.10.c.5 in the notification or coordination of an earth station column.

[10] Only the list of country or geographic designators or a narrative description of the service area shall be supplied.

Reasons: This is consequential to ADD S9.7A and ADD S9.7B. Administrations will need to submit specific earth station information for earth stations associated with geostationary-satellite networks in the fixed-satellite service meeting the conditions in the proposed addition to Appendix S5. Since there is currently no requirement to give the specific locations of earth stations, in addition to ADD S9.7A.2 and ADD S9.7B.2, a resolution for the transition period may also be needed to have typical earth stations associated with GSO FSS networks, already in coordination or notified, that meet the criteria to be brought in as specific earth stations. In this resolution, there will have to be some guidance on date priorities. The modifications under the column for *Notification or coordination of a geostationary-satellite network (including Appendix S30B)* would apply to earth stations associated with GSO FSS networks already in coordination or notified. The modifications in the column for *Notification or coordination of an earth station* would apply to earth stations communicated to the Bureau after the date established by WRC-2000 under ADD S9.7A.1 and ADD S9.7B.1. Additional guidance will need to be added to the *Instructions for Filling Out the Form of Notice ApS4/II and ApS4/III Relating to Space Radiocommunications Stations* distributed by Circular Letter CR/65 or in a similar instruction.

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D – Overall link characteristics

Items in Appendix	Advance publication of a geostationary-satellite network	Advance publication of a non-geostationary-satellite network subject to coordination under Section II of Article S9	Advance publication of a non-geostationary-satellite network not subject to coordination under Section II of Article S9	Notification or coordination of a geostationary-satellite network (including Appendix S30B)	Notification or coordination of a non-geostationary-satellite network	Notification or coordination of an earth station	Notice for space stations in the broadcasting-satellite service under Appendix S30 *	Notice for feeder-link stations under Appendix S30A *	Notice for stations in the fixed-satellite service under Appendix S30B	Items in Appendix	Radio astronomy
D.1				X						D.1	
D.2.a				X[9]		C[9]				D.2.a	
D.2.b				X						D.2.b	

X Mandatory information   O Optional information   C This information need only be furnished when it has been used as a basis to effect coordination with another administration

[9] Information mandatory for coordination under No. ADD **S9.7A**.

* The application of this column is suspended pending the decision of WRC-99.

Reasons: This is consequential to ADD S9.7A and ADD S9.7B and will be required when simple frequency-changing transponders are used on the space station.

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APPENDIX S5

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.7A** GSO earth station/ non-GSO system	A specific earth station in a geostationary-satellite network in the fixed-satellite service in respect of a non-geostationary-satellite system in the fixed-satellite service.	The following frequency bands: 10.7-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 17.8-18.6 GHz (space-to-Earth), and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) the frequency bands overlap; and ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations and meets all of the following conditions: a) earth station antenna maximum isotropic gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; b) G/T of 44 dB/K or higher; c) space station emission bandwidth of 250 MHz or higher for the frequency bands 10.7-12.75 GHz or 800 MHz or higher for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; and	i) compare frequency bands; ii) use the maximum antenna gain (G) of the specific receive earth station (Appendix **S4** C.10 *c)* 2)), the lowest total receiving system noise temperature (T) (Appendix **S4** C.10 *c)* 5) or D.2 *a)*, as appropriate), and the space station emission bandwidth (Appendix **S4** C.7 *a*)) in the geostationary-satellite network as given in Appendix **S4** data; and iii) use the epfd_{down} radiated by the non-GSO FSS system into the earth station employing the very large antenna when this antenna is pointed towards the wanted GSO satellite	The threshold/condition for coordination does not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
			iii) the $epfd_{down}$ from the satellite system using the non-geostationary orbit exceeds: a) –174.5 dB(W/(m^2 · 40 kHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude, or –202 dB(W/ (m^2 · 40 kHz)) for any percentage of the time for non-GSO systems with any satellites operating above 2 500 km altitude in the frequency band 10.7-12.75 GHz; b) –157 dB(W/(m^2 · MHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude or –185 dB(W/(m2 · MHz)) for any percentage of the time for non-GSO systems with any satellites operating above 2 500 km altitude in the frequency bands 17.8-18.6 GHz or 19.7-20.2 GHz		

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.7B** non-GSO system/ GSO earth station	A non-geostationary-satellite system in the fixed-satellite service in respect of a specific earth station in a geostationary-satellite network in the fixed-satellite service.	The following frequency bands: 10.7-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 17.8-18.6 GHz (space-to-Earth), and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) the frequency bands overlap; and ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations and meets all of the following conditions: a) earth station antenna maximum isotropic gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; b) G/T of 44 dB/K or higher; c) space station emission bandwidth of 250 MHz or higher for the frequency bands 10.7-12.75 GHz or 800 MHz or higher for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; and iii) the $epfd_{down}$ from the satellite system using the non-geostationary orbit exceeds:	i) compare frequency bands; ii) use the maximum antenna gain (G) of the specific receive earth station (Appendix **S4** C.10 *c)* 2)), the lowest total receiving system noise temperature (T) (Appendix **S4** C.10 *c)* 5) or D.2 *a)*, as appropriate), and the space station emission bandwidth (Appendix **S4** C.7 *a*)) in the geostationary-satellite network as given in Appendix **S4** data; and iii) use the $epfd_{down}$ radiated by the non-GSO FSS system into the earth station employing the very large antenna when this antenna is pointed towards the wanted GSO satellite	The threshold/condition for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
			a) –174.5 dB(W/(m^2 · 40 kHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude, or –202 dB(W/(m^2· 40 kHz)) for any percentage of the time for non-GSO systems with any satellites operating above 2 500 km altitude in the frequency band 10.7-12.75 GHz; b) –157 dB(W/(m^2 · MHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude or –185 dB(W/(m^2 · MHz)) for any percentage of the time for non-GSO systems with any satellites operating above 2 500 km altitude in the frequency bands 17.8-18.6 GHz or 19.7-20.2 GHz		

Reasons: This is consequential to ADD S9.7A and S9.7B.

WRC-2000 agenda item 1.13.1 - to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

Protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where epfd limits have been adopted

Background information

The ITU-R and CPM-99 agreed that "[t]here is a need to provide a regulatory mechanism that would ensure protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where equivalent power flux-density (epfd) limits have been adopted." CPM-99 Report at section 3.1.1.3.2. With respect specifically to the GSO BSS, section 3.1.3.1.4(b) of the CPM-99 Report to WRC-2000 states that "[t]here is a need to ensure that the aggregate epfd produced by all co-frequency non-GSO FSS systems does not exceed the maximum interference levels, as determined by the agreed to aggregate epfd masks, that are necessary to protect these GSO BSS systems." This agreement can be implemented by including aggregate $epfd_{down}$ limits annexed to a WRC-2000 Resolution. Such a Resolution is proposed below based on the agreement reached within the ITU-R.

In addition to the single-entry $epfd_{down}$ limits (validation, operational, and additional operational), CPM-99 agreed that a mechanism was needed which would provide assurance to GSO FSS and GSO BSS systems that the aggregate interference from all non-GSO FSS systems would not exceed that determined as an acceptable level. Aggregate validation limits had already been developed within the ITU-R based on the single-entry validation limits and are contained in Table WWW-1A to WWW-1D below.

Additional language has been added to Resolution WWW (WRC-2000) to call for the development of procedures in an ITU-R recommendation that can be used by administrations during non-GSO FSS coordinations and to recognize that Resolution 130 (Rev.WRC-2000) calls for the development of an ITU-R recommendation on additional operational limits.

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RESOLUTION WWW (WRC-2000)

Protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where epfd limits have been adopted

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-97 has adopted, in Article **S22**, provisional epfd limits to be met by non-GSO FSS systems in order to protect GSO FSS and GSO BSS networks in parts of the frequency range 10.7-30 GHz;

b) that WRC-2000 has revised Article **S22** to ensure the limits contained therein provide adequate protection to GSO systems without causing undue constraints to any of the systems and services sharing these frequency bands;

c) that Article **S22** includes single entry validation, operational and for certain antenna sizes additional operational epfd limits which apply to non-GSO FSS systems in these bands;

d) that these single-entry validation limits have been derived from aggregate equivalent power flux-density (epfd) masks, assuming a maximum effective number of non-GSO FSS systems of 3.5;

e) that the aggregate interference caused by all co-frequency non-GSO FSS systems in these bands into GSO FSS systems should not exceed the maximum interference levels that are necessary to protect these GSO systems;

f) that WRC-97 decided, and WRC-2000 confirmed, that non-GSO FSS systems in these bands are to coordinate the use of these frequencies between themselves under the provisions of No. **S9.10** of the Radio Regulations;

g) that the orbital characteristics of such systems are likely to be inhomogeneous;

h) that as a result of this likely inhomogeneity, the aggregate epfd levels from multiple non-GSO FSS systems are not directly related to the number of actual systems sharing a frequency band, and the number of such systems operating co-frequency is likely to be small;

i) that the possible misapplication of single entry limits should be avoided,

recognizing

a) that non-GSO FSS systems are likely to need to implement interference mitigation techniques to share frequencies among themselves;

b) that because the use of such interference mitigation techniques will likely keep the number of non-GSO systems small, the aggregate interference caused by non-GSO FSS systems into GSO systems will also likely be small;

c) that notwithstanding *considering e)* and *recognizing b)*, there may be instances where the aggregate interference from non-GSO systems could exceed the interference levels given in Annex 1;

d) that administrations operating GSO systems may wish to ensure that the aggregate epfd produced by all operating co-frequency non-GSO FSS systems in the frequency bands referred to in *considering a)* above into GSO FSS and/or GSO BSS networks does not exceed the aggregate interference levels given in Annex 1,

further recognizing

e) that Resolution **130** (**Rev.WRC-2000**) requests the ITU-R to develop a recommendation that includes the aggregate additional operational limits contained in Annex 2 of Resolution **130** to be used as guidance by administrations during their non-GSO FSS coordinations,

resolves

1 that administrations operating or planning to operate non-GSO FSS systems in the frequency bands referred to in *considering a)* above, individually or in collaboration, take all possible steps, including by means of appropriate modifications to their systems if necessary, to ensure that the actual aggregate interference into GSO FSS and GSO BSS networks caused by such systems operating co-frequency in these frequency bands does not exceed the aggregate power levels shown in Annex 1, (see No. **S22.5K**);

2 that, in the event that an administration operating a GSO network identifies that the aggregate interference levels in Annex 1 are exceeded, administrations operating non-GSO FSS systems in these frequency bands shall expeditiously take all necessary measures to reduce the aggregate epfd levels to those in Annex 1 or to reduce such interference to higher levels that are acceptable to the affected GSO administration, (see No. **S22.5K**),

requests ITU-R

1 to develop, as a matter of urgency, and complete, in time for consideration by the next WRC, a methodology, based on the worst case non-GSO FSS satellite pfd mask and other conservative assumptions, for calculating the aggregate epfd produced by all non-GSO FSS systems operating or planning to operate co-frequency in the frequency bands referred to in *considering a)* above into GSO FSS and GSO BSS networks and for comparing the calculated levels with the aggregate power levels shown in Annex 1;

2 to continue its studies on the accurate modelling of interference from non-GSO FSS systems into GSO FSS and GSO BSS networks in the frequency bands referred to in *considering a)* above in order to assist the administrations planning or operating non-GSO FSS systems in their efforts to limit the aggregate epfd levels produced by their systems into GSO networks;

3 to develop a recommendation, as a matter of urgency, that contains procedures to be used amongst administrations to ensure that the aggregate epfd limits contained in Annex 1 are not exceeded by operators of non-GSO FSS systems,

requests the Director of the Radiocommunication Bureau

1 to assist in the development of the methodology referred to in *requests ITU-R* 1 above;

2 to report to WRC-02/03 on the results of studies in *requests ITU-R* 1 and 3 above.

ANNEX 1 TO RESOLUTION WWW (WRC-2000)

TABLE **WWW-1A**[1,3]

Limits to the aggregate $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$epfd_{down}$ dB(W/m^2)	Percentage of time during which $epfd_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[2]
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3	–170.0 –168.6 –165.3 –160.4 –160.0 –160.0	0 90 99 99.97 99.99 100	40	60 cm Rec. ITU-R S.[4/57]
	–176.5 –173.0 –164.0 –161.6 –161.4 –160.8 –160.5 –160 –160	0 99.5 99.84 99.945 99.97 99.99 99.99 99.9975 100	40	1.2 m Rec. ITU-R S.[4/57]
	–185 –184 –182 –168 –164 –162 –160 –160	0 90 99.5 99.9 99.96 99.982 99.997 100.00	40	3 m Rec. ITU-R S.[4/57]
	–190 –190 –166 –160 –160	0 99 99.99 99.998 100	40	10 m Rec. ITU-R S.[4/57]

1 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

2 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

3 In addition to the limits shown in Table **WWW-1A**, the following aggregate $epfd_{down}$ limits apply to all antenna sizes greater than 60 cm in the frequency bands listed in Table **WWW-1A**.

100% of the time $epfd_{down}$ dB(W/(m^2 · 40 kHz))	Latitude (North or South) (°)
–160	0 < |Latitude| ≤ 57.5
–160 + 3.4(57.5 - |Latitude|)/4	57.5 < |Latitude| ≤ 63.75
–165.3	63.75 ≤ |Latitude|

TABLE **WWW-1B**[1]

Limits to the aggregate epfd$_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	epfd$_{down}$ dB(W/m^2)	Percentage of time during which epfd$_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[2]
17.8-18.6	–170 –170 –164 –164	0 90 99.9 100	40	1 m Rec. ITU-R S.[4/57]
	–156 –156 –150 –150	0 90 99.9 100	1 000	
17.8-18.6	–173 –173 –166 –164 –164	0 99.4 99.9 99.92 100	40	2 m Rec. ITU-R S.[4/57]
	–159 –159 –152 –150 –150	0 99.4 99.9 99.92 100	1 000	
17.8-18.6	–180 –180 –172 –164 –164	0 99.8 99.8 99.992 100	40	5 m Rec. ITU-R S.[4/57]
	–166 –166 –158 –150 –150	0 99.8 99.8 99.992 100	1 000	

1 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

2 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

TABLE **WWW-1C**[1]

Limits to the aggregate $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$epfd_{down}$ dB(W/m^2)	Percentage of time during which $epfd_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[2]
19.7-20.2	–182 –172 –154 –154	0 90 99.94 100	40	70 cm Rec. ITU-R S.[4/57]
	–168 –158 –140 –140	0 90 99.94 100	1 000	
19.7-20.2	–185 –176 –165 –160 –154 –154	0 91 99.8 99.8 99.99 100	40	90 cm Rec. ITU-R S.[4/57]
	–171 –162 –151 –146 –140 –140	0 91 99.8 99.8 99.99 100	1 000	
19.7-20.2	–191 –162 –154 –154	0 99.933 99.998 100	40	2.5 m Rec. ITU-R S.[4/57]
	–177 –148 –140 –140	0 99.933 99.998 100	1 000	
19.7-20.2	–195 –184 –175 –161 –154 –154	0 90 99.6 99.984 99.9992 100	40	5 m Rec. ITU-R S.[4/57]
	–181 –170 –161 –147 –140 –140	0 90 99.6 99.984 99.9992 100	1 000	

[1] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[2] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

TABLE **WWW-1D**[2, 3]

Limits to the aggregate $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands into 30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm and 300 cm BSS antennas

Frequency band (GHz)	**$epfd_{down}$ dB(W/m^2)**	**Percentage of time during which epfddown level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern**[1]
11.7- 12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–160.400 –160.100 –158.600 –158.600 –158.330 –158.330	0.000 25.000 96.000 98.000 98.000 100.000	40	30 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–170.000 –167.000 –164.000 –160.750 –160.000 –160.000	0.000 66.000 97.750 99.330 99.950 100.000	40	45 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–171.000 –168.750 –167.750 –162.000 –161.000 –160.200 –160.000 –160.000	0.000 90.000 97.800 99.600 99.800 99.900 99.990 100.000	40	60 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–173.75 –173 –171 –165.5 –163 –161 –160 –160.000	0.000 33.000 98.000 99.100 99.500 99.800 99.970 100.000	40	90 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–177.000 –175.250 –173.750 –173.000 –169.500 –167.800 –164.000 –161.900 –161.000 –160.400 –160.000	0.000 90.000 98.900 98.900 99.500 99.700 99.820 99.900 99.965 99.993 100.000	40	120 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

11.7-12.5 GHz in Region 1 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3 12.2-12.7 GHz in Region 2	–179.500 –178.660 –176.250 –163.250 –161.500 –160.350 –160.000 –160.000	0.000 33.000 98.500 99.810 99.910 99.975 99.995 100.000	40	180 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz in Region 1 11.7-12.2 GHz and 12.5-12.75 GHz in Region 3 12.2-12.7 GHz in Region 2	–182.000 –180.900 –178.000 –164.400 –161.900 –160.500 –160.000 –160.000	0.000 33.000 99.250 99.850 99.940 99.980 99.995 100.000	40	240 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 GHz In Region 1 11.7-12.2 GHz and 12.5-12.75 GHz In Region 3 12.2-12.7 GHz In Region 2	–186.500 –184.000 –180.500 –173.000 –167.000 –162.000 –160.000 –160.000	0.000 33.000 99.500 99.700 99.830 99.940 99.970 100.000	40	300 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

1 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO BSS systems.

2 For BSS antenna diameters 180 cm, 240 cm and 300 cm, in addition to the aggregate limit shown in Table **WWW-1D**, the following aggregate 100% of the time $epfd_{down}$ limit also applies:

100% of the time $epfd_{down}$ dB(W/(m^2 · 40 kHz))	**Latitude (North or South) (°)**
–160.0	0 < |Latitude| ≤ 57.5
–160.0 + 3.4 * (57.5 - |Latitude|)/4	57.5 < |Latitude| ≤ 63.75
–165.3	63.75 ≤ |Latitude|

3 For BSS antenna diameter 240 cm, in addition to the aggregate 100% of the time $epfd_{down}$ limit specified in footnote 2 of this table, a –167 dB(W/(m^2 · 40 kHz)) aggregate 100% of the time operational $epfd_{down}$ limit also applies to receive antennas located in Region 2, west of 140° W, north of 60° N, pointing toward GSO BSS satellites at 91° W, 101° W, 110° W, 119° W and 148° W with elevation angles greater than 5°. [This limit is implemented during a transition period of [15] years.]*

* This transitional regime would be applicable only if the pfd limits in section 5 *c)* of Annex 1 to Appendix **S30** are sufficiently relaxed.

Reasons: The ITU-R agreed that there is a need to provide a regulatory mechanism that would ensure protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where $epfd_{down}$ limits have been adopted. See section 3.1.1.3.2 of the CPM Report to WRC-2000. The aggregate limits contained in Tables WWW-1A to WWW-1D above are related to the single entry validation limits proposed in Tables S22-1A to S22-1D using the conversion methodology and conversion factor of 3.5, both agreed upon within the ITU-R.

In addition to the single-entry $epfd_{down}$ limits (validation, operational, and additional operational), CPM-99 agreed that a mechanism was needed which would provide assurance to GSO FSS and GSO BSS systems that the aggregate interference from all non-GSO FSS systems would not exceed that determined as an acceptable level. Aggregate validation limits had already been developed within the ITU-R based on the single-entry validation limits and are contained in Table WWW-1A to WWW-1D.

The square brackets around the last sentence in footnote 3 of Table WWW-1D can be removed only if the pfd limits in section 5 *c*) of Annex 1 to Appendix S30 are sufficiently relaxed as described in section 5.2.3.5 of the CPM Report.

WRC-2000 agenda item 1.13.1 - to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

Section VII

Background information

The CPM-99 Report indicated the need for regulatory procedures to implement the operational and additional operational $epfd_{down}$ limits which identify non-GSO systems exceeding the operational/additional operational limits and ensure immediate reduction of the interference level to the operational/additional operational limits by any non-GSO system exceeding those limits. The procedures proposed below, which would form a new Section VII to Article S15, were developed in response to this requirement.

Proposed section to include in Section VII - Article S15 for assuring compliance with operational limits and additional operational limits in Article S22

ADD IAP/14/288

S15.47 § 35 When an administration identifies $epfd_{down}$ levels in excess of the applicable operational $epfd_{down}$ limits or additional operational $epfd_{down}$ limits of Tables **S22-4A** and **S22-4B** and footnote 3 to Table **S22-1D** of the Radio Regulations, it shall first attempt to identify the source of the excess $epfd_{down}$ levels.

S15.48 § 36 If the administration operating the affected geostationary satellite network is able to identify the source of the excess $epfd_{down}$ interference, the administration may proceed to No. **S15.56** below.

S15.49 § 37 An administration that is unable to determine the source of the excess $epfd_{down}$ interference it is experiencing shall send a request for cooperation to all administrations operating non-geostationary fixed-satellite service systems in the band(s) where excess $epfd_{down}$ interference was experienced. The request should provide all relevant details, such as the location and operating frequencies of the affected geostationary earth station, and provide the dates, times, and, if available, levels of the excess $epfd_{down}$ interference experienced. A copy of the request shall be sent concurrently to the Bureau and to the non-GSO FSS operators, where possible.

S15.50 § 38 Each administration receiving the request shall acknowledge receipt, within 5 days. The administration receiving the request is urged to provide, with its acknowledgement, any information that may be used to identify the source of the excess $epfd_{down}$ interference. A copy of the acknowledgment and associated information shall be provided concurrently to the Bureau.

S15.51 § 39 If any administration fails to respond to a request made within 5 days, the Bureau shall send, by the close of the next business day, each such non-responding administration the acknowledgment called for in No. **S15.50** to be provided within 3 days thereafter. The Bureau shall provide copies of the request to the requesting administration and all recipients of the initial request.

S15.52 § 40 Once an administration has acknowledged receipt of the request made in No. **S15.49** above, it shall, within an additional 3 days thereafter, provide the requesting administration, the Bureau, and all other recipients of the initial request pursuant to No. **S15.49** above either with an admission that a non-geostationary fixed-satellite service system for which it is responsible is the cause of the excess $epfd_{down}$ interference or with information indicating that no non-geostationary fixed-satellite service system for which it is responsible could have caused the excess $epfd_{down}$ interference experienced by the network of the requesting administration.

S15.53 § 41 If any administration receiving a request pursuant to No. **S15.51** above fails to respond within the specified 3 day period, the Bureau shall immediately include the following statement in the "Remarks" column of the Master Register for the relevant frequency assignments for the subject non-geostationary fixed-satellite service system: "The use of these frequency bands by [name of system/name of administration] is the subject of an unresolved complaint of excess interference."

S15.54 § 42 The statement shall remain in the Master Register until such time as the responsible administration either provides information pursuant to No. **S15.52** above indicating that its non-geostationary fixed-satellite system is not the cause of the excess interference or, if it is the source of the excess $epfd_{down}$ interference, that it has complied with the obligations set forth in **S15.57**. The Bureau shall include notice of this entry in the Master Register in the Weekly Circular.

S15.55 § 43 If any administration fails to provide a timely and complete response pursuant to No. **S15.51** above, the remedial measures of Nos. **S15.52** and **S15.53** shall apply.

S15.56 § 44 Once the source of the excess $epfd_{down}$ interference has been identified, the administration operating the affected GSO satellite network shall inform the administration operating the non-geostationary fixed-satellite service system causing the excess interference of the excess, and request immediate corrective action. The notification/request for corrective action should provide all relevant details such as the amount and source of the excess $epfd_{down}$ interference received, and shall be copied to the Radiocommunication Bureau.

S15.57 § 45 Upon receipt of a request for corrective action made pursuant to No. **S15.56** above, the administration operating the non-geostationary fixed-satellite service system causing the excess interference shall immediately reduce emissions of the subject system to the levels required in Table **S22-4A** or Table **S22-4B** or footnote 3 to Table **S22-1D**, as appropriate, and, within 5 days of receipt of the request, so advise the administration whose network is affected. A copy of the acknowledgement and confirmation of the action taken shall be sent to the Bureau.

S15.58 § 46 Within 5 days after receipt of a request for corrective action made pursuant to No. **S15.56** above, in cases where the procedures in Nos. **S15.49** through **S15.55** above had not previously been applied, the administration receiving the request may, as an alternative to reducing emissions in the manner set forth in No. **S15.57**, provide the requesting administration and the Bureau with information indicating that no non-geostationary fixed-satellite service system for which it is responsible could have caused the excess $epfd_{down}$ interference experienced by the network of the requesting administration. In such a case, the procedures in Nos. **S15.49** through **S15.55** shall be applied before the procedures in Nos. **S15.59** and **S15.60** may be applied.

S15.59 § 47 If any administration fails to comply with No. **S15.57** above, the Bureau shall immediately include the following statement in the "Remarks" column of the Master Register for the relevant frequency assignments for the subject non-geostationary fixed-satellite service system: "The use of these frequency bands by [name of system/name of administration] is in violation of Nos. **S22.5G** and **S22.2** of the Radio Regulations."

The Bureau shall include notice of this entry in the Master Register in the Weekly Circular. The statement in the "Remarks" column shall remain in the Master Register until such time as the responsible administration complies with No. **S15.57** above.

S15.60 § 48 If after 30 days from the entry of the statement in the Master Register pursuant to No. **S15.59**, the administration operating the non-geostationary fixed-satellite service system causing the excess interference has not reduced emissions of the subject system to the levels required in Table **S22-4A** or Table **S22-4B** or footnote 3 to Table **S22-1D**, as appropriate, the Bureau shall:

The content of S15.60 § 48 will depend on the option selected. For consideration by WRC-2000, CITEL has identified the following possible options for the completion of this provision:

- *Suspension of right to international recognition,*
- *Cancellation of entry in MIFR,*
- *No further action,*
- *Other possible options.*

Reasons: CPM-99 agreed that "validation" masks, in conjunction with "operational" and "additional operational" limits, as appropriate, would adequately protect GSO FSS and GSO BSS systems. CPM-99 also agreed on the need for regulatory procedures to implement the operational limits which identify any non-GSO FSS systems exceeded in the operational limits and ensure immediate reduction of the interference level to the operational limits by any non-GSO FSS system exceeding those limits. See sections 3.1.2.4.7, 3.1.2.4.8, and 3.1.6.2 of the CPM Report. The procedures proposed above respond to this need.

WRC-2000 agenda item 1.13.1 - to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

Proposed suppression of Annex 1 to Resolution 130 (WRC-97)

Background information

Some modifications to Resolution 130 are currently being reviewed by CITEL Administrations. The proposals below are submitted since the limits in the Annex to this Resolution have been revised and are to be included in Article S22.

SUP IAP/14/289

ANNEX 1 TO RESOLUTION 130 (WRC-97)

Provisional limits

Reasons: Suppression of Annex 1 is as recommended in Annex 5 to Chapter 3 of the Report of CPM-99-2.

WRC-2000 agenda item 1.13.1 - to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

Suppresion of Annex 1 to Resolution 538 (WRC-97)

Background information

Some modifications to Resolution 538 are currently being reviewed by CITEL Administrations. The proposals below are submitted since the limits in the Annex to this Resolution have been revised and are to be included in Article S22.

SUP IAP/14/290

ANNEX TO RESOLUTION 538 (WRC-97)

Provisional limits

Reasons: Limits as revised by WRC-2000 will be included in Article S22 of the Radio Regulations.

WRC-2000 agenda item 1.18 - to consider the use of new digital technology for the maritime mobile service in the band 156-174 MHz and consequential revision of Appendix 18/S18, taking into account Resolution 342 (WRC-97)

Resolution 87 (Minneapolis, 1998) Role of the notifying administration in the case of an administration on behalf of a named group of administrations

Background information

The administrations have considered any possible modifications to the Radio Regulations under Resolution 87. The administrations have not experienced any difficulties either with other administrations acting as the notifying administration for a group of named administrations or acting as the notifying administration for INTELSAT. The CITEL Administrations believe that the Radio Regulations are now adequate in this area and require no changes regarding the responsibilities of the notifying administration. The notifying administration and the intergovernmental organizations should retain the flexibility of making their own arrangements for interfaces with the ITU. Members of an intergovernmental organization responsible for satellite networks can best determine how it needs to comply with the Radio Regulations.

NOC IAP/14/291

S9.1 Before initiating any action under this Article or under Article **S11** in respect of frequency assignments for a satellite network or a satellite system, an administration, or one[6] acting on behalf of a group of named administrations, shall, prior to the coordination procedure described in Section II of Article **S9** below, where applicable, send to the Bureau a general description of the network or system for advance publication in the Weekly Circular not earlier than five years and preferably not later than two years before the planned date of bringing into use of the network or system (see also Nos. **S11.44** and **S11.44B** to **S11.44I**). The characteristics to be provided for this purpose are listed in Appendix **S4**. The coordination or notification information may also be communicated to the Bureau at the same time; it shall be considered as having been received by the Bureau not earlier than six months after the date of receipt of the information for advance publication where coordination is required by Section II of Article **S9**. Where coordination is not required by Section II, notification shall be considered as having been received by the Bureau not earlier than six months after the date of publication of the advance publication information.

Reasons: The current Radio Regulations are adequate. With respect to No. S9.1 the proposal applies only to the issue of the notifying administration.

NOC IAP/14/292

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[6] **S9.1.1** Whenever, under this provision, an administration acts on behalf of a group of named administrations, all members of that group retain the right to respond in respect of their own networks or systems.

Reasons: The current Radio Regulations are adequate.

NOC IAP/14/293

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[10] **S9.6.1** In the case of coordination of an assignment in a satellite network, an administration may act on behalf of a group of named administrations. Whenever, under this provision, an administration acts on behalf of a group of named administrations, all members of the group retain the right to respond in respect of their own services which could affect or be affected by the proposed assignment.

Reasons: The current Radio Regulations are adequate.

NOC IAP/14/294

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[4] **S11.15.1** A frequency assignment to a space station or typical earth station as part of the satellite network may be notified by one administration acting on behalf of a group of named administrations. Any further notice (modification or deletion) relating to such an assignment shall, in the absence of information to the contrary, be regarded as having been submitted on behalf of the entire group.

Reasons: The current Radio Regulations are adequate.

WRC-2000 agenda item 1.19 - to consider the report of the inter-conference representative group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system

Annex 7 to Appendix S30. Ensuring continued future access for Region 2 FSS networks to the GSO arc segment 37° W to 10° E in the band 11.7-12.2 GHz as currently provided by Annex 7 of Appendix S30

Background information

In addition to inviting the ITU-R to study the technical possibilities for increasing the minimum capacity assigned to all Region 1 and 3 countries in the BSS Plan for those Regions, Resolution **532** (**WRC-97**) requested the IRG "to examine Annex 7 [of Appendix S30/30] in the light of its studies for possible revision of the BSS Plans and with respect to the decisions taken by **WRC-97**, such as the reduction of downlink e.i.r.p." In response, the IRG and its associated Group of Technical Experts (GTE) examined Annex 7 in considerable detail.

The examination focused principally on Section A3) of the Annex, quoted here in its entirety.

"Any new orbital position in the Regions 1 and 3 Plan in the range of the orbital arc between 37° W and 10° E associated with a new assignment, or resulting from a modification of an assignment in the Plan, shall be coincident with, or within 1° to the east of, a nominal orbital position in the Region 1 and 3 Plan at the date of entry into force of the Final Acts of the 1977 Conference (in force on 1 January 1979).

In the event of a modification to an assignment in the Regions 1 and 3 Plan, the use of a new nominal orbital position not coincident with any nominal orbital position in the Plan at the date of entry into force of the Final Acts of the 1977 Conference (in force on 1 January 1979) shall involve an 8 dB reduction in the e.i.r.p. compared to that appearing in the Regions 1 and 3 Plan for the assignment before modification."

The need for such restrictions was agreed at WARC SAT-77 to take four facts into account: a) the band 11.7-12.2 GHz is allocated on a primary basis to the FSS in Region 2, the BSS in Region 1 and 3, and the terrestrial services (FS, MS, and BS) in all three Regions; b) the GSO arc segment 37° W to 10° E is of common interest to the Region 2 FSS and the Region 1 BSS; c) the BSS Plan adopted at WARC SAT-77 utilized "nominal orbital positions" at regular 6° intervals beginning with, and moving eastward from, 37° W; and, d) in 1977, the e.i.r.p. of a typical FSS satellite was over 20 dB lower than that assumed for the BSS satellites in the Plan.

One obvious consequence was that, in order to serve Region 2 from the orbital arc in question, future FSS systems would necessarily have to operate from positions between adjacent BSS orbital positions in the Plan. Technical studies at WARC SAT-77 showed that, for an FSS network serving eastern South America and a BSS Plan assignment serving western Africa, such operation required a minimum orbital separation of about 2.5° between the FSS and the BSS satellites. Accordingly, the first paragraph of section A3 ensures that future additions to the BSS Plan will not reduce the separation between adjacent BSS positions below 5°.

Another consequence was that, to facilitate sharing with both terrestrial services and the Region 2 FSS, it would be desirable to use lower satellite e.i.r.p.s for additions to the BSS Plan at positions different from those in the original Plan. For this reason, the second paragraph of Section A3) of Annex 7 specifies an 8 dB e.i.r.p. reduction when the Plan modification involves a new orbital position. It should be noted that this constraint is not confined to the arc 37° W to 10° E.

The technical examination by the ITU-R of the orbital position and e.i.r.p. constraints of Annex 7 led to the following main conclusions.

1) Despite the fact that the technical characteristics of both FSS and BSS networks have changed considerably since 1977 (higher e.i.r.p.s and smaller antennas for the FSS; lower e.i.r.p.s and even smaller antennas for the BSS; the use of digital modulation, lower system noise temperatures, and antennas with improved sidelobe levels in both), all of the technical studies conclude that the worst-case minimum required separation between a Region 2 FSS and a Region 1 BSS satellite remains at about 2 to 2.5°.

2) With the general reduction of 5 dB in the satellite e.i.r.p. assumed in revising the original BSS Plan at **WRC-97**, the 8 dB reduction for in the second paragraph of Section A3) of Annex 7 is no longer required to protect the terrestrial services.

3) The sharing criteria of Annex 1 of Appendix S30 (for protecting Region 2 FSS networks that have been notified or are in coordination from modifications to the Regions 1 and 3 Plans) and the corresponding criteria of Annex 4 of Appendix S30 (to protect the Plan from new Region 2 FSS systems) are not, in themselves, sufficient to ensure either access by Region 2 FSS networks or appropriate interference protection to both FSS and BSS in the orbital arc 37° W to 10° E.

4) The results of the IRG planning feasibility studies demonstrated that compliance with the Annex 7 orbit position limitations was not a barrier to the successful elaboration of a Plan for Regions 1 and 3 providing the desired 10 channels for each country (12 channels for Region 3 countries).

In addition to the foregoing technical conclusions, it was observed that, although the countries of North America have made heavy use of the GSO at positions west of about 60° W for FSS networks providing national coverage, the countries of South America have not yet made significant use of more easterly orbital positions. Indeed, although several planned “international” FSS networks include the 11.7-12.2 GHz band at positions in the orbital arc identified in Annex 7, only one such network is in operation, and none of them seek to use the full band or to offer a representative range of services. It can therefore be argued that, just as the **WRC-97** Plan provides long-term guarantees of orbit-spectrum access for national-coverage BSS systems for the developing countries of Region 1 and 3, the developing countries of Latin America continue to need provisions that will allow them to implement future national or multinational FSS systems. The need for such provisions is probably greater today than it was in 1977 precisely because of the heavy FSS use of more westerly orbital positions.

APPENDIX S30

ANNEX 7

Orbital position limitations

NOC IAP/14/295

A In applying the procedure of Article 4 for modifications to the appropriate Regional Plan, administrations should observe the following criteria:

NOC IAP/14/296

1) No broadcasting satellite serving an area in Region 1 and using a frequency in the band 11.7-12.2 GHz shall occupy a nominal orbital position further west than 37° W or further east than 146° E.

2) No broadcasting satellite serving an area in Region 2 that involves an orbital position different from that contained in the Region 2 Plan shall occupy a nominal orbital position:

a) further east than 54° W in the band 12.5-12.7 GHz; *or*

b) further east than 44° W in the band 12.2-12.5 GHz; *or*

c) further west than 175.2° W in the band 12.2-12.7 GHz.

However, modifications necessary to resolve possible incompatibilities during the incorporation of the Regions 1 and 3 feeder-link Plan into the Radio Regulations shall be permitted.

MOD IAP/14/297

3) Any new orbital position in the Regions 1 and 3 Plan in the range of the orbital arc between 37° W and 10° E associated with a new assignment, or resulting from a modification of an assignment in the Plan, shall be coincident with, or within 1° to the east of, a nominal orbital position in the Region 1 and 3 Plan at the date of entry into force of the Final Acts of the 19~~77~~97 Conference (in force on 1 January 19~~79~~99).

Within this range of orbital arc, ~~In the event of a modification to an assignment in the Regions 1 and 3 Plan,~~ the use of a new nominal orbital position not coincident with any nominal orbital position in the Plan at the date of entry into force of the Final Acts of the 19~~77~~97 Conference (in force on 1 January 19~~79~~99) shall involve ~~an 8~~ a 3 dB reduction in the e.i.r.p. compared to that appearing in the Regions 1 and 3 Plan for the assignment before modification.

NOC IAP/14/298

B The Region 2 Plan is based on the grouping of the space stations in nominal orbital positions of +0.2° and –0.2° from the centre of the cluster of satellites. Administrations may locate those satellites within a cluster at any orbital position within that cluster, provided they obtain the agreement of administrations having assignments to space stations in the same cluster. (See § 4.13.1 of Annex 3 to Appendix **S30A**.)

Reasons: The provisions of Annex 7 of Appendix S30, suitably updated as proposed here, are no less essential to the future development of Region 2 FSS networks for Latin American countries than they were when originally adopted at WARC SAT-77 and continued at WRC-97. They constitute a demonstrably effective means for ensuring equitable access by Region 2 FSS systems to the orbital arc 37° W to 10° E and the band 11.7-12.2 GHz while allowing the number of Region 1 BSS Plan assignments in this part of the orbit-spectrum resource to double through the addition of new orbital positions to the Plan. When WRC-97 revised the Regions 1 and 3 Plan, they reduced the e.i.r.p. of all assignments by 5 dB (except for the two or three already in operation); therefore, the e.i.r.p. reduction in the second paragraph of Section A3) can be reduced from 8 to 3 dB.

WRC-2000 agenda item 1.20 - to consider the issues related to the application of Nos. S9.8, S9.9 and S9.17 and the corresponding parts of Appendix S5 with respect to Appendices S30 and S30A, with a view to possible deletion of Articles 6 and 7 of Appendices S30 and S30A, also taking into consideration Recommendation 35 (WRC-95)

pfd limits in Annex 1 to Appendix S30 (Section 8 *b*)

Background information

Chapter 5 of the CPM Report addresses issues associated with Appendix S30 and S30A of the Radio Regulations. Specifically section 5.2.3.5 covers issues related to protection of the terrestrial service from modifications to the Appendix S30 BSS Plans. Sections 4, 5 and 8 of Annex 1 of Appendix S30 specifies power flux-density (pfd) limits to determine if terrestrial services may be affected by modifications to the Plans.

The CPM Report addresses in detail sections 5 *b*) and 5 *c*) of Annex 1 (pfd limits to protect terrestrial services in Regions 1 and 3) and proposes modifying those pfd limits to be consistent with the pfd limits contained in Table S21-4 of Article S21 for the protection of the fixed service from the fixed-satellite service. Additionally, section 5.2.3.5 of the CPM Report encourages review of the pfd limits to protect terrestrial services in sections 4, 5 and 8 of Annex 1 of Appendix S30 for possible modification or consolidation.

This proposal addresses section 8 *b*) of Annex 1, which provides the pfd limit to determine if terrestrial services in Region 2 may be affected by a modification to the Region 2 BSS Plan. The current limit is a single pfd value that does not vary as a function of arrival angle as is typical of pfd limits to protect terrestrial services in the Radio Regulations. After review of the existing limit it is proposed that the power flux-density limit in 8 *b*) be modified to bring it into alignment with the pfd limits to protect the fixed service in other parts of the Radio Regulations. This proposal is consistent with the proposal contained in the CPM Report regarding pfd limits to protect terrestrial services in Regions 1 and 3.

APPENDIX S30

ANNEX 1

NOC

8 Limits to the change in the power flux-density to protect the terrestrial services of other administrations

a) In Region 1 or 3:

With respect to § 4.3.1.4 of Article 4, an administration in Region 1 or 3 shall be considered as being affected if the consequence of the proposed modification of an existing assignment in the Regions 1 and 3 Plan is to increase the power flux-density arriving on any part of the territory of that administration by more than 0.25 dB over that resulting from that frequency assignment in the Regions 1 and 3 Plan at the time of entry into force of the Final Acts (1977 Conference, in force on 1 January 1979). The same administration shall be considered as not being affected if the value of the power flux-density anywhere in its territory does not exceed the limits expressed in § 5 *a)* and 5 *b)* of this Annex applied to the frequency range 11.7-12.5 GHz.

With respect to § 4.3.1.4 of Article 4, in the case of an addition of a new assignment to the Regions 1 and 3 Plan, an administration in Region 1 or 3 is considered as being affected if the power flux-density on any part of its territory exceeds the limit expressed in § 5 *a)* and 5 *b)* of this Annex applied to the frequency range 11.7-12.5 GHz.

MOD IAP/14/299

b) In Region 2:

With respect to § 4.3.3.4 of Article 4, an administration in Region 2 shall be considered as being affected if the consequence of the proposed modification to an existing assignment in the Region 2 Plan is to increase the power flux-density arriving on any part of the territory of that administration by more than 0.25 dB over that resulting from that frequency assignment in the Region 2 Plan at the time of entry into force of the Final Acts (1985 Conference). The same administration shall be considered as not being affected if the value of the power flux-density anywhere in its territory does not exceed the following limits: ~~–115 dB(W/m²).~~

-148 dB(W/m^2/4 kHz) for $0° \leq \gamma < 5°$

$-148 + 0.5 (\gamma - 5)$ dB(W/m^2/4 kHz) for $5° \leq \gamma < 25°$

-138 dB(W/m^2/4 kHz) for $25° \leq \gamma < 90°$

where γ is the angle of arrival of the incident wave above the horizontal plane, in degrees.

With respect to § 4.3.3.4 of Article 4, in the case of an addition of a new assignment to the Region 2 Plan, an administration in Region 2 is considered as being affected if the power flux-density on any part of its territory exceeds ~~–115 dB(W/m²).~~ the following limits:

-148 dB(W/m^2/4 kHz) for $0° \leq \gamma < 5°$

$-148 + 0.5 (\gamma - 5)$ dB(W/m^2/4 kHz) for $5° \leq \gamma < 25°$

-138 dB(W/m^2/4 kHz) for $25° \leq \gamma < 90°$

where γ is the angle of arrival of the incident wave above the horizontal plane, in degrees.

Reasons: A modification in the pfd limit in Section 8 *b*) of Annex 1 of Appendix S30, as proposed above, would be consistent with pfd limits to protect terrestrial services in other parts of the Radio Regulations. This proposal conforms to the proposal in the CPM Report regarding pfd limits to protect terrestrial services in Regions 1 and 3.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Corrigendum 2 to
Document 14-E
10 May 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

COMMITTEE 5

CITEL Administrations

PROPOSAL FOR THE WORK OF THE CONFERENCE

Please replace proposal IAP/14/20 with the following:

NOC IAP/14/20

S52.219 3) Coast stations employing class J3E or J2D emissions in accordance with No. **S52.217** in the bands between 4 000 kHz and 27 500 kHz shall use the minimum power necessary to cover their service area and shall at no time use a peak envelope power in excess of 10 kW per channel.

Reasons: This is consistent with CITEL's proposals IAP/14/30 MOD S52.222 where CITEL proposes only an editorial modification and IAP/14/32 MOD S52.222.2 which modifies the power in order to provide adequate communications coverage due to geographical differences.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Corrigendum 4 to
Corrigendum 1 to
Document 14-E
25 May 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

COMMITTEE 4
COMMITTEE 5

CITEL Administrations

PROPOSAL FOR THE WORK OF THE CONFERENCE

Please replace the Table of Support to the Inter-American Proposals (IAP) 1-73 on page 2 with the attached.

Annex: 1

ANNEX

TABLE OF SUPPORT TO THE INTER-AMERICAN PROPOSALS (IAP) 1-73

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
1-8	Appendix S3	1.2		x				x	x	x		x			x	x			x				x					x				x	x	x	x	x
9-14	Proposal for the confirmation of the fixed-service allocation in the 31.8-33.4 GHz frequency range (Resolutions 126 and 726)	1.4		x				x	x	x		x	x		x	x		x	x				x			x		x				x	x	x	x	x
15	Identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000	1.6.2		x				x	x	x		x	x		x	x		x	x				x			x	x	x				x	x	x	x	x
16-41	Proposal to protect the operational, distress and safety communications in the HF bands used by the aeronautical mobile (R) and maritime mobile services	1.7		x				x	x	x		x	x		x	x			x				x			x		x				x	x	x	x	x
42-45	Proposal for communications by earth stations on board vessels using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service	1.8		x					x	x			x		x			x	x				x				x	x				x	x	x	x	x
46-47	Evaluation of the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service in a portion of the 1 559 - 1 567 MHz frequency range, in response to Resolutions 213 and 220 (WRC-97)	1.9		x				x	x	x		x	x		x				x				x			x	x	x				x	x	x	x	x
48-49	Proposal for the modification of S5.541A and the suppression of Resolution 121	1.12		x					x	x		x	x		x				x				x					x				x	x	x	x	x
50-52	Remove the 15.43-15.63 GHz space-to-Earth allocation from the Tables of Article RR S5	1.14						x	x	x		x	x		x				x				x			x		x				x	x	x	x	x
53-56	Proposal for worldwide allocation to the Earth exploration-satellite (passive) services in the band 18.6-18.8 GHz on a primary basis	1.17		x				x		x		x	x		x				x				x			x		x				x	x	x	x	x
57-73	Proposal to modify Appendix S18 and Resolution 342	1.18		x					x	x		x	x		x				x				x					x				x	x	x	x	x

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Corrigendum 3 to
Corrigendum 1 to
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ISTANBUL, 8 MAY – 2 JUNE 2000

COMMITTEE 4
COMMITTEE 5

CITEL Administrations

PROPOSAL FOR THE WORK OF THE CONFERENCE

Please replace the Table of Support to the Inter-American Proposals (IAP) 1-73 on page 2 with the attached.

Annex: 1

ANNEX

TABLE OF SUPPORT TO THE INTER-AMERICAN PROPOSALS (IAP) 1-73

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
1-8	Appendix S3	1.2		x				x	x	x		x			x	x							x					x				x		x	x	x
9-14	Proposal for the confirmation of the fixed-service allocation in the 31.8-33.4 GHz frequency range (Resolutions 126 and 726)	1.4		x				x	x	x		x	x		x	x		x					x					x				x		x	x	x
15	Identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000	1.6.2		x				x	x	x		x	x		x	x		x					x				x	x				x		x	x	x
16-41	Proposal to protect the operational, distress and safety communications in the HF bands used by the aeronautical mobile (R) and maritime mobile services	1.7		x				x	x	x		x	x		x	x							x					x				x		x	x	x
42-45	Proposal for communications by earth stations on board vessels using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service	1.8		x					x	x			x		x			x					x				x	x				x		x	x	x
46-47	Evaluation of the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service in a portion of the 1 559 - 1 567 MHz frequency range, in response to Resolutions 213 and 220 (WRC-97)	1.9		x				x	x	x		x	x		x								x				x	x				x		x	x	x
48-49	Proposal for the modification of S5.541A and the suppression of Resolution 121	1.12		x					x	x		x	x		x								x					x				x		x	x	x
50-52	Remove the 15.43-15.63 GHz space-to-Earth allocation from the Tables of Article RR S5	1.14						x	x	x		x	x		x								x					x				x		x	x	x
53-56	Proposal for worldwide allocation to the Earth exploration-satellite (passive) services in the band 18.6-18.8 GHz on a primary basis	1.17		x				x		x		x	x		x								x					x				x		x	x	x
57-73	Proposal to modify Appendix S18 and Resolution 342	1.18		x					x	x		x	x		x								x					x				x		x	x	x

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Corrigendum 2 to
Corrigendum 1 to
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11 May 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

COMMITTEE 4
COMMITTEE 5

CITEL Administrations

PROPOSAL FOR THE WORK OF THE CONFERENCE

Please replace the Table of Support to the Inter-American Proposals (IAP) 1-73 on page 2 with the attached.

Annex: 1

ANNEX

TABLE OF SUPPORT TO THE INTER-AMERICAN PROPOSALS (IAP) 1-73

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
1-8	Appendix S3	1.2		x				x	x	x		x			x	x							x											x	x	x
9-14	Proposal for the confirmation of the fixed service allocation in the 31.8-33.4 GHz frequency range (Resolutions 126 and 726)	1.4		x				x	x	x		x	x		x	x		x					x											x	x	x
15	Identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000	1.6.2		x				x	x	x		x	x		x	x		x					x				x							x	x	x
16-41	Proposal to protect the operational, distress and safety communications in the HF bands used by the aeronautical mobile (R) and maritime mobile services	1.7		x				x	x	x		x	x		x	x							x											x	x	x
42-45	Proposal for communications by earth stations on board vessels using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service	1.8		x					x	x			x		x			x					x				x							x	x	x
46-47	Evaluation of the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions 213 and 220 (WRC-97)	1.9		x				x	x	x		x	x		x								x				x							x	x	x
48-49	Proposal for the modification of S5.541A and the suppression of Resolution 121	1.12		x					x	x		x	x		x								x											x	x	x
50-52	Remove the 15.43-15.63 GHz space-to-Earth allocation from the Tables of Article RR S5	1.14						x	x	x		x	x		x								x											x	x	x
53-56	Proposal for worldwide allocation to the Earth exploration-satellite (passive) services in the band 18.6-18.8 GHz on a primary basis	1.17		x				x		x		x	x		x								x											x	x	x
57-73	Proposal to modify Appendix S18 and Resolution 342	1.18		x					x	x		x	x		x								x											x	x	x

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to Corrigendum 1 to Document 14-E
26 April 2000
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PLENARY MEETING

CITEL Administrations

PROPOSALS FOR THE WORK OF THE CONFERENCE

Please replace page 2 with the page attached.

TABLE OF SUPPORT TO THE INTER-AMERICAN PROPOSALS (IAP) 1-73

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
1-8	Appendix S3	1.2		x					x	x		x			x	x							x											x	x	
9-14	Proposal for the confirmation of the fixed service allocation in the 31.8-33.4 GHz frequency range (Resolutions 126 and 726)	1.4		x					x	x		x	x		x	x		x					x											x	x	
15	Identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000	1.6.2		x					x	x		x	x		x	x		x					x				x							x	x	
16-41	Proposal to protect the operational, distress and safety communications in the HF bands used by the aeronautical mobile (R) and maritime-mobile services	1.7		x					x	x		x	x		x	x							x											x	x	
42-45	Proposal for communications by earth stations on board vessels using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service	1.8		x					x	x			x		x			x					x				x							x	x	x
46-47	Evaluation of the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions 213 and 220 (WRC-97)	1.9		x					x	x		x	x		x								x				x							x	x	x
48-49	Proposal for the modification of S5.541A and the suppression of Resolution 121	1.12		x					x	x		x	x		x								x											x	x	
50-52	Remove the 15.43-15.63 GHz space-to-Earth allocation from the Tables of Article RR S5	1.14							x	x		x	x		x								x											x	x	
53-56	Proposal for worldwide allocation to the Earth exploration-satellite (passive) services in the band 18.6-18.8 GHz on a primary basis	1.17		x						x		x	x		x								x											x	x	
57-73	Proposal to modify Appendix S18 and Resolution 342	1.18								x		x	x		x								x											x	x	

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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21 March 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

CITEL Administrations

PROPOSALS FOR THE WORK OF THE CONFERENCE

Please replace page 2 and agenda item 1.8 (background information and proposals 44 and 45) of Document WRC2000/14 with the attached.

TABLE OF SUPPORT TO THE INTER-AMERICAN PROPOSALS (IAP) 1-73

IAP No.	Topic	Agenda item	ATG	ARG	BAH	BRB	BLZ	BOL	B	CAN	CHL	CLM	CTR	DMA	EQA	SLV	GRD	GTM	GUY	HTI	HND	JMC	MEX	NCG	PNR	PRG	PRU	DOM	SCN	LCA	VCT	SUR	TRD	USA	URG	VEN
1-8	Appendix S3	1.2		x					x	x		x			x	x																		x	x	
9-14	Proposal for the confirmation of the fixed service allocation in the 31.8-33.4 GHz frequency range (Resolutions 126 and 726)	1.4		x					x	x		x	x		x	x		x																x	x	
15	Identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000	1.6.2		x					x	x		x	x		x	x		x					x				x							x	x	
16-41	Proposal to protect the operational, distress and safety communications in the HF bands used by the aeronautical mobile (R) and maritime mobile services	1.7		x					x	x		x	x		x	x							x											x	x	
42-45	Proposal for communications by earth stations on board vessels using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service	1.8		x					x	x			x		x			x					x				x							x	x	x
46-47	Evaluation of the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions 213 and 220 (WRC-97)	1.9		x					x	x		x	x		x								x				x							x	x	x
48-49	Proposal for the modification of S5.541A and the suppression of Resolution 121	1.12		x					x	x		x	x		x								x											x	x	
50-52	Remove the 15.43-15.63 GHz space-to-Earth allocation from the Tables of Article RR S5	1.14							x	x		x	x		x								x											x	x	
53-56	Proposal for worldwide allocation to the Earth exploration-satellite (passive) services in the band 18.6-18.8 GHz on a primary basis	1.17		x						x		x	x		x								x											x	x	
57-73	Proposal to modify Appendix S18 and Resolution 342	1.18								x		x	x		x								x											x	x	

Agenda item 1.8 - To consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands

Proposal for communications by earth stations on board vessels using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service

Background information

This item concerns provision of communications by earth stations on board vessels (ESVs) using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service. These stations operate in three distinct modes: at sea; while stationary in or near port; and in motion approaching or departing from port.

Operations at sea (beyond a certain distance for near-shore coordination) by ESVs in the fixed-satellite service do not present a potential for interference to stations in the fixed service operating in accordance with the 6 GHz FS allocation, and therefore need not be coordinated. Operations while these earth stations are stationary at pre-determined points can be coordinated bilaterally with fixed service systems. Technical and regulatory issues concern the potential for interference between in-motion operations by these ESVs operating close to shore and stations in the fixed service both on and offshore.

The studies that have been conducted in ITU-R have illustrated that the values for the minimum distance are principally affected by the interference criteria required to protect the fixed service and the number of passages per unit time by vessels equipped with earth stations. Based on different values for these assumptions, the results of these preliminary studies yielded a range of values for the minimum distance from 100 km to 540 km. It should be noted that studies submitted to the CPM by some administrations suggested values for the minimum distance of 150 km to 370 km. Upon further review CITEL Administrations are of the opinion that 200 km is sufficiently conservative to protect the fixed service systems operating in the same band from interference.

ADD IAP/14/44

S5.ESV In the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz, transponders on space stations in the fixed-satellite service may be used, additionally, by earth stations on vessels. Such use is subject to the provisions specified in the procedures of Resolution **ZZZ (WRC-2000)**.

Reasons: To establish regulatory and technical provisions for operations of earth stations on board vessels in the fixed-satellite service and protection for terrestrial stations operating in the FS in the same band.

ADD IAP/14/45

RESOLUTION ZZZ (WRC-2000)

Provisions to enable earth stations located on board vessels to operate in fixed-satellite service networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that there is a demand for global wideband satellite communication services on vessels;

b) that the technology exists that would permit the use of fixed-satellite services (FSS) networks by earth stations on board vessels (ESVs) operating in the 3 700-4 200 MHz and 5 925-6 425 MHz bands;

c) that ESVs have the potential to cause unacceptable interference to the fixed service (FS) systems in the band 5 925-6 425 MHz;

d) that FS systems have the potential to cause interference to ESVs in the 3 700-4 200 MHz band;

e) that ESVs operating in these bands require considerably less than the full bandwidth in this FSS allocation and only a portion of the visible geostationary arc;

f) that there are a limited number of geostationary FSS systems that have global coverage;

g) that in order to ensure the protection and future growth of the FS, the ESV must operate with certain technical and operational constraints;

h) that administrations may authorize radiocommunication stations on off-shore structures and platforms for which they are responsible;

i) that based on appropriate assumptions a minimum distance can be calculated beyond which the ESV will not have the potential to cause unacceptable interference to the fixed service in this band,

noting

a) that operation within the territorial sea is at the discretion of the administration with territorial authority, in which case the relevant procedures of that administration will apply;

b) that operation of earth stations on vessels from specified fixed points at locations outside the territorial sea but for which an administration has territorial jurisdiction is fully within the FSS,

resolves

1 that the administration that issues the radio licence for the use of ESVs in these bands (licensing administration) shall ensure that such stations do not cause unacceptable interference to stations in the fixed service;

2 that licensing administrations shall ensure that ESVs are capable of operating in compliance with the requirements of this Resolution;

3 that operators of ESVs shall comply with the conditions listed in the Annex to this Resolution and as may be established by the licensing administration(s);

4 that ESVs shall not claim protection from fixed service station transmissions;

5 that on a provisional basis any transmissions from ESVs within a distance of 200 km of any given coast shall be based upon the prior agreement of that coastal administration;

6 that ESV operators shall provide any assistance necessary to the coastal administration in order to facilitate the agreement;

7 that the ESV system shall include means of identification and automatic mechanisms to terminate transmissions whenever the station operates outside its pre-authorized geographic (see *resolves* 5) or operational limits;

8 that ESVs shall be equipped so as to enable the licensing administration under the provisions of Article **S18** to verify earth station performance and to accomplish the switch off of the ESV transmission immediately upon request by an administration whose services may be affected;

9 that when ESVs operating beyond the territorial sea but within 200 km of the coast of an administration fail to comply with the terms required by that administration pursuant to *resolves* 3 and 5, then that administration may:

– request the ESV to comply with such terms or cease operation immediately; or

– request the licensing administration to require such compliance or immediate cessation of the operation;

10 that any licensing authority that licenses ESVs shall agree to maintain at all times a point of contact, which shall be published in a circular of the ITU, that may be contacted by an affected administration seeking assistance pursuant to *resolves* 3 and 5 above,

invites ITU-R as a matter of urgency

1 to continue its studies to determine the optimum technical and operational constraints to be applied to ESV operations and, in particular, to determine the minimum operational distance from the coast of an administration beyond which ESVs are assumed not to have the potential to cause unacceptable interference to fixed service stations of that administration;

2 to develop recommendations on methods for coordination between terrestrial stations and ESVs while in motion at less than the minimum distance specified in *resolves* 5;

3 to report on the results of these studies to the Conference Preparatory Meeting for WRC-[03],

urges administrations

to participate actively in the aforementioned studies by submitting contributions to ITU-R,

requests

WRC-[03] to take appropriate action based on those studies.

ANNEX TO RESOLUTION ZZZ (WRC-2000)

Provisional technical constraints applicable to ESVs operating in the bands 3 700-4 200 MHz and 5 925-6 425 MHz

Minimum diameter of ESV antenna:	2.4 m
Maximum half-power beamwidth of ESV antenna:	1.5 degrees
Minimum elevation angle of ESV antenna:	10°
Maximum necessary bandwidth per vessel:	2.346 MHz
Maximum necessary bandwidth in a single operating area:	36 MHz
Maximum ESV transmitter power spectral density at the input to the antenna:	17 dB(W/MHz)
Tracking accuracy of ESV antenna:	0.2 degrees

Reasons: To establish regulatory and operational provisions for ESV operations in the fixed-satellite service and to avoid the uncontrolled deployment of, and communications by ESVs and ensure the protection of the fixed service.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 14-E
18 January 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

CITEL Administrations

PROPOSALS FOR THE WORK OF THE CONFERENCE

TABLE OF SUPPORT TO THE INTER-AMERICAN PROPOSALS (IAP) 1-73

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WRC-2000 agenda item 1.2 - To finalize remaining issues in the review of Appendix S3 to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation 66 (Rev.WRC-97) and the decisions of WRC-97 on adoption of new values, due to take effect at a future time, of spurious emissions for space services

Background information

Recommendation 66 (Rev.WRC-97) directs ITU-R to submit a report to WRC-2000 with a view to finalizing the space services spurious emissions limits in Appendix S3 of the Radio Regulations. The CITEL Administrations propose text that would remove the “design objectives” designation from the space services spurious emissions limits and make related appropriate modifications applicable to deep-space systems, satellites with spurious emissions falling within the necessary bandwidth of another transmitter on the same satellite, and amateur earth stations below 30 MHz. Also, the CITEL Administrations propose to adequately recognize the case of very narrowband and unmodulated signals, particularly for the space services. Furthermore, the CITEL Administrations propose to correct an oversight in Appendix S3 regarding limits for the radiodetermination service, and specify that spurious emission levels for radar systems be determined from radiated emissions.

APPENDIX S3

Table of maximum permitted spurious emission power levels

(See Article **S3**)

1 The following sections indicate the maximum permitted levels of spurious emissions, in terms of power as indicated in the tables, of any spurious component supplied by a transmitter to the antenna transmission line. Section I is applicable until 1 January 2012 to transmitters installed on or before 1 January 2003; Section II is applicable to transmitters installed after 1 January 2003 and to all transmitters after 1 January 2012. This Appendix does not cover out-of-band emissions. Out-of-band emissions are dealt with in No. **S4.5**.

2 Spurious emission from any part of the installation, other than the antenna and its transmission line, shall not have an effect greater than would occur if this antenna system were supplied with the maximum permitted power at that spurious emission frequency.

3 These levels shall not, however, apply to emergency position-indicating radiobeacon (EPIRB) stations, emergency locator transmitters, ships’ emergency transmitters, lifeboat transmitters, survival craft stations or maritime transmitters when used in emergency situations.

4 For technical or operational reasons, more stringent levels than those specified may be applied to protect specific services in certain frequency bands. The levels applied to protect these services, such as safety and passive services, shall be those agreed upon by the appropriate world radiocommunication conference. More stringent levels may also be fixed by specific agreement between the administrations concerned. Additionally, special consideration of transmitter spurious emissions may be required for the protection of safety services, radio astronomy and space services using passive sensors. Information on the levels of interference detrimental to radio astronomy, Earth exploration satellites and meteorological passive sensing is given in the most recent version of Recommendation ITU-R SM.329.

5 Spurious emission limits for combined radiocommunication and information technology equipment are those for the radiocommunication transmitters.

Section I – Spurious emission limits for transmitters installed on or before 1 January 2003 (valid until 1 January 2012)

MOD IAP/14/1

6 ~~The measurement methods for radar systems should be guided by Recommendation ITU-R M.1177. For those radar systems for which acceptable methods of measurement do not exist, t~~Radar systems are exempt from spurious emission limits under this section. The lowest practicable power of spurious emission should be achieved.

TABLE I

Attenuation values and absolute mean power levels used to calculate maximum permitted spurious emission power levels for use with radio equipment

Frequency band containing the assignment (lower limit exclusive, upper limit inclusive)	**For any spurious component, the attenuation (mean power within the necessary bandwidth relative to the mean power of the spurious component concerned) shall be at least that specified below and the absolute mean power levels given shall not be exceeded**[1]
9 kHz to 30 MHz	40 dB 50 mW [2, 3, 4]
30 MHz to 235 MHz	
– mean power above 25 W	60 dB 1 mW [5]
– mean power 25 W or less	40 dB 25 µW
235 MHz to 960 MHz	
– mean power above 25 W	60 dB 20 mW [6, 7]
– mean power 25 W or less	40 dB 25 µW [6, 7]
960 MHz to 17.7 GHz	
– mean power above 10 W	50 dB 100 mW [6, 7, 8, 9]
– mean power 10 W or less	100 µW [6, 7, 8, 9]
Above 17.7 GHz	The lowest possible values achievable shall be employed (see Recommendation **66 (Rev.WRC-97)**).

TABLE I (*end*)

1 When checking compliance with the provisions of the Table, it shall be verified that the bandwidth of the measuring equipment is sufficiently wide to accept all significant components of the spurious emission concerned.

2 For mobile transmitters which operate below 30 MHz, any spurious component shall have an attenuation of at least 40 dB without exceeding the value of 200 mW, but every effort should be made to comply with the level of 50 mW wherever practicable.

3 For transmitters of a mean power exceeding 50 kW which can operate on two or more frequencies covering a frequency range approaching an octave or more, while a reduction below 50 mW is not mandatory, a minimum attenuation of 60 dB shall be provided.

4 For hand-portable equipment of mean power less than 5 W, the attenuation shall be 30 dB, but every practicable effort should be made to attain 40 dB attenuation.

5 Administrations may adopt a level of 10 mW provided that harmful interference is not caused.

6 Where several transmitters feed a common antenna or closely spaced antennas on neighbouring frequencies, every practicable effort should be made to comply with the levels specified.

7 Since these levels may not provide adequate protection for receiving stations in the radio astronomy and space services, more stringent levels might be considered in each individual case in the light of the geographical position of the stations concerned.

8 These levels are not applicable to systems using digital modulation techniques, but may be used as a guide. Values for these systems may be provided by the relevant ITU-R Recommendations, when available (see Recommendation **66 (Rev.WRC-97)**).

9 These levels are not applicable to stations in the space services, but the levels of their spurious emissions should be reduced to the lowest possible values compatible with the technical and economic constraints to which the equipment is subject. Values for these systems may be provided by the relevant ITU-R Recommendations, when available (see Recommendation **66 (Rev.WRC-97)**).

Section II – Spurious emission limits for transmitters installed after 1 January 2003 and for all transmitters after 1 January 2012

Application of these limits

7 The frequency range of the measurement of spurious emissions is from 9 kHz to 110 GHz or the second harmonic if higher.

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8 Guidance regarding the methods of measuring spurious emissions is given in the most recent version of Recommendation ITU-R SM.329. The e.i.r.p. method specified in that Recommendation should be used when it is not possible to measure the power supplied to the antenna transmission line, or for specific applications, such as radars, where the antenna is designed to provide significant attenuation at the spurious frequencies. Additionally, the e.i.r.p. method may need some modification for special cases, e.g. beam-forming radars.

9 Guidance regarding the methods of measuring spurious emissions from radar systems is given in the most recent version of Recommendation ITU-R M.1177. The reference bandwidths required for proper measurement of radar spurious emissions should be calculated for each particular radar system. Thus, for the three general types of radar pulse modulation utilized for radionavigation, radiolocation, acquisition, tracking and other radiodetermination functions, the reference bandwidth values should be:

– for fixed-frequency, non-pulse-coded radar, one divided by the radar pulse length, in seconds (e.g. if the radar pulse length is 1 μs, then the reference bandwidth is 1/1 μs = 1 MHz);

– for fixed-frequency, phase coded pulsed radar, one divided by the phase chip length, in seconds (e.g. if the phase coded chip is 2 μs long, then the reference bandwidth is 1/2 μs = 500 kHz);

– for frequency modulated (FM) or chirped radar, the square root of the quantity obtained by dividing the radar bandwidth in MHz by the pulse length, in seconds (e.g. if the FM is from 1 250 MHz to 1 280 MHz or 30 MHz during the pulse of 10 μs, then the reference bandwidth is $(30 \text{ MHz}/10\ \mu\text{s})^{1/2}$ = 1.73 MHz).

For those radar systems for which acceptable methods of measurement do not exist, the lowest practicable power of spurious emission should be achieved.

10 The spurious emission levels are specified in the following reference bandwidths:

– 1 kHz between 9 kHz and 150 kHz

– 10 kHz between 150 kHz and 30 MHz

– 100 kHz between 30 MHz and 1 GHz

– 1 MHz above 1 GHz.

As a special case, the reference bandwidth of all space service spurious emissions should be 4 kHz.

11 For the purpose of setting limits, all emissions, including harmonic emissions, intermodulation products, frequency conversion products and parasitic emissions, which fall at frequencies separated from the centre frequency of the emission by ±250%, or more, of the necessary bandwidth of the emission will generally be considered as spurious emissions. However, this frequency separation may be dependent on the type of modulation used, the maximum bit rate in the case of digital modulation, the type of transmitter and frequency coordination factors. For example, in the case of digital (including digital broadcasting) modulation systems, broadband systems, pulsed modulation systems and narrow-band high power transmitters, the frequency separation may need to differ from the ±250% factor. For multichannel or multicarrier transmitters/transponders, where several carriers may be transmitted simultaneously from a final output amplifier or an active antenna, the centre frequency of the emission is taken to be the centre of the –3 dB bandwidth of the transmitter or transponder and the necessary bandwidth is taken to be the transmitter or transponder bandwidth.

ADD IAP/14/3

11*bis* As an emitted signal becomes more and more narrow (to the limiting case of an unmodulated carrier with theoretical necessary bandwidth of zero), the application of the term “necessary bandwidth” as used in determining the region where spurious emission limits apply to space services, becomes more and more difficult. In the limit, ±250% of necessary bandwidth (generally recognized as establishing the region beyond which spurious emissions are defined), approaches zero. Beacon and other unmodulated signals, such as those used in uplink and downlink circuits in control and tracking of satellites, are examples of a case where it is difficult to practically apply the term “necessary bandwidth” in determining where out-of-band emissions end, and spurious emissions begin. Pending further studies and definitive action by a future world radiocommunication conference, in calculating the region where spurious emission limits apply for transmitters using amplifiers to pass essentially an unmodulated signal (or a signal with very small bandwidth), the amplifier bandwidth is taken to be the necessary bandwidth (in calculating the regions where spurious emissions apply.

ADD IAP/14/4

11*ter* For satellites employing more than one transponder, and when considering the limits for spurious emission as indicated by Headnote 11 to Appendix **S3**, spurious emissions from one transponder may fall on a frequency at which a companion, second transponder is transmitting or in the guardband between two transponders. In this situation, the level of spurious emission from the first transponder is well exceeded by fundamental emissions of the second transponder or within the guard bands between the different transponders. Therefore, limits in this Appendix do not apply to those spurious emissions on a satellite which fall within the bands where there are transmissions from the same satellite into the same service area.

12 Examples of applying 43 + 10 log (*P*) to calculate attenuation requirements

Where specified in relation to mean power, spurious emissions are to be at least *x* dB below the total mean power *P*, i.e. –*x* dBc. The power *P* (W) is to be measured in a bandwidth wide enough to include the total mean power. The spurious emissions are to be measured in the reference bandwidths given in the Recommendation. The measurement of the spurious emission power is independent of the value of necessary bandwidth. Because the absolute emission power limit, derived from 43 + 10 log (*P*), can become too stringent for high-power transmitters, alternative relative powers are also provided in Table II.

Example 1

A land mobile transmitter, with any value of necessary bandwidth, must meet a spurious emission attenuation of 43 + 10 log (*P*), or 70 dBc, whichever is less stringent. To measure spurious emissions in the frequency range between 30 MHz and 1 GHz, Recommendation ITU-R SM.329-7 *recommends* 4.1 indicates the use of a reference bandwidth of 100 kHz. For other frequency ranges, the measurement must use the appropriate reference bandwidths given in *recommends* 4.1.

With a measured total mean power of 10 W:

– Attenuation relative to total mean power = 43 + 10 log (10) = 53 dBc.

– The 53 dBc value is less stringent than the 70 dBc, so the 53 dBc value is used.

– Therefore: Spurious emissions must not exceed 53 dBc in a 100 kHz bandwidth, or converting to an absolute level, spurious emissions must not exceed 10 dBW – 53 dBc = –43 dBW in a 100 kHz reference bandwidth.

With a measured total mean power of 1 000 W:

– Attenuation relative to total mean power = 43 + 10 log (1 000) = 73 dBc.

– The 73 dBc value is more stringent than the 70 dBc limit, so the 70 dBc value is used.

– Therefore: Spurious emissions must not exceed 70 dBc in a 100 kHz bandwidth, or converting to an absolute level, spurious emissions must not exceed 30 dBW – 70 dBc = –40 dBW in a 100 kHz reference bandwidth.

Example 2

A space service transmitter with any value of necessary bandwidth must meet a spurious emission attenuation of 43 + 10 log (*P*), or 60 dBc, whichever is less stringent. To measure spurious emissions at any frequency, Note 10 to Table II indicates using a reference bandwidth of 4 kHz.

With a measured total mean power of 20 W:

– Attenuation relative to total mean power = 43 + 10 log (20) = 56 dBc.

– The 56 dBc value is less stringent than the 60 dBc limit, so the 56 dBc value is used.

– Therefore: Spurious emissions must not exceed 56 dBc in a 4 kHz reference bandwidth, or converting to an absolute level, spurious emissions must not exceed 13 dBW – 56 dBc = −43 dBW in a 4 kHz reference bandwidth.

MOD IAP/14/5

TABLE II

Attenuation values used to calculate maximum permitted spurious emission power levels for use with radio equipment

Service category in accordance with Article S1, or equipment type [15]	**Attenuation (dB) below the power supplied to the antenna transmission line**
All services except those services quoted below:	43 + 10 log (*P*), or 70 dBc, whichever is less stringent
Space services (earth stations) [10, ~~14~~16]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Space services (space stations) [10, ~~14~~17]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Radiodetermination[14]	43 + 10 log (*PEP*), or 60 dB, whichever is less stringent
Broadcast television [11]	46 + 10 log (*P*), or 60 dBc, whichever is less stringent, without exceeding the absolute mean power level of 1 mW for VHF stations or 12 mW for UHF stations. However, greater attenuation may be necessary on a case by case basis.
Broadcast FM	46 + 10 log (*P*), or 70 dBc, whichever is less stringent; the absolute mean power level of 1 mW should not be exceeded
Broadcasting at MF/HF	50 dBc; the absolute mean power level of 50 mW should not be exceeded
SSB from mobile stations [12]	43 dB below *PEP*
Amateur services operating below 30 MHz (including with SSB) [12, 16]	43 + 10 log (*PEP*), or 50 dB, whichever is less stringent
Services operating below 30 MHz, except space, radiodetermination, broadcast, those using SSB from mobile stations, and amateur [12]	43 + 10 log (*X*), or 60 dBc, whichever is less stringent, where *X* = *PEP* for SSB modulation, and *X* = *P* for other modulation

TABLE II (*end*)

Service category in accordance with Article S1, or equipment type [15]	**Attenuation (dB) below the power supplied to the antenna transmission line**
Low-power device radio equipment [13]	56 + 10 log (*P*), or 40 dBc, whichever is less stringent
Emergency position-indicating radio beacon Emergency locator transmitter Personal location beacon Search and rescue transponder Ship emergency, lifeboat and survival craft transmitters Land, aeronautical or maritime transmitters when used in emergency	No limit

P: mean power in watts supplied to the antenna transmission line, in accordance with No. **S1.158**. When burst transmission is used, the mean power *P* and the mean power of any spurious emissions are measured using power averaging over the burst duration.

PEP: peak envelope power in watts supplied to the antenna transmission line, in accordance with No. **S1.157**.

dBc: decibels relative to the unmodulated carrier power of the emission. In the cases which do not have a carrier, for example in some digital modulation schemes where the carrier is not accessible for measurement, the reference level equivalent to dBc is decibels relative to the mean power *P*.

[10] Spurious emission limits for all space services are stated in a 4 kHz reference bandwidth.

[11] For analogue television transmissions, the mean power level is defined with a specified video signal modulation. This video signal has to be chosen in such a way that the maximum mean power level (e.g. at the video signal blanking level for negatively modulated television systems) is supplied to the antenna transmission line.

[12] All classes of emission using SSB are included in the category “SSB”.

[13] Low-power radio devices having a maximum output power of less than 100 mW and intended for short-range communication or control purposes; such equipment is in general exempt from individual licensing.

MOD IAP/14/6

[14] ~~These values are “design objectives”. This note will not be applicable after WRC-99~~Radiodetermination (Radar) system spurious emission dB attenuation shall be determined for radiated emission levels, not at the antenna transmission line. The measurement methods for determining the radiated spurious emission levels from the radar systems should be guided by Recommendation ITU-R M.1177.

[15] In some cases of digital modulation (including digital broadcasting), broadband systems, pulsed modulation and narrow-band high-power transmitters for all categories of services, there may be difficulties in meeting limits close to ± 250% of the necessary bandwidth.

ADD IAP/14/7

[16] Amateur earth stations operating below 30 MHz are in the service category “Amateur services operating below 30 MHz (including with SSB)”.

ADD IAP/14/8

[17] Space stations, intended to operate in deep space (defined in **S1.177**) are exempt from spurious emission limits.

Reasons: Recommendation 66 (Rev.WRC-97) directs the ITU-R to submit a report to the next WRC with a view to finalizing the space services spurious emissions limits in Appendix S3 of the Radio Regulations. The CITEL administrations propose to confirm the values in Table II and “clean up” the table by removing the “design objectives” designation from the space services spurious emissions limits. Furthermore, by clarifying the exemption of radar systems from the Section I limits, the CITEL administrations propose to correct an oversight in Appendix S3 regarding limits for the radiodetermination service that may lead incorrectly to the application of the Section I limits to radars. Also, the CITEL administrations propose to clarify the application of the e.i.r.p. measurement method to radars particularly, but also to other systems where antenna line measurements may not be appropriate.

WRC-2000 agenda item 1.4 - To consider issues concerning allocations and regulatory aspects related to Resolutions 126 (WRC-97), 128 (WRC-97), 129 (WRC-97), 133 (WRC-97), 134 (WRC-97) and 726 (WRC-97)

Proposal for the confirmation of the fixed service allocation in the 31.8-33.4 GHz frequency range (Resolutions 126 and 726)

Background information

Resolutions 126 and 726 invite ITU-R to address, among other issues, sharing between high density fixed systems (HDFS) and other radiocommunication services sharing spectrum in the bands 31.8-33.4 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz bands.

At WRC-97, a number of frequency bands above 30 GHz were identified through Resolution 726 as available for the deployment of high-density fixed systems. Included in Resolution 726 is the frequency range 31.8-33.4 GHz. WRC-97 amended the Table of Frequency Allocations to include the fixed service on a primary basis in the 31.8-33.4 GHz range subject to conditions found in Resolution 126. The first condition stipulated that this allocation to the fixed service would not go into force until 1 January 2001. Secondly, this allocation would be reviewed at WRC-2000 taking into account the results of sharing studies and the future requirements of the other allocated services. The frequency range 31.8-33.4 GHz has also has primary allocations to the radionavigation, space research (space-to-Earth) (deep space) and the inter-satellite services.

ITU-R, through various working parties, have studied the sharing potential between the fixed service (high density applications) and the other primary services. With regard to sharing between the fixed and radionavigation service, studies indicated that sharing may be possible through the use of appropriate mitigation and operational measures, recognizing that fixed systems may receive emissions from airborne radionavigation systems. However, actual interference events are expected to be rare. The CPM Report recommended that sharing between the fixed and radionavigation service could be addressed through the development of appropriate ITU-R Recommendations. Sharing between the fixed service and the deep space facilities is considered practical as there are only a few deep space sites in the world and coordination with the fixed stations is feasible. It would be appropriate to adopt a suitable free-space spectral pfd limit at the surface of the Earth in order to provide adequate protection to HDFS systems from BSS satellites in a temporary near-Earth orbit phase, Studies have also concluded that interference levels from high-density fixed stations into inter-satellite receivers are well within acceptable limits.

MOD IAP/14/9

29.9-34~~,~~.2 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
31.8-32	FIXED MOD S5.547A RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) MOD S5.547 S5.547B S5.548	
32-32.3	FIXED MOD S5.547A INTER-SATELLITE RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) MOD S5.547 S5.547C S5.548	
32.3-33	FIXED MOD S5.547A INTER-SATELLITE RADIONAVIGATION MOD S5.547 S5.547D S5.548	
33-33.4	FIXED MOD S5.547A RADIONAVIGATION MOD S5.547 S5.547E	

SUP IAP/14/10

RESOLUTION 726 (WRC-97)

Frequency bands above 30 GHz available for high-density applications in the fixed service

MOD IAP/14/11

S5.547 The bands 31.8-33.4 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are available for high-density applications in the fixed service~~ (see Resolution **726 (WRC-97)**)~~.

SUP IAP/14/12

RESOLUTION 126 (WRC-97)

Use of the frequency band 31.8-33.4 GHz for high-density systems in the fixed service

MOD IAP/14/13

S5.547A ~~Use of the band 31.8-33.4 GHz by the fixed service shall be in accordance with Resolution **126 (WRC-97)**.~~Due to the operational nature of the radionavigation service, systems in the fixed service operating in the 31.8-33.4 GHz band may be subject to emissions from airborne radionavigation systems. Interference into fixed systems is expected to be rare, however, administrations are encouraged to take practical measures to minimize potential interference, taking into account **S4.10**.

MOD IAP/14/14

TABLE **S21-4** *(end)*

Frequency band	**Service***	**Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane**			**Reference bandwidth**
		0°-5°	**5°-25°**	**25°-90°**	
31.8-32.3 GHz	Space research	–120	–120 + 0.75(δ – 5)	–105	1 MHz
32-33 GHz	Inter-satellite	–135	–135 + (δ – 5)	–115	1 MHz

Reasons: Sharing studies have concluded that reasonable measures can be taken by the various services using this band to ensure practical co-existence. As a result, it is possible to confirm the fixed allocations in the band 31.8-33.4 GHz, and to identify this band as being available for HDFS applications. Consequently, Resolution 126 can be suppressed. In addition, the draft CPM Report to WRC-2000 provides suitable pfd limits to protect the fixed service. With regard to the band 31.8-33.4 GHz, Resolution 726 can be suppressed since the necessary ITU-R studies required to confirm the fixed service allocation have been completed.

WRC-2000 agenda item 1.6.2 - Identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000

Background information

At the time that the WRC-2000 agenda was established, studies were under way within TG 8/1 examining whether global roaming could be accomplished by identifying one or more global radio control channels that could allow radios to be tuned to the appropriate frequency band identifying a "physical" channel was wanted, in favour of using other approaches that may include the development of a "logical" channel structure for this purpose.

Based on discussions to date within TG 8/1, it has been determined that facilitation of multimode terminal operation and worldwide roaming of IMT-2000 is possible without a specific physical global radio control channel.

IAP/14/15

There is no need to identify a global radio control channel for IMT-2000 in the Radio Regulations, therefore no action is required by WRC-2000.

WRC-2000 agenda item 1.7 - Review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting operational, distress and safety communications, taking into account Resolution 346 (WRC-97)

Proposal to protect the operational, distress and safety communications in the HF bands used by the aeronautical mobile (R) and maritime mobile services

Background information

WP 8B and CPM have identified two issues comprising this agenda item:

1) HF bands allocated for the distress and safety communications of the maritime and aeronautical mobile (R) services have been subjected to an increase in harmful interference caused by unauthorized use. It is essential for the safety-of-life and property that these distress and safety channels are kept free from unauthorized use and harmful interference.

2) Several maritime HF distress and safety frequencies are also used for international routine calling. The routine calling can cause interference to distress and safety communications due to the caller not being aware of ongoing traffic on the ship calling frequency since the ship is tuned to a different receive frequency for coast station calls and replies.

In addition, both the CPM Report and the report of the SCRPM to CPM address the issue of interference in the HF bands by providing possible methods with satisfying this agenda item. One method proposes the modification of Resolution 207, where administrations would be drawn towards the fact that the interference is often due to unauthorized sources and to study solutions in assisting the mitigation of this interference. Another method calls upon ITU-R to study the future technical and operational needs of the maritime mobile and aeronautical mobile (R) services, in particular solutions providing effective and efficient distress and safety communications. Therefore, CITEL administrations propose the modification of Resolution 207 and the addition of new Resolution [HF].

Maritime issues

The protection of maritime HF distress and safety frequencies, in particular the frequencies 12 290 kHz and 16 420 kHz, is addressed in Resolution 346 (WRC-97). A significant source of interference to distress traffic on these frequencies is due to their use as calling frequencies. Resolution 346 calls for administrations to minimize the use of these frequencies for non-safety calling purposes by coast and ship stations.

GMDSS distress and safety frequencies are also used for calling in some of the other maritime HF bands. In each maritime HF band one channel is designated as an international calling channel pair for radiotelephony. In the 4, 6, 12 and 16 MHz bands, the distress and safety frequency is the same as the ships transmitting frequency on the calling channel.

The radiotelephony calling channels are used on duplex basis, whilst the distress and safety frequencies are used on simplex. When a ship is calling a coast station, it transmits on the distress frequency. The problem is that at times that the ship has difficulty monitoring whether or not there is ongoing distress traffic, because its receiver is on the corresponding coast station frequency. This problem occurs in the 4, 6, 12 and 16 MHz bands and not in the 8, 18, 22 and 25 MHz bands. The problem is being caused by the transmitting station not adhering to existing regulatory standards which require a station to listen on its transmitting frequency prior to transmitting. Equipment modification may be necessary in order to listen on the ship frequency of a duplex pair prior to transmitting on that frequency.

Once initial contact has been established and working frequencies coordinated, traffic handling is accomplished directly on the coordinated working frequencies.

CPM identified that compliance with existing Radio Regulations, S52.224 which requires that a station listens before transmitting, is a method to help alleviate the interference problem. Further regulations are not required, rather enforcement of the existing regulation. CPM considered the modification of Article S52 and Appendices S13 and S17 to exclude routine calling from the HF distress and safety frequencies as a method to satisfy the agenda item. This method may require modification of existing equipment.

CITEL administrations propose no change to divide the existing distress and calling channels in two separate frequencies, one exclusive distress and safety frequency and one international radiotelephony calling frequency. The distress frequencies should remain the same as they are at present where calling is allowed and no modifications to the distress procedures are required. Strict compliance and enforcement of existing Radio Regulations, S52.224, which requires that a station listen before it transmits, would alleviate this problem.

This proposal contains the minimum modifications required in the Radio Regulations and its Appendices in order to improve the situation on the HF radiotelephony distress and safety frequencies.

CPM further encouraged the use of digital selective calling (DSC) instead of calling by radiotelephony, while recognizing that all vessels may not be fitted with DSC.

This proposal is also encouraging ships and coast stations to use digital selective calling. If voice calling is required, it should in the first instance be done on the coast station working channel and secondarily on the appropriate calling frequency.

Aeronautical issues

The interference to HF frequencies allocated to the aeronautical mobile (R) service between 2 850 kHz and 22 000 kHz appears to be the result of unauthorized non-aviation use of aeronautical mobile (R) frequencies. In some parts of the world the aeronautical mobile (R) HF frequencies are being used for land mobile, broadcast, fixed point-to-point communications and in maritime applications such as in support of fishing fleets. These unauthorized uses have resulted in frequent cases of harmful interference and have diminished the spectrum available for the aeronautical mobile (R) safety-of-life applications.

Administrations should ensure that stations of services other than the aeronautical mobile (R) service refrain from using frequencies in the bands allocated exclusively to the aeronautical mobile (R) service. Administrations should make every effort to identify and locate the source of any unauthorized emission causing harmful interference. Recognizing that such emissions are capable of endangering human life and property and the safe and regular conduct of aircraft operations, should take necessary measures to prevent stations from operating in contravention of ITU Radio Regulations.

WP 8B and CPM recommend modifications of Article S15 to ensure that suitable provisions are made for the aeronautical mobile (R) service.

CITEL administrations propose modifications to Article S15 to include reference to Appendix S27. This modification will ensure special consideration is given to avoiding interference on the frequencies used for safety and regularity of flight. Currently, Article S15 only refers to Article S31 Appendix S13, which is primarily for maritime services.

CITEL administrations propose no changes to Appendix S27. Presently, the HF bands allocated to the aeronautical mobile (R) service are nearly saturated by the use of analogue voice communications. This spectrum must be maintained for the new digital high-frequency data link (HFDL) communications. HFDL communications will provide a capability for the transfer of air traffic control and aeronautical operational control data to and from pilots operating over oceanic airspace, on polar routes, and in airspace over sparsely populated or undeveloped countries where other communications systems are not practical. The International Civil Aviation Organization (ICAO) will have completed Standards and Recommended Practices for HFDL before the end of 1999. Appendix S27 contains the Allotment Plan for the aeronautical use of HF aeronautical mobile (Route) service. Review of Appendix S27, if necessary, should be performed by ICAO and by ITU-R Working Party 8B and consequently considered by a subsequent WRC.

ARTICLE S15

Interferences

Section I – Interference from Radio Stations

MOD IAP/14/16

S15.8 § 4 Special consideration shall be given to avoiding interference on distress and safety frequencies and those related to distress and safety identified in Appendix **S13** and safety and regularity of flight identified in Appendix **S27**.

Reasons: Frequencies for safety and regulatory of flight in the aeronautical mobile (R) service are not listed in Appendix S13, since this Appendix is primarily for maritime services. Inclusion of Appendix S27 in this provision will ensure special consideration is given to avoiding interference on these frequencies used for safety and regularity of flight.

Section VI – Procedure in a case of harmful interference

MOD IAP/14/17

S15.28 § 20 Recognizing that transmissions on the distress and safety frequencies and frequencies used for the safety and regularity of flight (see Article **S31** ~~and~~, Appendix **S13** and Appendix **S27**) require absolute international protection and that the elimination of harmful interference to such transmissions is imperative, administrations undertake to act immediately when their attention is drawn to any such harmful interference.

Reasons: Frequencies for safety and regulatory of flight in the aeronautical mobile (R) service are not listed in Article S31 or Appendix S13, since this Appendix is primarily for maritime services. Inclusion of Appendix S27 would lead to the protection of frequencies used for safety and regularity of flight against interference.

MOD IAP/14/18

S15.35 § 27 On being informed that a station over which it has jurisdiction is believed to have been the cause of harmful interference, an administration shall, as soon as possible, acknowledge receipt of that information by ~~telegram~~the quickest means available. Such acknowledgement shall not constitute an acceptance of responsibility.

Reasons: Improvements in technology provide quicker means of communicating information, such email and facsimiles. The quicker a case of interference is reported, the quicker the action can be taken against that interference, and the shorter the duration of the interference.

ARTICLE S52

Special rules relating to the use of frequencies

NOC IAP/14/19

S52.216 *C – Bands between 4 000 kHz and 27 500 kHz*

C1 – Mode of operation of stations

MOD IAP/14/20

S52.219 3) Coast stations employing class J3E or J2D emissions in accordance with No. **S52.217** in the bands between 4 000 kHz and 27 500 kHz shall use the minimum power necessary to cover their service area and shall at no time use a peak envelope power in excess of 10 kW per channel. On the radiotelephony calling frequencies 4 417 kHz and 6 516 kHz coast stations shall limit their peak envelope power to the lowest value to maintain reliable communications, not to exceed 5 kW.

Reasons: Due to geographical differences, the higher power of 5 kW is required to provide adequate communications coverage.

NOC IAP/14/21

S52.220 4) Ship stations employing class J3E or J2D emissions in accordance with No. **S52.217** in the bands between 4 000 kHz and 27 500 kHz shall at no time use a peak envelope power in excess of 1.5 kW per channel.

Reasons: Higher shipboard power increases the potential for interference and out-of-band emissions.

ADD IAP/14/22

S52.220A Administrations should encourage the coast stations and ships under their jurisdiction to utilize the digital selective-calling techniques for call and reply.

Reasons: Decreases the potential for interference on the distress channels.

ADD IAP/14/23

S52.220B When calling by radiotelephony is necessary, it should be done (in order of preference):

Reasons: Decreases the potential for interference on the distress channels.

ADD IAP/14/24

S52.220C 1) On the working frequencies assigned to the coast station in question or

Reasons: Decreases the potential for interference on the distress channels.

ADD IAP/14/25

S52.220D 2) when this is not possible, on the international calling frequencies listed under **S52.221**.

Reasons: Decreases the potential for interference on the distress channels.

C2 – Call and reply

NOC IAP/14/26

S52.221 § 97 1) Ship stations may use the following carrier frequencies for calling in radiotelephony:

4 125 kHz[3, 4, 5]
6 215 kHz[4, 5]
8 255 kHz
12 290 kHz[5]
16 420 kHz[5]
18 795 kHz
22 060 kHz
25 097 kHz

Reasons: It is not necessary to convert calling frequencies from duplex to simplex.

NOC IAP/14/27

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[3] **S52.221.1** In the United States, the carrier frequency 4 125 kHz is also authorized for common use by coast and ship stations for single-sideband radiotelephony on a simplex basis, provided the peak envelope power of such stations does not exceed 1 kW (see also No. **S52.222.2**).

Reasons: This note supports existing United States use of this channel in remote areas of our Search and Rescue areas of responsibility and supports communications in remote areas.

NOC IAP/14/28

[4] **S52.221.2** The carrier frequencies 4 125 kHz and 6 215 kHz are also authorized for common use by coast and ship stations for single-sideband radiotelephony on a simplex basis for call and reply purposes, provided that the peak envelope power of such stations does not exceed 1 kW. The use of these frequencies for working purposes is not permitted (see also Appendix **S13** and No. **S52.221.1**).

Reasons: This note supports existing use of this channel in remote areas of Search and Rescue responsibility and supports communications in remote areas.

NOC IAP/14/29

[5] **S52.221.3** The carrier frequencies 4 125 kHz, 6 215 kHz, 8 291 kHz, 12 290 kHz and 16 420 kHz are also authorized for common use by coast and ship stations for single-sideband radiotelephony on a simplex basis for distress and safety traffic.

Reasons: This note supports existing uses and enhances maritime safety in remote geographical areas.

MOD IAP/14/30

S52.222 2) Coast stations may use the following carrier frequencies for calling in radiotelephony[6]:

4 417 kHz[7]
6 516 kHz[7]
8 779 kHz
13 137 kHz

17 302 kHz
19 770 kHz
22 756 kHz
26 172 kHz

Reasons: Conversion to simplex operation is not necessary.

SUP IAP/14/31

[6] **S52.222.1**

Reasons: This system is out of date and no longer in use.

MOD IAP/14/32

[7] **S52.222.2** The carrier frequencies 4 417 kHz and 6 516 kHz are also authorized for common use by coast and ship stations for single-sideband radiotelephony on a simplex basis, provided that the peak envelope power of such stations ~~does not exceed 1 kW~~shall be limited to the lowest value to maintain reliable communications, not to exceed 5 kW. The use of 6 516 kHz for this purpose should be limited to daytime operation (see also No. **S52.221.1**).

Reasons: Consequential to MOD S52.219.

NOC IAP/14/33

S52.224 § 99 1) Before transmitting on the carrier frequencies 4 125 kHz, 6 215 kHz, 8 291 kHz, 12 290 kHz or 16 420 kHz a station shall listen on the frequency for a reasonable period to make sure that no distress traffic is being sent (see Recommendation ITU-R M.1171).

Reasons: It may not be a simple task to monitor the ship transmit frequency when set to a duplex calling channel.

MOD IAP/14/34

S52.227 2) The frequencies to be used for the conduct of simplex radiotelephony are shown in Appendix **S17**, Sub-Section B. In these cases, the peak envelope power of the coast station transmitter shall not exceed 1 kW.

Reasons: Editorial.

APPENDIX S17

Frequencies and channelling arrangements in the high-frequency bands for the maritime mobile service

(See Article **S52**)

NOC IAP/14/35

PART A – Table of subdivided bands

PART B – Channelling arrangements

Section I – Radiotelephony

NOC IAP/14/36

5 The following frequencies in Sub-Section A are allocated for calling purposes:

– Channel No. 421 in the 4 MHz band;

– Channel No. 606 in the 6 MHz band;

– Channel No. 821 in the 8 MHz band;

– Channel No. 1221 in the 12 MHz band;

– Channel No. 1621 in the 16 MHz band;

– Channel No. 1806 in the 18 MHz band;

– Channel No. 2221 in the 22 MHz band;

– Channel No. 2510 in the 25 MHz band.

The remaining frequencies in Sub-Sections A, B, C-1 and C-2 are working frequencies.

Reasons: Conversion to simplex operation is not necessary.

NOC IAP/14/37

5A For the use of the carrier frequencies:

4 125 kHz (Channel No. 421)

6 215 kHz (Channel No. 606)

8 291 kHz (Channel No. 833)

12 290 kHz (Channel No. 1221)

16 420 kHz (Channel No. 1621)

in Sub-Section A, by coast and ship stations for distress and safety purposes, see Article **S31** and Appendix **S13**.

Reasons: Conversion to simplex operation is not necessary.

NOC IAP/14/38

Sub-Section A

Table of single-sideband transmitting frequencies (kHz) for duplex (two-frequency) operation

Reasons: Conversion to simplex operation is not necessary.

NOC IAP/14/39

APPENDIX S27*

Frequency allotment Plan for the aeronautical mobile (R) service and related information

Reasons: ICAO in consultation with the ITU-R should perform any review of Appendix S27, if necessary. The HF bands allocated to the aeronautical mobile (R) service are nearly saturated by the use of analog voice communications. This spectrum must be maintained for the new digital high-frequency data link (HFDL) communications. The worldwide implementation of HFDL communications will reduce the burden on voice communications between pilots and controllers by using the data link for routine communications and freeing voice communications for more critical communications.

MOD IAP/14/40

RESOLUTION 207 (~~Mob-87~~Rev.WRC-2000)

Unauthorized use of frequencies in the bands allocated to the maritime mobile service and to the aeronautical mobile (R) service[1]

The World ~~Administrative~~ Radiocommunication Conference ~~for the Mobile Services, Geneva, 1987~~(Istanbul, 2000),

considering

a) that provisions of the Radio Regulations prohibit the unauthorized use of certain frequencies for other than safety related communications;

b) that enforcing compliance with these regulatory provisions is becoming increasingly difficult with the availability of low-cost HF SSB transceivers;

~~a~~c) that monitoring observations of the use of frequencies in the band 2 170-2 194 kHz and in the bands allocated exclusively to the maritime mobile service between 4 063 kHz and 27 500 kHz and to the aeronautical mobile (R) service between 2 850 kHz and 22 000 kHz show that a number of frequencies in these bands are still being used by stations of other services, some of which are operating in contravention of No. **S23.2**;

~~b~~d) that these stations are causing harmful interference to the maritime mobile and aeronautical mobile (R) services;

~~c~~e) that HF radio is the sole means of communication in certain situations for the maritime mobile service and that certain frequencies in the bands mentioned in *considering ~~a~~c)* are reserved for distress and safety purposes;

~~d~~f) that HF radio is the sole means of communication in certain situations for the aeronautical mobile (R) service and that this is a safety service~~,~~;

g) that this Conference has reviewed the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting the operational, distress and safety communications [and has adopted Resolution [HF] (WRC-2000) to study the future technical and operational needs for the existing distress and safety frequencies and possible solutions to provide for efficient and effective distress, safety and other communications beyond the year 2000],

considering in particular

~~e~~h) that it is of paramount importance that the distress and safety channels of the maritime mobile service be kept free from harmful interference, since they are essential for the protection of the safety of life and property;

~~f~~i) that it is also of paramount importance that channels directly concerned with the safe and regular conduct of aircraft operations be kept free from harmful interference, since they are essential for the safety of life and property,

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[1] WRC-97 made editorial amendments to this Resolution.

resolves

to urge administrations

1 to ensure that stations of services other than the maritime mobile service abstain from using frequencies in distress and safety channels and their guard bands and in the bands allocated exclusively to that service, except under the conditions expressly specified in Nos. **S4.4**, **S5.128**, **S5.129**, **S5.137** and **S4.13** to **S4.15**; and to ensure that stations of services other than the aeronautical mobile (R) service refrain from using frequencies allocated to that service except under the conditions expressly specified in Nos. **S4.4** and **S4.13**;

2 to make every effort to identify and locate the source of any unauthorized emission capable of endangering human life or property and the safe and regular conduct of aircraft operations, and to communicate their findings to the Radiocommunication Bureau;

3 to participate in the monitoring programmes that the Bureau may organize pursuant to this Resolution;

4 to make every effort to ensure that such emissions are made in appropriate bands allocated to services other than the maritime mobile service or the aeronautical mobile (R) service;

5 to request their competent authorities to take, within their respective jurisdiction, such legislative or regulatory measures which they consider necessary or appropriate in order to prevent stations from unauthorized use of distress and safety channels or operating in contravention of No. **S23.2**,

to invite the Radiocommunication Bureau

1 to study possible solutions, technical and regulatory, to assist in mitigating HF interference;

~~1~~2 to continue to organize monitoring programmes, at regular intervals, in the maritime distress and safety channels and their guard bands and in the bands allocated exclusively to the maritime mobile service between 4 063 kHz and 27 500 kHz and to the aeronautical mobile (R) service between 2 850 kHz and 22 000 kHz, with a view to ensuring the timely distribution of monitoring data and identifying the stations of other services operating on these channels or in these bands;

~~2~~3 to seek the cooperation of administrations in identifying the sources of those emissions by all available means and in securing the cessation of those emissions;

~~3~~4 when the station of another service transmitting in a band allocated to the maritime mobile service or to the aeronautical mobile (R) service has been identified, to inform the administration concerned,

to invite ITU-R and ITU-D

1 to increase regional awareness of appropriate practices to help mitigate interference in the HF bands, especially on distress and emergency channels;

2 to include the problem of interference to distress and emergency channels on agenda of regional radiocommunication and development seminars,

requests administrations

to take all necessary steps in such cases to ensure the cessation of any transmissions contravening the provisions of the Radio Regulations on the frequencies or in the bands referred to in this Resolution.

ADD IAP/14/41

DRAFT RESOLUTION [HF] (WRC-2000)

Technical and operational needs for distress and safety frequencies allocated to the maritime mobile service and the aeronautical mobile (R) service

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the HF frequencies currently used by the aeronautical and maritime mobile services for distress, safety and other communications, including allotted operational frequencies, suffer from harmful interference and are often subject to difficult propagation conditions;

b) that WRC-97 considered some aspects of the use of the HF bands for distress and safety communications in the context of the Global Maritime Distress and Safety System (GMDSS), especially with regard to regulatory measures;

c) that existing regulatory measures prohibit the unauthorized use of certain frequencies for other than safety related traffic;

d) that enforcing compliance with these regulatory measures is becoming increasingly difficult with the availability of low-cost HF SSB transceivers;

e) that unauthorized operations using maritime and aeronautical HF frequencies are continuing to increase and are already a serious risk to HF distress, safety and other communications;

f) that this Conference revised Resolution **207** regarding the unauthorized use of frequencies in the bands allocated to the maritime mobile service and to the aeronautical mobile (R) service;

g) that there is a need for a review of the frequency assignments and provisions for HF distress, safety and aeronautical mobile (R) service communications;

h) that some administrations have resorted to the use of transmitting warning messages on operational HF channels as a means of deterring unauthorized users,

resolves to invite ITU-R

1 to study the future technical and operational needs for the existing HF operational, distress and safety frequencies and possible solutions to provide for efficient and effective operational, distress and safety communications in the maritime mobile and aeronautical mobile (R) services beyond the year 2000;

2 to report the results of the studies referred to in *resolves* 1 to WRC-03,

further resolves

1 to urge all administrations and concerned organizations, including IMO and ICAO, to actively participate and contribute to the ITU-R studies;

2 to urge administrations to take all practicable steps to comply with Resolution **207 (Rev.WRC-2000)**,

instructs the Secretary-General

to communicate this Resolution to the attention of the International Maritime Organization and the International Civil Aviation Organization.

WRC-2000 agenda item 1.8 - To consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands

Proposal for communications by earth stations on board vessels using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service

Background information

This item concerns provision of communications by earth stations on board vessels (ESVs) using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service. These stations operate in three distinct modes: at sea; while stationary in or near port; and in motion approaching or departing from port.

Operations at sea (beyond a certain distance for near-shore coordination) by ESVs in the fixed-satellite service do not present a potential for interference to stations in the fixed service operating in accordance with the 6 GHz FS allocation, and therefore need not be coordinated. Operations while these earth stations are stationary at predetermined points can be coordinated bilaterally with fixed service systems. Technical and regulatory issues concern the potential for interference between in-motion operations by these ESVs operating close to shore and stations in the fixed service both on and offshore.

The studies that have been conducted in ITU-R have illustrated that the values for the minimum distance are principally affected by the interference criteria required to protect the fixed service and the number of passages per unit time by vessels equipped with earth stations. Based on different values for these assumptions, the results of these preliminary studies yielded a range of values for the minimum distance from 100 km to 540 km. It should be noted that studies submitted to CPM by some administrations suggested values for the minimum distance of 150 km to 370 km. However, there should be a single minimum distance value.

MOD IAP/14/42

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
3 600-~~4 200~~3 700 FIXED FIXED-SATELLITE (space-to-Earth) Mobile	**3 500-3 700** FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation S5.433 S5.435	
3 700-4 200 FIXED FIXED-SATELLITE (space-to-Earth) ADD S5.ESV Mobile	**3 700-4 200** FIXED FIXED-SATELLITE (space-to-Earth) ADD S5.ESV MOBILE except aeronautical mobile	

Reasons: To establish regulatory and technical provisions for operations of earth stations on board vessels in the fixed-satellite service.

MOD IAP/14/43

5 830-7 550 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 925-~~6 700~~6 425	FIXED FIXED-SATELLITE (Earth-to-space) ADD S5.ESV MOBILE S5.149 S5.440 S5.458	
6 425-6 700	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.149 S5.440 S5.458	

Reasons: To establish regulatory and technical provisions for operations of earth stations on board vessels in the fixed-satellite service.

ADD IAP/14/44

S5.ESV In the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz, transponders on space stations in the fixed-satellite service may be used, additionally, by earth stations on vessels. Such use is subject to the provisions specified in the procedures of Resolution **ZZZ** (WRC-2000).

Reasons: To establish regulatory and technical provisions for operations of earth stations on board vessels in the fixed-satellite service.

ADD IAP/14/45

RESOLUTION ZZZ (WRC-2000)

Provisions to enable earth stations located on board vessels to operate in fixed-satellite service networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that there is a demand for global wideband satellite communication services on vessels;

b) that the technology exists that would permit the use of fixed-satellite services (FSS) networks by earth stations on board vessels (ESVs) operating in the 3 700-4 200 MHz and 5 925-6 425 MHz bands;

c) that ESVs have the potential to cause unacceptable interference to the fixed service (FS) systems in the band 5 925-6 425 MHz;

d) that FS systems have the potential to cause interference to ESVs in the 3 700-4 200 MHz band;

e) that ESVs operating in these bands require considerably less than the full bandwidth in this FSS allocation and only a portion of the visible geostationary arc;

f) that there are a limited number of geostationary FSS systems that have global coverage;

g) that in order to ensure the protection and future growth of the FS, the ESV must operate with certain technical and operational constraints;

h) that administrations may authorize radiocommunication stations on off-shore structures and platforms for which they are responsible;

i) that based on appropriate assumptions a minimum distance can be calculated beyond which the ESV will not have the potential to cause unacceptable interference to the fixed service in this band,

noting

a) that operation within the territorial sea is at the discretion of the administration with territorial authority, in which case the relevant procedures of that administration will apply;

b) that operation of earth stations on vessels from specified fixed points at locations outside the territorial sea but for which an administration has territorial jurisdiction is fully within the FSS,

resolves

1 that the administration that issues the radio licence for the use of ESVs in these bands (licensing administration) shall ensure that such stations do not cause unacceptable interference to stations in the fixed service;

2 that licensing administrations shall ensure that ESVs are capable of operating in compliance with the requirements of this Resolution;

3 that operators of ESVs shall comply with the conditions established by the licensing administration(s);

4 that ESVs shall not claim protection from fixed service station transmissions;

5 that any transmissions from ESVs within a distance X km off any given coast shall be based upon the prior agreement of that coastal administration;

6 that the ESV system shall include means of identification and automatic mechanisms to terminate transmissions whenever the station operates outside its pre-authorized geographic (see *resolves* 5) or operational limits;

7 that ESVs shall be equipped so as to enable the licensing administration under the provisions of Article **S18** to verify earth station performance and to accomplish the switch off of the ESV transmission immediately upon request by an administration whose services may be affected;

8 that when ESVs operating beyond the territorial sea but within X km of the coast of an administration fail to comply with the terms required by that administration pursuant to *resolves* 3 and 5, then that administration may:

– request the ESV to comply with such terms or cease operation immediately; or

– request the licensing administration to require such compliance or immediate cessation of the operation;

9 that any licensing authority that licenses ESVs shall agree to maintain at all times a point of contact, which shall be published in a circular of the ITU, that may be contacted by an affected administration seeking assistance pursuant to *resolves* 3 and 5 above.

WRC-2000 agenda item 1.9 - To take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service (MSS) in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions 213 (Rev.WRC-95) and 220 (WRC-97)

Background information

Proposals were made to WRC-97 to reallocate portions of the 1 559 -1 610 MHz band which, with the exception of a fixed service allocation in some countries, currently is exclusively allocated to the radionavigation-satellite service and aeronautical radionavigation service worldwide. Other proposals were made not to change the existing allocations in these bands. In Resolution 220 (WRC-97), ITU-R was requested to study, as a matter of urgency, the technical criteria and operational and safety requirements to determine if sharing between the aeronautical radionavigation and radionavigation-satellite services, operating or planned to be operate, in the band 1 559-1 610 MHz, and the mobile-satellite service in a portion of the 1 559-1 567 MHz frequency range, is feasible, taking into account the essential need to protect systems operating in the aeronautical radionavigation and radionavigation-satellite services in the band 1 559-1 610 MHz.

There are millions of RNSS receivers in use today for a wide range of applications, including safety-of-life-critical navigation on land, at sea, and in the air. Today, most of these receivers operate with the global positioning system (GPS), an important element of the global navigation satellite system (GNSS) that operates in the 1 559-1 610 MHz band.

GPS provides position and time information to users by means of one-way transmissions using RNSS (space-to-Earth) allocations. GPS is information technology that uses systems of hardware and software, as well as information (time and ephemeris) transmitted from satellites to provide derived information to the user.

GLONASS and GPS are established elements of the International Civil Aviation Organization (ICAO) GNSS, operating in the band 1 559-1 610 MHz. These systems are accepted by the ICAO Council for use in international civil aviation. ICAO is currently developing standards and recommended practices for international application in civil aviation. The GNSS will be used during all phases of flight, including precision approaches and landing, and under all weather conditions. The latter places extensive requirements on the performance characteristics of the system. The aeronautical use of RNSS is recognized in the Radio Regulations as a safety-of-life application. GPS is the sole basis for the formation of International Atomic Time and Coordinated Universal Time (UTC) by the International Bureau of Weights and Measures. GPS is also the primary means by which clocks are synchronized within telecommunications networks for Time Division Multiple Access transmissions. Time and frequency functions are or will be available on other RNSS systems.

As Resolution 220 (WRC-97) recognizes RNSS and ARNS systems are evolutionary and other types of GNSS are under development for operation in the band 1 559-1 610 MHz. There are both aeronautical and non-aeronautical safety-of-life services in the 1 559-1 610 MHz band, and it is well established that there is an essential need to protect systems operating in the ARNS and RNSS.

The core signal structures of the MSS and the RNSS and ARNS are fundamentally different: MSS uses a two-way signal while ARNS and RNSS transmits a weak, receive-only signal. Having systems from a radiocommunication service operate on a co-primary, co-frequency basis in the 1 559-1 610 MHz band would limit ARNS and RNSS operators' flexibility to adjust their spectrum usage, and would hamper efforts to develop a GNSS that is capable of meeting evolving international needs and of providing adequate protection for international civil use worldwide.

Studies undertaken in the ITU addressed current aeronautical radionavigation and radionavigation-satellite service systems, as well as future radionavigation services planned for this band.

These studies reached the following conclusions:

- MSS (space-to-Earth) and ARNS/RNSS are fundamentally incompatible in any portion of the 1 559-1 567 MHz band. Not only do MSS signals disrupt ARNS/RNSS, but GNSS pseudolites disrupt MSS signals.
- The –112 dB(W/m^2/MHz) power flux-density level at the Earth's surface that is mentioned in Resolution 220 clearly would not protect existing RNSS systems (such as GPS) from harmful interference.
- The RNSS is extensively used, and is continuing to undergo a tremendous expansion which drives further evolution. These factors, along with the many critical timing, positioning, and navigation uses of RNSS sharing of the 1 559-1 610 MHz band, weigh conclusively against sharing any portion of the band segment at 1 559-1 567 MHz with any co-frequency communication service.
- The use of pseudolites in the ARNS/RNSS bands at 1 559-1 567 MHz is in its early stages, but is expected to increase in terms of numbers, geographic scope, and complete utilization of the frequency band in the near future. This use is incompatible with co-frequency MSS (space-to-Earth).

NOC IAP/14/46

CITEL Administrations propose that no allocation be made to the mobile-satellite service (space-to-Earth) in any portion of the 1 559-1 567 MHz band under agenda item 1.9.

Reasons: The current allocation, 1 559-1 610 MHz, is required for radionavigation services, including critical aeronautical safety applications, on a worldwide basis. Based on studies conducted in ITU-R pursuant to Resolution 220, sharing in this band with communications services such as the mobile-satellite service (space-to-Earth) is not possible.

SUP IAP/14/47

RESOLUTION 220 (WRC-97)

Studies to consider the feasibility of use of a portion of the band 1 559-1 610 MHz by the mobile-satellite service (space-to-Earth)

Reasons: Studies performed by ITU-R show that co-frequency sharing between the mobile-satellite service and the radionavigation-satellite and aeronautical radionavigation services within the band 1 559-1 567 MHz is not feasible. ITU-R studies satisfy the requirement of Resolution 220 (WRC-97). As a result, Resolution 220 should be suppressed.

WRC-2000 agenda item 1.12 - To consider the progress of studies on sharing between feeder links of non-GSO MSS networks and GSO FSS networks in the bands 19.3-19.7 GHz and 29.1-29.5 GHz, taking into account Resolution 121 (Rev.WRC-97)

Proposal for the modification of S5.541A and the suppression of Resolution 121

Background information

Resolution 121 requests that ITU-R conduct a study of sharing possibilities between GSO FSS and non-GSO MSS feeder links in the bands. In response, ITU-R WP 4A of Study Group 4 has agreed a draft new Recommendation, “Mitigation techniques to facilitate coordination in the 20/30 GHz non-GSO MSS feeder links”.

The Recommendation includes the topics of adaptive power control, high gain antennas, geographic isolation, site diversity and link balancing.

This Recommendation is considered to have covered the requirements of Resolution 121 (Rev.WRC-97) and thus satisfies the agenda.

MOD IAP/14/48

S5.541A Feeder links of non-geostationary networks in the mobile-satellite service and geostationary networks in the fixed-satellite service operating in the band 29.1-29.5 GHz (Earth-to-space) shall employ uplink adaptive power control or other methods of fade compensation, such that the earth station transmissions shall be conducted at the power level required to meet the desired link performance while reducing the level of mutual interference between both networks. These methods shall apply to networks for which Appendix **S4** coordination information is considered as having been received by the Bureau after 17 May 1996 and until they are changed by a future competent world radiocommunication conference. Administrations submitting Appendix **S4** information for coordination before this date are encouraged to utilize these techniques to the extent practicable.~~ These methods are also subject to review by ITU-R (see Resolution **121 (Rev.WRC-97)**).~~

Reasons: The objective of Resolution 121 has been addressed through the development of a draft new Recommendation in Study Group 4 of ITU-R.

SUP IAP/14/49

RESOLUTION 121 (Rev.WRC-97)

Continued development of interference criteria and methodologies for fixed-satellite service coordination between feeder links of non-geostationary satellite networks in the mobile-satellite service and geostationary-satellite networks in the fixed-satellite service in the bands 19.3-19.7 GHz and 29.1-29.5 GHz

Reasons: The objectives of Resolution 121 have been met.

WRC-2000 agenda item 1.14 - To review the results of the studies on the feasibility of implementing non-GSO MSS feeder links in the 15.43-15.63 GHz in accordance with Resolution 123 (WRC-97)

Remove the 15.43-15.63 GHz space-to-Earth allocation from the tables of Article RR S5

Background information

Studies conducted subject to Resolution 123 (WRC-97) dealt with two aspects:

1) need for the allocation to non-GSO MSS feeder links in the band 15.43-15.63 GHz (space-to-Earth);

2) feasibility of implementing non-GSO MSS feeder links in the band 15.43-15.63 GHz (space-to-Earth) regarding protection of RAS, EESS (passive) and SRS (passive) operating in the band 15.35-15.4 GHz.

The ITU-R studies concluded that the space-to-Earth operation of non-GSO MSS feeder links in parts of the 15.43-15.63 GHz band is significantly difficult and sometimes impossible, due to technical limitations that would have to be imposed on the feeder links.

The ITU-R studies complied with the Resolution 123 (WRC-97) provisions completely and hence covered all issues related to agenda item 1.14. Taking into account that Resolution 123 (WRC-97) has attained its objectives and aims, it would be appropriate to suppress it.

The results of the studies, as reported in the CPM Report, showed that it should be feasible to implement the existing non-GSO MSS feeder downlinks in the band 15.43-15.63 GHz taking into account the protection requirements for RAS and other passive services in this band. Providing that the existing non-GSO MSS feeder downlinks systems planning to use this band can provide the required protection to the passive services, the ITU-R studies did not identify any additional technical or operational disadvantages with respect to the existing systems.

The CPM Report also concludes that, for future non-GSO MSS systems using the space-to-Earth allocation at 15.43-15.63 GHz, substantial mitigation techniques would be required to adequately protect the RAS from harmful interference.

The technical studies also concluded that, because of high levels of suppression of out-of-band emissions required, use of the band 15.43-15.63 GHz for space-to-Earth feeder links should not extend beyond non-GSO MSS satellite networks for which advanced publication information has been received by the Bureau prior to WRC-2000.

Common CITEL proposals were developed to reflect this point of view.

MOD IAP/14/50

14.25-15.63 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
15.43-15.63	FIXED-SATELLITE ~~(space-to-Earth)~~ (Earth-to-space) MOD S5.511A AERONAUTICAL RADIONAVIGATION S5.511C	

SUP IAP/14/51

RESOLUTION 123 (WRC-97)

Feasibility of implementing feeder links of non-geostationary satellite networks in the mobile-satellite service in the band 15.43-15.63 GHz (space-to-Earth) while taking into account the protection of the radio astronomy service, the Earth exploration-satellite (passive) service and the space research (passive) service in the band 15.35-15.4 GHz

MOD IAP/14/52

S5.511A Use of the band 15.43-15.63 GHz by the fixed-satellite service (~~space-to-Earth (see Resolution **123 (WRC-97)**) and~~ Earth-to-space) is limited to feeder links of non-geostationary systems in the mobile-satellite service, subject to coordination under No. **S9.11A**. In the space-to-Earth direction, the use of this band is limited to feeder links of non-GSO MSS systems for which advanced publication information has been received prior to WRC-2000 and the minimum earth station elevation angle above and gain towards the local horizontal plane and the minimum coordination distances to protect an earth station from harmful interference shall be in accordance with Recommendation ITU-R S.1341. Also in the space-to-Earth direction, harmful interference shall not be caused to stations of the radio astronomy service using the band 15.35-15.4 GHz. The threshold levels of interference and associated power flux-density limits which are detrimental to the radio astronomy service are given in Recommendation ITU-R RA.769-1 for 98% of the time. Special measures will need to be employed to protect the radio astronomy service in the band 15.35-15.4 GHz.

WRC-2000 agenda item 1.17 - To consider possible worldwide allocation for the earth exploration-satellite (passive) and space research (passive) services in the band 18.6-18.8 GHz, taking into account the results of the ITU-R studies

Proposal for worldwide allocation to the Earth exploration-satellite (passive) services in the band 18.6-18.8 GHz on a primary basis

Background information

At present, the allocations for the Earth exploration-satellite (passive) and the space research (passive) services in the band 18.6-18.8 GHz are on a primary basis in Region 2, but on a secondary basis in Regions 1 and 3.

The allocation to the Earth exploration-satellite (passive) service must be upgraded to primary status if the long-term ability to obtain environmental data with passive spaceborne sensors is to be preserved. Compatibility between the passive sensors and the fixed and fixed-satellite services requires adoption of constraints on the parameters of the fixed and fixed-satellite systems that use the band.

A pfd limit of –95 dBW/m^2 in a reference bandwidth of 200 MHz on geostationary systems in the fixed-satellite service will enable passive sensors to perform their mission if measurements are restricted to portions of the sensor orbit where the sensor is moving away from the equator while taking sensor data over land masses. Additionally, allowing for an exceedance of this value by 3 dB for up to 5% of the time will allow the fixed-satellite service to implement power control in overcoming rain fades when needed.

Similarly, limiting the power delivered to any antenna of a station in the fixed service measured across the band 18.6-18.8 GHz to not exceed 0 dBW in 200 MHz along with an antenna pattern complying with Recommendation ITU-R F.699-4 will enable sharing with the fixed service.

MOD IAP/14/53

18.6-22.21 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
18.6-18.8	**18.6-18.8**	**18.6-18.8**
<u>EARTH EXPLORATION-SATELLITE (passive)</u>	EARTH EXPLORATION-SATELLITE (passive)	<u>EARTH EXPLORATION-SATELLITE (passive)</u>
FIXED	FIXED	FIXED
FIXED-SATELLITE (space-to-Earth) <u>MOD</u> S5.523	FIXED-SATELLITE (space-to-Earth) <u>MOD</u> S5.523	FIXED-SATELLITE (space-to-Earth) <u>MOD</u> S5.523
MOBILE except aeronautical mobile	MOBILE except aeronautical mobile	MOBILE except aeronautical mobile
~~Earth exploration-satellite (passive)~~	SPACE RESEARCH (passive)	~~Earth exploration-satellite (passive)~~
Space research (passive)		Space research (passive)
<u>MOD</u> S5.522	<u>MOD</u> S5.522	<u>MOD</u> S5.522

Reasons: To establish a common worldwide primary allocation to the Earth exploration-satellite (passive) services to be used for environmental measurements.

MOD IAP/14/54

S5.522 ~~In making assignments to stations in the fixed and mobile services, administrations are invited to take account of passive sensors in the Earth-exploration satellite and space research services operating in the band 18.6-18.8 GHz. In this band, administrations should endeavour to limit as far as possible both the power delivered by the transmitter to the antenna and the e.i.r.p. in order to reduce the risk of interference to passive sensors to the minimum.~~In the band 18.6-18.8 GHz, fixed and mobile service stations shall be limited to a total power delivered to each antenna of 0 dBW.

Reasons: To enable passive sensors and the fixed service to operate in the band without excessive interference to the sensors.

MOD IAP/14/55

S5.523 ~~In assigning frequencies to stations in the fixed-satellite service in the direction space-to-Earth, administrations are requested to limit as far as practicable the power flux-density at the Earth's surface in the band 18.6-18.8 GHz, in order to reduce the risk of interference to passive sensors in the earth exploration-satellite and space research services.~~ The fixed-satellite service shall be limited to a power flux-density at the Earth's surface of –95 (dBW/m^2) across the 18.6-18.8 GHz band for all angles of arrival. This power flux-density limit may be exceeded by 3 dB for up to 5% of the time everywhere in the FSS service area. The use of this band by non-geostationary-satellite orbit fixed satellite service systems with apogees lower than 20 000 km shall be in accordance with the provisions of Resolution **ZZZ (WRC-2000)**.

Reasons: To enable passive sensors and the fixed-satellite service to operate in the band without excessive interference to the sensors. Further studies have not been completed to determine an allowable power flux-density limit on non-geostationary fixed-satellite service systems needed to protect Earth exploration-satellite service (passive).

ADD IAP/14/56

DRAFT RESOLUTION ZZZ (WRC-2000)

Power flux-density limits applicable to non-GSO systems for protection of Earth exploration-satellite service (passive) in the band 18.6-18.8 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-2000 made changes to the Table of Frequency Allocations in the band 18.6-18.8 GHz;

b) that the power flux-density (pfd) limit in footnote MOD S5.523 of the Radio Regulations was derived solely upon consideration of geostationary-satellite orbit fixed-satellite service systems and non-geostationary-satellite orbit fixed-satellite service systems with apogees higher than 20 000 km;

c) that initial sharing studies have indicated that low-Earth orbiting fixed-satellite service systems cause significantly greater interference into Earth exploration-satellite (passive) service sensors than do geostationary-satellite orbit fixed-satellite service systems;

d) that further sharing studies are required of the power flux-density limit applicable to non-geostationary-satellite orbit fixed satellite service systems operating below 20 000 km for the protection of Earth exploration-satellite (passive) service systems,

resolves

that non-geostationary-satellite orbit fixed-satellite service systems operating with apogees below 20 000 km shall do so only on a non-interference basis until an appropriate power flux-density limit is determined for protection of EESS (passive) systems,

invites ITU-R

to study, as a matter of urgency, the appropriate power flux-density values to be applied to non-geostationary-satellite systems in the 18.6-18.8 GHz band to ensure protection of the Earth exploration-satellite (passive) service without unduly constraining the development of either type of system, and submit the results to a future competent conference,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

WRC-2000 agenda item 1.18 - To consider the use of new digital technology for the maritime mobile service in the band 156-174 MHz and consequential revision of Appendix 18/S18, taking into account Resolution 342 (WRC-97)

Proposal to modify Appendix S18 and Resolution 342

Background information

Appendix S18 of the ITU Radio Regulations defines the channels of the maritime mobile service. These channels support a variety of functions including “Distress, Safety and Calling: public correspondence, inter-ship, ship/shore/ship, port operations and ship movement”. The maritime mobile frequency band, 156-174 MHz, (effectively 156-162 MHz in the Americas due to previous domestic regulatory actions) supports maritime communications worldwide.

WP 8B and CPM studied this agenda item and determined that the status of the ITU-R studies indicate that revisions of Appendix S18 to introduce new digital technologies is not possible at this conference. However, it is possible to take action to address the issue of congestion.

With the rapidly increasing use of the VHF maritime mobile band, particularly for data communications, increased congestion and mutual interference is being experienced which, among others, has resulted in unacceptable degradation of the distress and safety related function for which this band is utilized. Unless action is taken this situation will only worsen as usage continue to grow.

At WRC-97, CITEL proposed simplex use of duplex channels for Appendix S18. This was approved for a few specific public correspondence channels only, channels 18 and 82-86. Note *m)* to Appendix S18 must be modified to add more channels for simplex use. This will allow for more efficient use of Appendix S18 channels and provide flexibility for administrations to meet their immediate requirements, while maintaining compatibility with the vast number of ships and pleasure craft now using the band in accordance with Appendix S18.

WP 8B and CPM recommend modifications to Appendix S18 to provide administrations with further flexibility to use the channels of Appendix S18 in simplex mode if required. This would allow the use of duplex channels in Appendix S18 in simplex mode and would increase the number of available channels. The cost of the change would be minimal and administrations could be able to quickly address certain local problems of congestion. Furthermore, the conference could consider permitting, subject to non-interference and no protection, the use of some of these channels or sub-bands created by the conversion of duplex channel to simplex channels for the initial testing and possible future introduction of new technologies, subject to non-operational use. This would necessarily be subject to special arrangement between interested or affected administrations.

CITEL administrations propose to modify Note *m)* to allow simplex use of duplex channels for the remainder of the channels not already identified as simplex. CITEL administrations also propose the addition of a new Note [*z)*] to allow the use of the simplex channels per Note *m)* for the testing and development of new technologies on a non-operational basis, subject to special arrangements between affected or interested administrations.

In addition, CITEL administrations propose to modify Resolution 342 to continue the study of one or more new interoperable technologies for the maritime mobile service.

MOD IAP/14/57

APPENDIX S18

Table of transmitting frequencies in the VHF maritime mobile band

(See Article **S52**)

NOTE - For assistance in understanding the Table, see notes *a)* to *n)* below.

Channel designator	Notes	Transmitting frequencies (MHz)		Inter-ship	Port operations and ship movement		Public corres-pondence
		Ship stations	Coast stations		Single frequency	Two frequency	
16		156.800	156.800	DISTRESS, SAFETY AND CALLING			
76	*n)*	156.825			x		
17	*g)*	156.850	156.850	x	x		
77		156.875		x			
18	*m), [z)]*	156.900	161.500		x	x	x
78	*m), [z)]*	156.925	161.525		x	x	x
19	*m), [z)]*	156.950	161.550		x	x	x
79	*m), [z)]*	156.975	161.575		x	x	x
20	*m), [z)]*	157.000	161.600		x	x	x
80	*m), [z)]*	157.025	161.625		x	x	x
21	*m), [z)]*	157.050	161.650		x	x	x
81	*m), [z)]*	157.075	161.675		x	x	x
22	*m), [z)]*	157.100	161.700		x	x	x
82	*m), [z)]*	157.125	161.725		x	x	x
23	*m), [z)]*	157.150	161.750		x	x	x
83	*m), [z)]*	157.175	161.775		x	x	x
24	*m), [z)]*	157.200	161.800		x	x	x
84	*m), [z)]*	157.225	161.825		x	x	x
25	*m), [z)]*	157.250	161.850		x	x	x
85	*m), [z)]*	157.275	161.875		x	x	x
26	*m), [z)]*	157.300	161.900		x	x	x
86	*m), [z)]*	157.325	161.925		x	x	x
27	*m), [z)]*	157.350	161.950		x	x	x
87		157.375			x		
28	*m), [z)]*	157.400	162.000		x	x	x
88		157.425			x		
AIS 1	*l)*	161.975	161.975				
AIS 2	*l)*	162.025	162.025				

Notes referring to the Table

Specific notes

MOD IAP/14/58

m) These channels ~~(18 and 82 to 86)~~ may be operated as single frequency channels, subject to special arrangement between interested or affected administrations.

Reasons: Adding more channels for simplex use will allow for more efficient use of Appendix S18 channels and provide flexibility for administrations to meet their immediate requirements, while maintaining compatibility with the vast number of ships and pleasure craft now using the band in accordance with Appendix S18.

ADD IAP/14/59

[*z)*] These channels may be used for the testing and development of new technologies on a non-interference, no protection, non-operational basis. Such use is subject to special arrangement between interested or affected administrations.

Reasons: May permit facilitation of the development and testing of new technology. Use of channels for the development and testing of new technologies may, in turn, encourage maritime radio equipment manufacturers to advance or accelerate such development and testing.

MOD IAP/14/60

RESOLUTION 342 (Rev.WRC-~~97~~2000)

Review of new technology to provide improved efficiency in the use of the band 156-174 MHz by stations in the maritime mobile service

MOD IAP/14/61

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

MOD IAP/14/62

a) that the agenda of ~~WRC-97~~this Conference include~~d~~s the consideration of the use of Appendix **S18** to the Radio Regulations in respect of maritime mobile communications and the use of new technology for maritime radiotelephony channels;

b) Recommendation **318 (Mob-87)**;

c) that Appendix **S18** identifies frequencies to be used for distress and safety communications on an international basis;

d) that the introduction of new technology in the maritime mobile service shall not disrupt distress and safety communications in the VHF band including those established by the International Convention for the Safety of Life at Sea (SOLAS), 1974, as amended;

e) that ITU-R is conducting studies on improving efficiency in the use of this band, and that these studies are still ongoing;

f) that changes made in Appendix **S18** should not prejudice the future use of these frequencies or the capabilities of systems or new applications required for use by the maritime mobile service;

g) that the congestion on Appendix **S18** frequencies calls for the implementation of efficient new technologies;

h) that the use of new technology on maritime VHF frequencies will make it possible to better respond to the emerging demand for new services,

SUP IAP/14/63

noting

ADD IAP/14/64

noting

a) that digital systems have been successfully implemented in portions of the land mobile service;

ADD IAP/14/65

b) that the use of mobile telephones (PC and cellular) along the coast had led to the reduced user of maritime public correspondence systems,

resolves

MOD IAP/14/66

a) that ~~WRC-99~~a future world radiocommunication conference should consider the use of new technology in the band 156-174 MHz and consequential revision of Appendix **S18**~~,~~ if necessary;

ADD IAP/14/67

b) that in order to provide full worldwide interoperability of equipment on ships, there should be one technology or more than one interoperable worldwide technology implemented in Appendix **S18**,

invites ITU-R

MOD IAP/14/68

to continue studies on the following with a view to providing a report to ~~WRC-99~~a future WRC and identify the future requirements of the maritime mobile service. If the requirements warrant the replacement of existing technology with new technology then:

SUP IAP/14/69

a)

(MOD) IAP/14/70

~~b~~a) to identify suitable technical characteristics of the system or interoperable systems to replace existing technology;

MOD IAP/14/71

~~c~~b) to identify necessary modifications if required, to the frequency plan contained within Appendix **S18**;

MOD IAP/14/72

~~d~~c) to recommend a timetable for the introduction of new technology if required, and ~~the necessary changes~~a transition plan;

(MOD) IAP/14/73

~~e~~d) to study and recommend how new technology can be introduced without harming the distress and safety requirements,

instructs the Secretary-General

to communicate this Resolution to the International Maritime Organization.

Reasons: These modifications do not restrict the new technology to digital or to one technology; all available technologies should be studied, as new technologies are constantly emerging. It is spectrally inefficient to set aside spectrum, which is already extremely congested, for a new technology that has not yet been determined.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Note by the Secretary-General

GENERAL REVIEW OF RESOLUTIONS AND RECOMMENDATIONS OF WARC/WRC

Attached is the report of the Director of the Radiocommunication Bureau which was prepared in response to Resolution 95 (WRC-97).

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

Director, Radiocommunication Bureau

GENERAL REVIEW OF RESOLUTIONS AND RECOMMENDATIONS OF WARC/WRC

WRC-97, by its Resolution 95, instructed the Director of the Radiocommunication Bureau,

"to conduct a general review of the Resolutions and Recommendations of previous conferences and, if necessary after consultation with the Radiocommunication Advisory Group and the chairmen of the relevant radiocommunication study groups, to submit a report to future competent world radiocommunication conferences which indicates their current status, and what follow-up action may be advised.".

The Bureau performed an initial study in this respect and submitted the results to CPM-99, for information. CPM took note of it and made some specific suggestions (see Chapter 7, section 7.4, of the CPM Report to WRC-2000).

Further reports on this subject were submitted to the tenth Chairmen and Vice-Chairmen meeting (Geneva, 26 November 1999) and to the eighth meeting of the Radiocommunication Advisory Group (Geneva, 17-20 January 2000). Based on the advice received from these meetings, the Bureau prepared an updated report which is contained in the Attachment to this document.

The Bureau wishes to emphasize that the indications in the column "Possible follow-up" should not be considered as proposals for the work of the Conference, but, in accordance with the *instructs* of Resolution 95 (see above), are merely suggestions as to the possible course of action to be taken in respect of the concerned Resolution/Recommendation.

The Bureau refrained from indicating any possible course of action in respect to those Resolutions/Recommendations that are explicitly on the agenda of WRC-2000.

Attachment: 1

ATTACHMENT

Review of WARC/WRC Resolutions and Recommendations in response to Resolution 95 (WRC-97)

Res. No.	Subject	Remark	Possible follow-up
1	Notification of frequency assignments	Still relevant.	NOC
2	Equitable use of GSO and frequency bands for space services	Still relevant.	NOC
4	Period of validity of GSO space systems	Still relevant; for consideration by a future WRC.	NOC
5	Technical cooperation - propagation in tropical areas	**Obsolete** (in view of the BDT activities).	SUP
7	National radio-frequency management	Some actions completed; new elements became relevant in the context of the structural changes within Member States.	MOD
8	Transfer procedures/changes in HF-FX	**Obsolete**, all actions completed on 31 December 1998.	SUP
10	Frequencies for Red Cross	Basic provisions still relevant, but text should be updated taking into account current technologies in use.	MOD
13	Formation of call signs	Still relevant, without real problems. More details in Document 16. NOTE - This Resolution is referred to in No. S19.32.	NOC
14	Transfer of technology	**Obsolete** in view of the current BDT activities.	SUP
15	Cooperation in space radiocommunications	Many aspects are obsolete in view of the current BDT activities.	MOD/SUP
18	Identification/non-parties in an armed conflict	Still relevant.	NOC
20	Technical cooperation - aeronautical service	**Obsolete** in view of the ICAO activities.	SUP
21	Transfer of HF-FX in 2007	Still relevant (some elements are obsolete). NOTE - This Resolution is referred to in Nos. S5.136, S5.143, S5.146, S5.151.	MOD
23	Suspension of provisions for TEX in HF	**Obsolete** as from 1 January 1999 (date of entry into force of the simplified Radio Regulations).	SUP
24	Review of Constitution/provisional application	**Obsolete** in view of the action taken by PP-98.	SUP
25	Operation of Global Satellite Systems	Still relevant (some elements are obsolete).	MOD
26	Review of footnotes	Still relevant (permanent agenda item at each WRC).	NOC

27	Incorporation by reference/principles	Still relevant (permanent agenda item at each WRC). Ongoing studies. See Chapter 7 of CPM Report (section 7.3 and Annexes 2-5 to Chapter 7). NOTE - This Resolution is referred to in No. S3.7, as well as in many other provisions.	MOD
28	Revision of references to ITU-R Recommendations	Still relevant. **Report by RA-2000 to WRC-2000.**	NOC
29	Occupancy by FX/MO of the HF bands allocated to the BC in 1992	Actions initiated; for consideration by a future WRC (preliminary agenda item 2.13 for WRC-02/03, as per Resolution 722). **See also Document 5.**	NOC
30	WIC on CD-ROM	Actions completed. **See BR Report to WRC-2000.**	MOD/SUP
33	Procedure for BSS (pre-planned)	Still relevant. To be reviewed by a future WRC. NOTE - This Resolution is quoted in various provisions (e.g. Nos. S5.311, S5.396) and in various other Resolutions (e.g. 34, 42, 49, 507, 525 and 528). As other provisions are applicable to the relevant submissions after 1 January 1999, appropriate amendments need to be introduced in these references.	NOC
34	Planning the band 12.5-12.75 GHz in R3	Still relevant. See also the Note in the comments related to Resolution 33.	NOC
42	Interim systems in R2 (BSS and FSS) in AP30/30A bands	Still relevant. See also the Note in the comments related to Resolution 33.	NOC
44	Compatibility of equipment in MSS	**Obsolete** in view of current situation.	SUP
46	Coordination/notification procedures in non-GSO bands	**Obsolete** as from 1 January 1999 (matter covered by the simplified Radio Regulations). NOTE - As many texts of the RR contain references to this Resolution, consequential changes/amendments to these texts may be required, in the frame of agenda item 3, should this Resolution be abrogated (e.g. in Appendix S5, in Resolutions 27, 49, 54, 70, 121, 127, 130, 132, 215, 219, 538, 716 and 728, and in Recommendation 104).	SUP
49	Due diligence	Still relevant. Additional aspects introduced by PP-98. **Report to WRC-2000 and future WRC.** See also the Note in the comments related to Resolutions 33 and 46.	MOD
50	Interval between WRCs	**Obsolete** in view of the action taken by PP-98.	SUP
51	Transitional arrangements concerning coordination and notification	Still relevant (at least until the year 2005).	NOC
52	Provisional application of some provisions of Article S11	**Obsolete** as from 1 January 1999.	SUP

53	Updating of the remarks of Appendices S30 and S30A	Still relevant. For consideration by WRC-2000 (agenda item 1.21).	-
54	Provisional application of RS46 procedures in some bands	**Obsolete** as from 1 January 1999. See also the Note in the comments related to Resolution 46.	SUP
60	Revision of APS7/28	**Obsolete**, action completed. For consideration by WRC-2000 (agenda item 1.3); see Chapter 7 of CPM Report (§ 7.2.4 suggests a possible revision of Resolution 60).	-
63	Protection from ISM equipment	**Obsolete**, action completed.	SUP
70	Standards for LEO	**Obsolete** in view of current situation. See also the Note in the comments related to Resolution 46.	SUP
72	Regional preparations	Actions completed (report submitted to PP-98; relevant instructions are now contained in Resolution 25 (Rev.Minneapolis, 1998).	SUP
73	Compatibility BSS-R1/FSS-R3 in 12 GHz	Still relevant. For consideration by WRC-2000 (?)	NOC
80	Principles of the Constitution, to be taken into consideration	**Report by RRB to WRC-2000.**	-
95	Review of Resolution/Recommendation	Still relevant (permanent agenda item at each WRC). **Report to RAG-2000 and WRC-2000.**	NOC
105	Improvements in APS30B	Still relevant.	NOC
111	FSS in 18/20/30 GHz	Still relevant (ongoing studies).	NOC
114	FSS (feeder links for MSS) in 5 GHz	Still relevant. NOTE **-** This Resolution is referred to in Nos. S5.441 and S5.444A.	NOC
121	Coordination criteria feeder links in 19/29 GHz	Ongoing studies, **progress report to WRC-2000** (agenda item 1.12); see Chapter 6 of CPM Report (§ 6.4.2 suggests that Resolution 121 could be suppressed). See also the Note in the comments related to Resolution 46. NOTE **-** This Resolution is referred to in No. S5.541A.	-
122	HAP in 47/48 GHz	Ongoing studies, WRC-2000 to review (agenda item 1.5); see Chapter 6 of CPM Report (§ 6.2.1.2 suggests the need for more studies, with example draft modification to Resolution 122 in Annex 1 to Chapter 6). NOTE **-** This Resolution is referred to in No. S5.552A.	-

123	Feeder links to non-GSO MSS in 15 GHz	Ongoing studies, WRC-2000 to review (agenda item 1.14); see Chapter 6 of CPM Report (§ 6.5.2 suggests that Resolution 123 could be suppressed). NOTE - This Resolution is referred to in No. S5.511A.	-
124	Sharing FX/EESS in 8 GHz	ITU-R studies completed. DNR ITU-R F.[Document 9/1019] submitted to RA-2000. WRC-2000 may wish to review this Resolution. NOTE - This Resolution is referred to in No. S5.462A.	MOD
125	Sharing MSS/RA in 1.6 GHz	Ongoing studies, future WRC to review.	NOC
126	HD systems (FX) in 31-33 GHz	Ongoing studies, WRC-2000 to review (agenda item 1.4); see Chapter 6 of CPM Report (§ 6.1.1.4 suggests suppression of Resolution 126). NOTE - This Resolution is referred to in No. S5.547A.	-
127	New allocations for feeder links to GSO MSS in 1.4 GHz	Ongoing studies, for consideration by a future WRC (preliminary agenda item 3.5 for WRC-02/03, as per Resolution 722). See also the Note in the comments related to Resolution 46.	NOC
128	Allocation to FSS in 42 GHz	Ongoing studies, WRC-2000 to review (agenda item 1.4); see Chapter 6 of CPM Report (§ 6.1.4 suggests retaining of a suitably modified Resolution 128 in order to complete the remaining studies). NOTE - This Resolution is referred to in No. S5.551.	-
129	Sharing FSS/other in 41 GHz	Ongoing studies, WRC-2000 to review (agenda item 1.4); see Chapter 6 of CPM Report (§ 6.1.5 indicates that no further studies are required).	-
130	Use of non-GSO FSS in certain bands	Ongoing studies; some elements of a transitional nature; for consideration by WRC-2000 (agenda item 1.13); see Chapter 3 of CPM Report (Annex 5 to Chapter 3 contains an example modification to Resolution 130, by suppressing Annexes 1 and 2). See also the Note in the comments related to Resolution 46. NOTE - This Resolution is referred to in Nos. S5.441, S5.484A, AS9.5, AS11.3, S22.5C1, S22.5D1.	-

131	pfd limits for non-GSO FSS in 11/18 GHz	Ongoing studies; some elements of a transitional nature; for consideration by WRC-2000 (agenda item 1.13); see Chapter 3 of CPM Report (§ 3.1.4.5 and Annex 4 to Chapter 3; Resolution 131 might be suppressed). NOTE - This Resolution is referred to in Nos. S21.16.6, S21.16.8, S21.16.9.	-
132	FSS in 18/28 GHz	Some elements are still relevant (e.g. *resolves* 2, which contains instructions to the Bureau as to the treatments of some submissions). See also the Note in the comments related to Resolution 46.	MOD
133	Sharing FX/other in 40 GHz	Ongoing studies; for consideration by WRC-2000 (agenda item 1.4); see Chapter 6 of CPM Report (§ 6.1.2).	-
134	FSS in 40.5-42.5 GHz	Ongoing studies; for consideration by WRC-2000 (agenda item 1.4). NOTE - This Resolution is referred to in Nos. S5.551D, S5.551E.	-
205	Protection of MSS in 406-406.1 MHz	Still relevant.	NOC
207	Monitor MMS/AM(R)S	Still relevant (implicitly on the agenda of WRC-2000, agenda item 1.7); see Chapter 1 of CPM Report (§ 1.2.3.1, possible MOD to Resolution 207).	-
209	Enlarging the scope of GMDSS	For consideration by a future WRC; **may not be relevant any longer**.	SUP
212	Implementation of IMT-2000	Still relevant, for consideration by WRC-2000 (agenda item 1.6); see Chapter 1 (§ 1.1) of CPM Report proposing three options: NOC, MOD or SUP, with a linked proposal for a new Resolution or Recommendation on this subject. NOTE - This Resolution is referred to in No. S5.388.	-
213	Use of 1.7 GHz by MSS	Ongoing studies, for consideration by WRC-2000 (agenda item 1.9); see Chapter 2 of CPM Report (§ 2.2). NOTE - This Resolution is referred to in No. S5.277.	-
214	Use of bands below 1 GHz by MSS	Ongoing studies, for consideration by WRC-2000 (agenda item 1.11); see Chapter 2 of CPM Report (§§ 2.3.1 and 2.3.2).	-
215	Coordination among non-GSO MSS	Still relevant, ongoing studies. See also the Note in the comments related to Resolution 46.	NOC

216	Broadening the allocation to the MSS in 14-14.5 GHz	Ongoing studies, for consideration by a future WRC (preliminary agenda item 8.5 for WRC-99, as per Resolution 721).	(MOD)
217	Wind profiler radars	Still relevant. NOTE - This Resolution is referred to in Nos. S5.162 and S5.291A.	NOC
218	MSS in 1.5/1.6 GHz	Ongoing studies, for consideration by WRC-2000 (agenda item 1.10); see Chapter 2 of CPM Report (§ 2.1). NOTE - This Resolution is referred to in Nos. S5.353A and S5.357A.	-
219	Allocation to MSS in 405-406 MHz	Ongoing studies, for consideration by WRC-2000 (agenda item 1.11); see Chapter 2 of CPM Report (§ 2.3.3). See also the Note in the comments related to Resolution 46.	-
220	Allocation to MSS in portion of the band 1 559-1 567 MHz	Ongoing studies, for consideration by WRC-2000 (agenda item 1.9); see Chapter 2 of CPM Report (§ 2.2).	-
300	Paired frequencies for NBDPT in HF/MMS	For consideration by a future WRC; some elements are **obsolete** in view of the decisions by WRC-95/97 concerning the examinations in HF bands. More details in the BR Report to WRC-2000 (Document 16). NOTE - This Resolution is referred to in No. S52.106.	MOD
310	Ship movement telemetry	Ongoing studies, for consideration by a future WRC.	NOC
312	Group channels for Morse telegraphy	Some elements are still relevant, although the use of Morse telegraphy has dramatically decreased. NOTE - This Resolution is referred to in No. S52.80.	MOD
331	Transition arrangements for the GMDSS	Ongoing studies, for consideration by a future WRC (preliminary agenda item 2.10 for WRC-02/03, as per Resolution 722). NOTE - This Resolution is referred to in Nos. S5.82, S30.4, S31.17.	NOC/(MOD)
339	Coordination of NAVTEX	Still relevant. NOTE - This Resolution is referred to in No. S5.79A.	NOC
340	Additional SAR information	Still relevant, ongoing activities (see also Document 16). NOTE - This Resolution is referred to in No. S32.5A.	NOC
341	On-board communications in UHF	Still relevant, ongoing activities. NOTE - This Resolution is referred to in No. S5.287.	NOC

342	Revision of APS18	Ongoing studies, for consideration by WRC-2000 (agenda item 1.18); see Chapter 1 of CPM Report (§ 1.3).	-
343	Certificates (vessels using GMDSS equipment on a non-compulsory basis)	Still relevant. NOTE - This Resolution is referred to in No. S48.7.	NOC
344	Exhaustion of MMSI	For consideration by a future WRC (preliminary agenda item 2.11.1 for WRC-02/03, as per Resolution 722). **BR Report to each WRC (see also Document16).**	NOC
345	Operation of GMDSS equipment on non-compulsory fitted vessels	Still relevant, ongoing activities.	NOC
346	Protection of distress and safety frequencies in 12/16 MHz	Ongoing studies, for consideration by WRC-2000 (agenda item 1.7); see Chapter 1 of CPM Report (§ 1.2).	-
347	Digital modulation in the MMS at MF/HF	Ongoing studies, for consideration by a future WRC (preliminary agenda item 2.4 for WRC-02/03, as per Resolution 722).	NOC/(MOD)
348	Priority of distress and safety communications	Ongoing studies, for consideration by a future WRC.	NOC
349	False alerts in GMDSS	Still relevant, ongoing activities. NOTE - This Resolution is referred to in No. S32.10A.	NOC
405	Frequencies for AM(R)	Still relevant, ongoing activities in ICAO.	NOC
406	Use of bands other than HF for AM(R) and AMS(R)	**Obsolete**, bearing in mind the technological improvements as well as current uses.	SUP
411	Implementation of new provisions for AM(OR)	**Obsolete** as from 15 December 1997.	SUP
412	Transfer arrangements for AM(OR)	**Obsolete**; all activities completed on 1 April 1999.	SUP
500	New carrier for LFBC in R1	Partly obsolete; additional details in the BR Report to WRC-2000 (Document 16).	MOD/SUP
506	GSO only, in BSS bands (12 GHz)	Still relevant.	NOC
507	Agreements/Plans for BSS	**Obsolete** (in view of the undertaken activities). See also the Note in the comments related to Resolution 33. NOTE - This Resolution is referred to in No. S11.37.2.	SUP
517	Transition from DSB to SSB in HFBC	Still relevant, ongoing activities. **BR Report to a competent conference (WRC-02/03?)** NOTE - This Resolution is referred to in No. S5.311.	NOC
518	Area/country symbols in APS30/S30A	**Obsolete** (in view of the current practices).	SUP
519	Provisions for interim systems	Still relevant (?), for consideration by a future WRC.	NOC

524	Revision of AP30/30A	**Obsolete** (in view of the activities taken by WRC-97 and the IRG/GTE activities).	SUP
525	Introduction of HDTV in 22 GHz	Still relevant. See also the Note in the comments related to Resolution 33. NOTE - This Resolution is referred to in No. S5.530.	NOC
526	Additional provisions for HDTV	Still relevant, for consideration by a future WRC.	NOC
527	Terrestrial VHF DAB	Still relevant, for consideration by a future WRC (preliminary agenda item 3.1 for WRC-02/03, as per Resolution 722).	NOC
528	BSS (sound) in 1.5 GHz	Still relevant, for consideration by a future WRC. See also the Note in the comments related to Resolution 33. NOTE - This Resolution is referred to in Nos. S5.345, S5.393 and S5.418.	NOC
531	Review of APS30/S30A	**Obsolete** (in view of the activities taken by WRC-97 and the IRG/GTE activities).	SUP
532	Review of APS30/S30A	Ongoing studies, for consideration by WRC-2000 (agenda item 1.19); see Chapter 5 of CPM Report.	-
533	Implementation of certain provisions relating to APS30/S30A	Still relevant; for possible review by WRC-2000.	-
534	Implementation of certain provisions relating to APS30/S30A	**Obsolete** (as from 1 January 1999).	SUP
535	Application of S12	The major part implemented. Some elements still relevant (funding of participants from LDC to seminars).	MOD
536	BSS satellites serving other countries	Still relevant.	NOC
537	Statistics on HFBC equipment	For consideration by a future WRC (see also doc. 16 containing results of a preliminary survey).	NOC
538	Non-GSO FSS in the bands of Appendices S30 and S30A	Ongoing studies; some elements of a transitional nature; for consideration by WRC-2000 (agenda item 1.13); see Chapters 3 and 5 of CPM Report (§§ 3.1 and 3.2; Annex 5 to Chapter 3 contains example modification to Resolution 538). See also the Note in the comments related to Resolution 46. NOTE - This Resolution is referred to in Nos. S5.484A, S5.487A, S5.516, A59.5, AS11.3, S22.5C1, S22.5D1.	-
602	Differential data correction on maritime radiobeacons	Still relevant, partly obsolete.	MOD
641	Use of the band 7 000-7 100 kHz	Still relevant.	NOC

642	Earth stations in the amateur sat. service	Still relevant.	NOC
644	Disaster communications	Partly implemented; some elements still relevant.	MOD
703	Interference criteria for the shared bands	Partly overtaken by events, bearing in mind the application of the concept of incorporation by reference of the relevant ITU-R Recommendations (see also Document 16).	MOD/SUP
705	Protection of services in 70-130 kHz	Some elements still relevant; for consideration by a future WRC.	MOD
706	Operation of FX/MOB in 90-110 kHz	Partly implemented; some elements still relevant; for consideration by a future WRC.	MOD
712	Allocation to space services	Partly implemented; some elements still relevant (*resolves* 1, *resolves* 2; which were put on the provisional agenda for WRC-99, as it appeared in Resolution 721); see also comments against Resolutions 723 and 727.	MOD
715	Sharing in 150 MHz and 400 MHz	Still relevant (ongoing studies).	NOC
716	Use of bands around 2 GHz	Still relevant, some elements are obsolete, **progress report to WRC-2000 (Document 16)**. See also the Note in the comments related to Resolution 46. NOTE - This Resolution is referred to in Nos. S5.389A, S5.389C and S5.390.	MOD
721	Agenda for the WRC-2000	**Obsolete** in view of the actions taken by the Council (Resolution 1130).	SUP
722	Preliminary agenda for WRC-01	For consideration by WRC-2000.	-
723	Allocations to space services	Still relevant; one item (*resolves* 2) for consideration by WRC-2000 (agenda item 1.16), other item (*resolves* 1) for consideration by a future WRC (preliminary agenda 8.6 for WRC-99, as foreseen by Resolution 721); see Chapters 4 and 8 of CPM Report (§ 4.1.1; § 8.1.3.3).	-
724	Use of the band 5 250-5 350 MHz by spaceborne active sensors	Still relevant, ongoing studies.	NOC
725	Use of the band 5 350-5 460 MHz by spaceborne active sensors	Still relevant, ongoing studies.	NOC
726	Allocations for high-density FX above 30 GHz	Still relevant; for consideration by WRC-2000 (agenda item 1.4); see Chapter 6 of CPM Report (§ 6.1.3.4 proposes modification or deletion of Resolution 726). NOTE - This Resolution is referred to in No. S5.547.	-
727	Use of 420-470 MHz by EESS (active)	Still relevant; for consideration by a future WRC (preliminary agenda 8.7 for WRC-99, as foreseen by Resolution 721).	NOC/(MOD)

728	Non-GSO MSS in 470-862 MHz	Still relevant; for consideration by a future WRC (preliminary agenda item 3.4 for WRC-02/03, as per Resolution 722). See also the Note in the comments related to Resolution 46.	NOC
729	Adaptive systems at MF/HF	Still relevant; ongoing studies with a view to present results to a future WRC (preliminary agenda item 3.6 for WRC-02/03, as per Resolution 722).	NOC

Rec. No.	**Subject**	**Remark**	**Possible follow-up**
7	Standard forms for licences	Still relevant.	NOC
8	Automatic identification	Still relevant, ongoing studies.	NOC
9	Operation of BC stations on board ships/aircraft	Still relevant.	NOC
14	Identification of special vessels	Many aspects are obsolete, ongoing studies with a view to present results to a future WRC. NOTE - This Recommendation is referred to in No. S33.28.	MOD
32	Space monitoring	Still relevant, although some elements are obsolete; may be consolidated with Recommendation 36.	MOD
34	Principles for allocation of frequency bands	Still relevant, ongoing studies.	NOC
35	Procedure for modification of a Plan	For consideration by WRC-2000 (agenda item 1.20).	-
36	International monitoring of emissions from space stations	Still relevant; may be consolidated with Recommendation 32.	MOD
61	Interference assessment above 28 MHz, standards	Only one ITU-R Recommendation established since 1979 (S.1150). To be deleted?	SUP/MOD
63	Calculation of necessary bandwidth	Still relevant (in the new context).	MOD
64	Protection ratios and E_{min}	Still relevant (in the new context).	MOD
66	Max. level of unwanted emissions	For consideration by WRC-2000 (agenda item 1.2); see Chapter 7 of CPM Report (§ 7.1).	-
71	Type approval	Still relevant.	NOC
100	Bands for troposcatter	Partly obsolete, ongoing studies with a view to present results to a future WRC.	MOD
104	pfd and e.i.r.p. limits	Still relevant, ongoing studies. See also the Note in the comments related to Resolution 46.	(MOD)

105	Coordination area	For consideration by WRC-2000 (agenda item 1.3).	-
316	Use of SES within harbours	**Obsolete** (Inmarsat MoU).	SUP/MOD
318	Improved APS18	Implicitly on the agenda of WRC-2000 (agenda item 1.18); see Chapter 1 of CPM Report (§ 1.3).	-
319	Adjacent channel interference in HF-MMS	Still relevant; ongoing studies with a view to present results to a future WRC.	NOC
401	Use of worldwide frequencies in AP27	Although this Recommendation contains useful suggestions to administrations, it is not observed by many administrations.	NOC/MOD
402	Coordinated use of WW frequencies in AP27	Although this Recommendation contains useful suggestions to administrations, it is not observed by many administrations. More details in the BR Report to WRC-2000 (Document 16).	MOD/SUP
405	Utilization of AMSS(R)	Obsolete, in view of current practices.	SUP
503	HFBC	Obsolete (implemented, observed by adm.).	SUP
506	Harmonics in BSS	Still relevant.	NOC
507	Spurious emissions in BSS	For consideration by WRC-2000 (agenda item 1.2).	-
515	Other modulation in HFBC	Ongoing studies.	NOC
517	SSB PR in HFBC	Some elements are obsolete, ongoing studies.	MOD
518	HFBC receivers	**Obsolete** in view of current practices.	SUP
519	Introduction of SSB, cessation of DSB	For consideration by a future WRC.	NOC
520	Elimination of out-of-band HFBC emissions	Still relevant.	NOC
521	Technical parameters for revision of AP30/30A	**Obsolete** (in view of the activities taken by WRC-97 and the IRG/GTE activities).	SUP
522	Coordination of HFBC schedules	Still relevant.	NOC
604	Characteristics of EPIRBs	Still relevant (matter under study).	NOC
605	Shipborne transponders	Still relevant; ongoing studies with a view to present results to a future WRC.	NOC
606	Radionav. in 4 200-4 400 MHz	Still relevant, ongoing studies with a view to present results to a future WRC.	NOC
622	Sharing of bands 2 025-2 110 MHz and 2 200-2 290 MHz	Still relevant; see Chapter 1 of CPM Report (§ 1.1.1.3.1).	-
700	Sharing of bands allocated to space services	Many elements are obsolete in view of current practices.	MOD/SUP
701	Use of 1.3 GHz by radio astronomy	Still relevant; ongoing studies with a view to present results to a future WRC.	NOC
702	Intentional emissions of extraterrestrial origin	Still relevant; ongoing studies with a view to present results to a future WRC.	NOC

705	Sharing BC/BSS in 700 MHz	Still relevant, ongoing studies (some elements are obsolete). NOTE - This Recommendation is referred to in No. S5.311.	MOD
706	Passive sensors in 18 GHz	Implicitly on the agenda of WRC-2000 (agenda item 1.17). Partly obsolete.	-
707	Sharing in 32-33 GHz	Still relevant, ongoing studies with a view to present results to a future WRC. NOTE - This Recommendation is referred to in No. S5.548.	NOC
709	Sharing AMS and inter-satellite above 54 GHz	Still relevant (some elements are obsolete), ongoing studies with a view to present results to a future WRC.	MOD
710	Use of airborne radars in shared bands	Still relevant (some elements are obsolete); ongoing studies with a view to present results to a future WRC.	MOD
711	Coordination of earth stations	Studies completed, for consideration by WRC-2000 (agenda item 1.3).	-
715	Multiservice satellites in GSO	Still relevant, for consideration by a future WRC.	NOC
718	Alignment of allocations in 7 MHz	Still relevant; for consideration by a future WRC (preliminary agenda item 2.12 for WRC-02/03, as per Resolution 722).	NOC
719	Multiservice satellites in GSO	Still relevant, for consideration by a future WRC.	NOC
720	Adaptive systems at MF/HF	**Obsolete**, ITU-R Recommendation approved (SM.1266 and F.1337).	SUP

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Note by the Secretary-General

REPORT OF THE THE RADIOCOMMUNICATION BUREAU ON EXPERIENCES IN THE APPLICATION OF THE RADIO REGULATORY PROCEDURES AND OTHER RELATED MATTERS

This document summarizes the experiences of the Radiocommunication Bureau in the application of the radio regulatory procedures, as contained in the articles of the Simplified Radio Regulations, as well as in the associated resolutions and recommendations. It contains also progress reports on various post-conference activities.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

Director, Radiocommunication Bureau

REPORT OF THE RADIOCOMMUNICATION BUREAU ON EXPERIENCES IN THE APPLICATION OF THE RADIO REGULATORY PROCEDURES AND OTHER RELATED MATTERS REFERRED TO IN SPECIFIC RESOLUTIONS AND RECOMMENDATIONS

1 Introduction

In accordance with the provisions of Article 7 of the Convention (CV180), the Director of the Radiocommunication Bureau is required to submit a report to the Conference on the activities of the Radiocommunication Sector covering the period between the two WRCs. Resolutions from previous WARC/WRCs, as well as from Plenipotentiary Conferences, also instruct the Director to submit appropriate reports on specific issues.

The Conference Preparatory Meeting prepared its Report to WRC-2000 on technical, operational and regulatory/procedural matters to be considered by WRC-2000 in response to Resolution 1130. Some elements in the CPM Report were drafted, *inter alia*, on the basis of contributions from the Bureau submitted to CPM-99. Such elements are not repeated in this document; appropriate cross-references to the relevant sections of the CPM Report to WRC-2000 are indicated in **Attachment 2** to this document.

This document summarizes the experiences of the Radiocommunication Bureau in the application of the radio regulatory procedures, as contained in the articles of the Simplified Radio Regulations, as well as in the associated resolutions and recommendations. It also contains progress reports on various post-conference activities, as well as on issues addressed in various Resolutions which call for such reports.

Further input from the Radiocommunication Bureau, as requested by other resolutions or recommendations, is contained in other conference documents.

2 Experiences in the application of the radio regulatory procedures

This section summarizes the experiences of the Bureau in the application of the procedures referred to in Articles S9 and S11 of the Radio Regulations, as well as in the associated articles, resolutions and recommendations, where appropriate. These experiences are rather limited, bearing in mind the relatively short time of application of the new procedures (since 1 January 1999).

2.1 Comments relating to Article S5

The practical application of the provisions of Nos. S5.488 and S5.491 has raised two particular issues that the Conference may wish to consider.

2.1.1 Application of Nos. S5.488 and S5.491 to geostationary-satellite systems

The use of the bands 11.7-12.2 GHz in Region 2 and 12.2-12.5 GHz in Region 3 by geostationary satellites in the fixed-satellite service is limited to national and subregional systems (Nos. S5.488 and S5.491). In order for the Bureau to examine properly any coordination request (CR) with frequency assignments under Nos. S5.488 or S5.491, as appropriate, such CR should have a service area limited to the national territory(ies) of the notifying administration, or in the case of an extended subregional service area, the CR should contain the agreement from any other administrations the territory(ies) of which is/are included in the planned service area (refer also to RRB's decisions on this issue, 13th meeting (6-14 July 1998)).

In the majority of cases, if not all, the above-required agreement in the case of a subregional system is missing. In such situations, the Bureau would normally reach an "Unfavourable Finding" with respect to the provisions of RR1503/No. S11.31. However, in the general interest of administrations, the Bureau has opted for a more flexible approach and decided to provide a period of three months to administrations to finalize the situation by defining the service area(s) in terms of administrations (country/territory symbol) which have agreed 1) to the inclusion of their territory in the proposed service area of the satellite system under consideration and 2) to authorize and name the administration proposing the system to act as notifying administration on their behalf. In the event that no reply is received from the administration initiating the coordination within the three-month period, the finding is amended to Unfavourable. This review of the finding has a retroactive impact on the result of No. S9.36 examinations of other networks performed by the Bureau during the above-mentioned intervening period (review of list of required coordinations).

The implementation of the above approach has proved to be burdensome for the Bureau, as well as for administrations, as it generates a lot of administrative exchanges between the BR and involved administrations.

In view of the above, the Conference may wish to reconsider the inclusion of such procedures (or otherwise) in Nos. S5.488 and S5.491.

2.1.2 Application of Nos. S5.488 and S5.491 to non-geostationary-satellites systems

The RRB, at its 12th meeting (20-24 April 1998), reviewed the Rule of Procedure concerning the application of Nos. S5.488 and S5.491 to non-geostationary-satellite systems. After having analysed all WRC-97 decisions related to the use of non-GSO FSS systems in certain frequency bands, particularly Resolutions 130 (WRC-97) and 538 (WRC-97), the RRB agreed to remove the restriction of national and subregional usage referred to in the above footnotes for non-GSO FSS systems. The Bureau has since applied the relevant Rule of Procedure and processed non-GSO systems accordingly.

The Conference may wish to consider whether the practice adopted in the Rule of Procedure might be reflected in the text of Nos. S5.488 and S5.491.

2.1.3 Application of No. S5.488 (Article 14/No. S9.21 for FSS in the band 11.7-12.2 GHz in Region 2)

At its 13th meeting (6-14 July 1998), the RRB revised the Rule of Procedure relating to the application of Article 14/No. S9.21 in No. S5.488 (former RR839). This revision was based on the understanding that the new text of No. S5.488, with no explicit reference to S9.21, means that there is no longer a need for the specific procedure of No. S9.21 to be applied in the band 11.7-12.2 GHz in Region 2, as of 1 January 1999.

The Radiocommunication Bureau subsequently raised with the RRB (16th meeting 24-28 May 1999) that this modification removes the only regulatory mechanism available to terrestrial services for their protection from GSO FSS services in this band in Region 2. With the concurrence of the RRB, this matter was brought to the attention of the CPM, which supported the need to clarify this regulatory procedural situation (refer CPM Report, Chapter 7, paragraph 7.6).

Three approaches were identified by the CPM:

Approach 1: introduction of hard pfd limits for GSO FSS networks operating in the band 11.7-12.2 GHz in Region 2.

Approach 2: introduction of pfd values, which are thresholds. For any Region 2 FSS networks exceeding the specified pfd values, there would be a requirement to reach agreement with any affected administrations.

Approach 3: to refer explicitly to No. S9.21 in No. S5.488 (to restore previous requirement to apply Article 14 as in RR839).

The Conference may wish to consider clarification of the application of S5.488 using one of the approaches outlined by the CPM (as noted above).

2.2 Comments relating to Article S9

Article S9 does not contain an explicit statement concerning the publication of Special Sections containing the status of the coordination procedures under Nos. S9.11 to S9.14 and S9.21. To this effect, the RRB adopted an appropriate Rule of Procedure (see Rule of Procedure against S9.52C).

The matter may be remedied by the introducing of an additional provision in Article S9, and a possible text is given below:

ADD

S9.53A Upon expiry of the deadline for comments to a coordination request under Nos. **S9.11** to **S9.14** and **S9.21**, the Bureau shall, according to its record, publish a Special Section, indicating the list of administrations having submitted their disagreement or other comments within the regulatory deadline.

2.3 Comments relating to Article S11

2.3.1 Treatment of inter-satellite links under S11.32

At its 17th meeting held from 13 to 17 September 1999, the RRB, having regard to advice from Study Group 7, approved a new Rule of Procedure in the application of No. S5.392 which indicates that, for inter-satellite links in frequency bands 2 025-2 110 MHz and 2 200-2 290 MHz, the link between the geostationary (GSO) space station and the non-geostationary (non-GSO) space station should not be taken into account by the Radiocommunication Bureau in its regulatory examination under RR 1504/S11.32. The adopted rule is specific to particular frequency bands and services. Indeed, the only space services allocated in these two frequency bands are the space research, Earth exploration-satellite and space operation services, and the space-to-space transmissions referred to are limited to data relay satellite systems operating within the allocated services.

At its 18th meeting (8-12 November 1999), and 19th meeting (21-25 February 2000) the Board noted emerging difficulties in treating cases involving inter-satellite links between GSO and non-GSO systems. The Bureau indicated that it currently has on hand notices from administrations involving some 50 cases that include inter-satellite links between GSO and non-GSO systems in various frequency bands allocated to the inter-satellite service. The RRB agreed that advice from appropriate ITU-R study groups should be sought as regards technical criteria, calculation method and associated tools to enable the Bureau to undertake an examination of conformity pursuant to No. S11.32. Accordingly appropriate advice has been sought from Study Group 4.

The scope of approaches that might be followed to resolve this issue could vary from the application of the principles already adopted in the Rule of Procedure on No. S5.392 (e.g. no coordination requirement) to a coordination requirement triggered only by bandwidths overlap. One important issue is to consider the respective regulatory treatment of one and the same link viewed from its two ends, in the particular case of an inter-satellite link between a GSO space station and a non-GSO space station: either coordination is not required from the GSO and non-GSO perspective, or coordination could be required from the GSO perspective, but not the non-GSO one, or coordination is required for both systems.

In light of the above and pending consideration by ITU-R Study Group 4, it is suggested that the Conference consider and determine the most appropriate regulatory approach to be taken.

2.3.2 Application of S11.39

The current wording of No. S11.39 (its last sentence which was added at WRC-97) may give rise to confusion, as it is not clear what the relationship of Nos. S11.39A to S11.39E is with respect to the first and second sentence of No. S11.39. In order to clarify this relationship, the RRB adopted an appropriate Rule of Procedure (see Rule of Procedure against S11.39).

In order to make the situation absolutely clear, provision No. S11.39 may be formulated in the following way:

MOD

S11.39 When the examination with respect to No. **S11.34** leads to a favourable finding, the assignment shall be recorded in the Master Register. When the finding is unfavourable, the notice shall be returned to the notifying administration, with an indication of the appropriate action. However, notices under Appendices **S25**, **S26** and **S27** which are in accordance with the technical principles of the relevant appendix but not with the associated allotment plan shall be treated as follows:

Furthermore, a new provision may be necessary, like the following one:

ADD

S11.39F A notice which is not in conformity with the technical principles of Appendices **S25**, **S26** or **S27**, as applicable, shall be returned to the notifying administration, unless the administration undertakes that it will be operated in accordance with No. **S4.4**; in such a case the assignment shall be recorded in the Master Register for information purposes and subject to application of No. **S8.5**.

2.4 Comments relating to Article S21

Provision No. S21.6 refers to Table S21-2, specifying the frequency bands which are shared with equal rights between space services, on one hand, and the fixed and mobile service, on the other hand, where the terrestrial station is subjected to power limits. This provision (and the related Table S21-2) enter into the category of the provisions referred to in Nos. S11.31.2; i.e. the category of provisions of a mandatory character. The characteristics of the relevant frequency assignment are examined from the viewpoint of conformity with these provisions, where the non-conformity results in unfavourable regulatory finding and in return of the notice to the notifying administration.

The Bureau scrutinized the Table of Frequency Allocations and compared it with Table S21-2. This comparison indicated that Table S21-2 is incomplete as it does not reflect all sharing situations from Article S5, nor does it contain power limits for some frequency bands which are shared with equal rights between space services, on one hand, and the fixed and mobile service, on the other hand. The missing bands are indicated with revision marks.

Table S21-2 contains power limits only in the bands between 1 610 MHz and 29.5 GHz. Provision No. S5.542 extends the applicability of power limits specified in Nos. S21.3 and S21.5 up to 31 GHz. Consequently, there is no provision which specifies the applicability of the power limit below 1 610 MHz and above 31 GHz, although the Table of Frequency Allocations contains other shared bands with allocations to space services (Earth-to-space) in the bands below 1 610 MHz (e.g. 1 427-1 429 MHz) as well as in the bands above 31 GHz (e.g. 31-31.3 GHz, 34.2-34.7 GHz, 40-40.5 GHz, 42.5-47 GHz, 47.2-50.2 GHz, 50.4-51.4 GHz, etc.). Therefore, no Article S21 examination is required by the RR in these bands. The Conference may wish to review this situation and to take appropriate decisions in this regard.

TABLE **S21-2**

Frequency band	Service	Limit as specified in Nos.
1 610-1 645.5 MHz (No. **S5.359**) 1 646.5-1 660 MHz (No. **S5.359**) 1 675-1 690 MHz (Region 2) 1 690-1 700 MHz (Region 2 countries listed in No. **S5.381**) 1 700-1 710 MHz (Region 2) 1 980-2 010 MHz 2 010-2 025 MHz (Region 2) 2 025-2 110 MHz 2 200-2 290 MHz 2 655-2 670 MHz[5] (Regions 2 and 3) 2 670-2 690 MHz 5 670-5 725 MHz (Nos. **S5.453** and **S5.455**) 5 725-5 755 MHz[5] (Region 1 countries listed in Nos. **S5.451**, **S5.453** and **S5.455**) 5 755-5 850 MHz[5] (Region 1 countries listed in Nos. **S5.451**, **S5.453**, **S5.455** and **S5.456**) 5 850-7 075 MHz 7 900-8 400 MHz 8 400-8 500 MHz	Fixed-satellite Meteorological-satellite Space research Space operation Earth exploration-satellite Mobile-satellite	**S21.2, S21.3, S21.4** and **S21.5**
10.7-11.7 GHz[5] (Region 1) 12.5-12.75 GHz[5] (Nos. **S5.494** and **S5.496**) 12.7-12.75 GHz[5] (Region 2) 12.75-13.25 GHz 13.75-14 GHz (Nos. **S5.499** and **S5.500**) 14.0-14.25 GHz (No. **S5.505**) 14.25-14.3 GHz (Nos. **S5.505**, **S5.508** and **S5.509**) 14.3-14.4 GHz[5] (Regions 1 and 3) 14.4-14.5 GHz 14.5-14.8 GHz	Fixed-satellite	**S21.2, S21.3** and **S21.5**
17.3-17.7 GHz (No. **S5.514**) 17.7-18.4 GHz 19.3-19.7~~6~~ GHz 22.55-23.55 GHz 24.45-24.75 GHz (Regions 1 and 3) 24.75-25.25 GHz (Region 3) 25.25-29.5 GHz 29.5-31 GHz (No. **S5.542**)	Fixed-satellite Inter-satellite Space research Mobile-satellite	**S21.2, S21.3** and **S21.5**

[5] **S21.6.1** The equality of right to operate when a band of frequencies is allocated in different Regions to different services of the same category is established in No. **S4.8**. Therefore any limits concerning inter-Regional interference which may appear in ITU-R Recommendations should, as far as practicable, be observed by administrations.

2.5 Comments relating to Resolution 300 (Rev.Mob-87)

This Resolution was initially adopted by the World Maritime Administrative Radio Conference (Geneva, 1974; WMARC-74), as Resolution Mar2-7, intended to serve as an interim measure concerning the use and notification of paired frequencies for NBDP telegraphy and data transmission systems in the HF bands allocated to the maritime mobile service, without prejudging the decisions of future competent conferences as to the establishment of an appropriate plan for the bands and systems in question. According to Resolution Mar2-7, administrations were requested to select the pairs of frequencies *with the assistance of the then IFRB* (see *resolves* 1.2 of that Resolution); the notices which were not in conformity with the above provisions (i.e. notices related to frequency pairs which were selected by the administration concerned without the IFRB's involvement) were returned to the notifying administrations (see *resolves* 1.4).

WARC-79 reviewed Resolution Mar2-7 and decided to maintain it, as Resolution 300, with minor changes of editorial character. However, when establishing the calendar of future planning conferences, WARC-79 did not envisage any conference whose mandate would be the establishment of a plan for the NBDP telegraphy in the HF bands.

Resolution 300 was further reviewed by the World Administrative Radio Conference for the mobile services (Geneva, 1987; Mob-87). WARC-Mob-87 made available an increased number of paired frequencies reserved for NBDP telegraphy and modified Resolution 300 in two aspects: 1) it deleted the reference to the would-be plan for NBDP telegraphy in the HF bands, and 2) it removed the mandatory provisions (set forth in the former paragraph 1.2) concerning the administrations' obligations to select frequencies for their coast stations with the assistance of the then IFRB. Nevertheless, it maintained the principle of a two-way examination of the probability of harmful interference to be caused by or to other existing or proposed uses, with the requirement for the then IFRB to inform the administrations concerned on the results of the examination.

WRC-95 and WRC-97 reviewed the overall concept of notification, examination and recording of frequency assignment notices and decided to abolish the examination of the probability of harmful interference in the non-planned bands below 28 MHz, as from 18 November 1995. However, these conferences did not change the concepts of Resolution 300 (Rev.Mob-87), which remain the only instrument which requires the examination of the probability of harmful interference in the non-planned band below 28 MHz.

In order to apply the procedures of Resolution 300, the then IFRB developed appropriate software, whose features are explained in IFRB Circular-letters No. 488 (dated 22 July 1981) and No. 874 (dated 20 August 1991). The relevant software modules have been running on the ITU mainframe computer Siemens until the end of 1999, when the ITU mainframe computer was phased out due to the non-compliance of the related database management system (CA-IDMS 10.21) with the Year-2000 requirements. Therefore, since 1 January 2000, the Bureau has no operational tool for performing these examinations[1] and the relevant notices are being kept in abeyance until such a time as the appropriate software module is put into production.

The summary statistics on the cases treated under the procedures set forth in Resolution 300 (Rev.Mob-87) since 1991 (date of the availability of the additional channels) until the end of 1999 are given in Table 1.

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[1] The development of new software module for these examinations, under TerRaSys, is foreseen only after 1 January 2001, bearing in mind the established priorities in this regard, which are based on the volume of notices which are to be treated by the relevant tool.

TABLE 1

Statistics related to the procedure governed by Resolution 300

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
No. of cases	2 929	3 429	429	88	82	47	50	83	21

In this connection, the Bureau wishes to indicate that despite the numerous incompatibilities identified during the examinations, which were communicated to the notifying administrations, the administrations rarely opted for an alternative frequency. Furthermore, there were very few cases of harmful interference in these bands that were reported to the Bureau (for information or for assistance).

In view of the above, it may be appropriate to review the need for maintaining the procedures of Resolution 300 (Rev.Mob-87), bearing in mind that these are the only procedures which call for an examination of the probability of harmful interference in the non-planned bands below 28 MHz, and taking also into account the usefulness of such examinations in the light of the administrations' actions in response to the identified incompatibilities. The administrations may wish to consider aligning the procedures of Resolution 300 (Rev.Mob-87) with those of Article S11, which would also eliminate the need for developing a new software module (under TerRaSys) for examination of the probability of harmful interference of the notices governed by current Resolution 300 (Rev.Mob-87), an activity which would be required if the current procedures of Resolution 300 (Rev.Mob-87) were to be maintained with no change. An example modification to Resolution 300 is given in **Attachment 1**.

2.6 Comments relating to Resolution 500

Resolution 500 has been adopted by WARC-79 and has been applied only 14 times since its adoption, the last one in August 1995. In view of the very low rate of modifications in the LF broadcasting band, the usefulness of this Resolution is questionable. Furthermore, the current version of the resolution, in *resolves* 5, contains a sentence which makes reference to RR1241 (i.e. examination with respect to the probability of harmful interference) which is not applicable any longer, bearing in mind the changes in the radio regulatory procedures adopted by WRC-95 and WRC-97.

2.7 Comments relating to Recommendation 402

2.7.1 This Recommendation was initially adopted by the World Administrative Radio Conference on the aeronautical mobile (R) service, Geneva, 1978, as an initial tool for assisting administrations to coordinate their requirements for worldwide frequencies in the respective allotments of the allotment plan of Appendix 27Aer2 (now Appendix S27). The category of worldwide frequencies was introduced at WARC-Aer2 with a view to support the requirements for long-distance aeronautical operational control communications (AOCC). In view of the limited number of worldwide frequencies, and in order to preserve the integrity of communications over worldwide frequencies, WARC-Aer2 adopted Recommendations Aer2-2 (subsequently numbered to 401 by WARC-79) and Aer2-3 (subsequently numbered to 402 by WARC-79). By Recommendation 401 (former number Aer2-2), WARC-Aer2 recommended to administrations to keep the number of HF stations for AOCC to a minimum, so as to ensure efficient use of worldwide frequencies, and where practicable, to establish such arrangements which would result in establishing a single station which would provide a service to several aircraft operating agencies from different countries. By Recommendation 402 (former number Aer2-3), WARC-Aer2 established a mechanism for a voluntary coordination between administrations, through both ITU and the ICAO, intended to ensure an efficient use of worldwide frequencies, while preserving the rights of administrations to use any frequency assignment in conformity with the relevant procedures of the Radio Regulations.

2.7.2 In order to facilitate the implementation of the decisions of WARC-Aer2, the then IFRB collected appropriate information from administrations on the planned use of the frequencies for long-distance AOCC and, in close collaboration with the ICAO, has developed the initial List of coordinated use of frequencies for long-distance AOCC. That List was communicated with the IFRB Circular-letter No. 533 of 1 February 1983 (i.e. on the date of the entry into force of the new allotment arrangement) so as to ensure timely implementation of the identified requirements for long distance AOCC. The same Circular-letter also contained an outline of the procedure for accommodating new requirements.

2.7.3 Administrations had cooperated for quite some time in following the joint ITU/ICAO procedure for choice of frequencies for long-distance AOCC. However, in some cases the administrations also preferred to exercise their rights in putting into operation frequency assignments, on the worldwide frequencies, which were not in accordance with the List of coordinated frequencies. By the end of 1990, the MIFR already contained some 70 frequency assignments of the worldwide frequencies for long-distance AOCC which were not in accordance with the ITU/ICAO List of coordinated frequencies. In view of the possible consequences of such an approach by large number of administrations, the then IFRB, in communicating the updated List of coordinated frequencies (IFRB Circular-letter No. 847 of 10 December 1990), has expressed its concern as to the possible degradation of the worldwide system for long-distance AOCC, due to the lack of application of the procedures of Recommendation 402. Similar concerns were expressed by the ICAO through an appropriate ICAO State letter.

2.7.4 Despite the concerns expressed by ITU and the ICAO, administrations continued to notify assignments of the worldwide frequencies for long-distance AOCC which were not in accordance with the ITU/ICAO List of coordinated frequencies and without applying the procedures of Recommendation 402. As the procedure of Recommendation 402 is not mandatory, the Bureau was obliged to accept such notifications when the notifying administration insisted on its notifications under Article 12/S11 of the Radio Regulations. In such cases, appropriate correspondence is being initiated, drawing the attention of the notifying administration on the desirability of applying the procedures of Recommendation 402. Similar correspondence is being addressed to the ICAO. The summary statistics on the cases treated since 1991 are given in Table 2.

TABLE 2

Statistics related to the procedure governed by Recommendation 402

Year	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
No. of notifications nominally governed by RC402	9	12	11	7	10	11	8	35	18
No. of cases included in the ITU/ICAO List	8	4	0	0	0	0	0	0	0

2.7.5 The statistical data clearly indicate the current irrelevance of the procedures of Recommendation 402. In view of the above, administrations may wish to consider various options as to the future of Recommendation 402, e.g.:

- a possible suppression of Recommendation 402, bearing in mind the ever-increasing non-observance of the related procedures which are strictly voluntary;
- an alternative regulatory mechanism (e.g. through an appropriate resolution) which would make these procedures mandatory, so as to preserve the integrity of the worldwide system for long-distance AOCC.

3 Post-conference activities and other issues addressed in various resolutions which call for progress reports

3.1 Implementation of Resolution 13 (Rev.WRC-97)

With this Resolution, WRC-97 instructed the Director to explore the possibility of extending the present allocation scheme concerning the allocation of international call sign series if it appears that all the possibilities of the present system of forming call signs is exhausted.

The Bureau wishes to report that the capacity of the call sign system based on the provisions of the present Radio Regulations (Article S19) is still sufficient[2]. Therefore, the Bureau considers that there is not yet a need for exploring the possibility of forming new international series on the basis of the method indicated in *resolves* 3.1 of Resolution 13 (Rev.WRC-97).

The report on the changes in the allocation of call sign series, referred to in No. S19.33, is contained in another conference document.

3.2 Incorporation by reference (issues referred to in Resolutions 27 (Rev.WRC-97) and 28 (WRC-95))

3.2.1 WRC-97, by its Resolution 27 (Rev.WRC-97), instructed the Director, BR, to arrange for a review of the provisions of the Radio Regulations containing references to ITU-R or ITU-T Recommendations with a view to proposing suitable recommendations to CPM-99 for inclusion in its Report to WRC-2000. Such a review was initiated through the Special Committee on Regulatory/Procedural Matters (SC), where a specific Rapporteur Group (SC-4) addressed this issue. In this connection, the Bureau submitted the results of its studies of those provisions in the *Articles* of the Radio Regulations, which make reference to ITU-R Recommendations, to the SC meeting (12-16 July 1999). The results of the study were incorporated in the SC Report to CPM-99. Additional reports, on those provisions in the *Appendices* of the Radio Regulations, which make reference to ITU-R Recommendations as they appear in the 1998 edition of the RR, were presented to CPM-99. The CPM conclusions in this respect can be found in section 7.3 of the CPM Report to WRC-2000, as well as in Annexes 2-5 to Chapter 7 of the same report.

3.2.2 The above study indicated that in many cases the reference to an ITU-R Recommendation could be replaced by a reference to another provision of the Radio Regulations, or by a short descriptive text, especially in those cases where such references to ITU-R Recommendations were introduced due to the rearrangement of the RR, pursuant to the VGE recommendations, and which formerly referred to a specific RR provision now transferred to an

[2] On 1 December 1999, twenty-nine international series (out of 978 possible series) were still free for future utilization.

ITU Recommendation. In other cases, where the numerous references to a single ITU-R Recommendation resulted in the inconsistency of the linking language (e.g. mandatory in some cases and non-mandatory, or undefined, in other cases), the study indicated that references to ITU-R Recommendations could be streamlined by proposing a clear mandatory linking language in one key provision, and by amending the other provisions accordingly. Finally, in several cases, the study detected a redundancy as the Radio Regulations already contained the material which was incorporated by a reference to an ITU-R Recommendation.

3.2.3 In applying the approach described in paragraph 3.2.2 above, it was concluded that it may be possible to considerably decrease the number of RR provisions making reference to ITU-R Recommendations, thus facilitating the task of continuing review of the provisions of the RR which make reference to ITU-R Recommendations with a view to possibly updating the relevant references, as requested by Resolution 28 (WRC-95), a task which is often performed under time pressure during conferences. Example modifications to the provisions of the Radio Regulations in this respect are contained in Annex 5 to Chapter 7 of the CPM Report to WRC-2000.

3.2.4 Both the SC and the CPM noted that Part A to Annex 3 to Resolution 27 (Rev.WRC-97) was incomplete as it does not list several provisions of Articles to Radio Regulations which make reference to ITU-R Recommendations (e.g. S5.391, S5.511C, S5.536A, S19.96A, S22.5A, S22.5C) which were adopted at WRC-97 after the adoption of Resolution 27 (Rev.WRC-97). Similar conclusions were drawn with respect to Part B to Annex 3 of Resolution 27 (Rev.WRC-97). The CPM noted the inconveniences due to incomplete lists in Resolution 27 (Rev.WRC-97) which resulted in an incomplete Volume 4 of the Radio Regulations. In order to ensure that the Radio Regulations do contain the complete collection of the ITU-R Recommendations that are incorporated by reference, CPM considered that a more formal mechanism should be adopted via a Resolution at WRC-2000 which would list explicitly all ITU-R Recommendations that are incorporated by reference and which will be published in the Radio Regulations.

3.2.5 With respect to Resolution 28 (WRC-95), an appropriate Report will be prepared immediately after the completion of the work of the RA-2000.

3.3 Resolution 73 (WRC-97)

Resolution 73 (WRC-97) relates to the measures to resolve the eventual incompatibility between the broadcasting-satellite service in Region 1 and the fixed-satellite service in the frequency band 12.2-12.5 GHz in Region 3, and vice versa. The Bureau has now processed all FSS networks received prior to 27 October 1997, and is therefore in a position to provide assistance, upon request and on a case-by-case basis, to Administrations of Region 3, which would enable then to proceed with the required coordination of their FSS satellite networks with BSS networks for which the Appendix S30, Annex 2 information has been received by the Bureau before 27 October 1997, also taking account of BSS networks included in the Ap30 Plan. See also NOTE 2 of Resolution 73 (WRC-97).

3.4 Liaison with IMO on coordination of NAVTEX services (Resolution 339 (WRC-97))

3.4.1 Pursuant to this Resolution, the Bureau established appropriate contacts with the IMO with a view to obtaining, on a regular basis, the relevant information on operational coordination for NAVTEX services on the frequencies 490 kHz, 518 kHz and 4 209.5 kHz. The format of the List of Coast Stations (List IV) was modified accordingly. The Bureau receives the relevant information regularly from IMO and also requests this information whenever a new edition of List IV or its recapitulative supplements is undertaken. The information is being published regularly since August 1998.

3.4.2 In this connection, the Bureau wishes to report on the apparent inconsistency in the instructions dealing with the publication of this information. Resolution 339 (WRC-97), in *instructs 2*, specifies that the information related to NAVTEX services is to be published in the List of Coast Stations (List IV). On the other side, Appendix S13 specifies in its Part A6, Section IV, paragraph 11, that List VI (Radiodetermination and Special Service Stations) shall also contain operational details on coast stations which are transmitting NAVTEX information, with a further provision, in paragraph 13 of the same section, that the frequency 518 kHz shall be used for transmission of NAVTEX information. Bearing in mind the different periodicity of the publication of Lists IV and VI, as well as the fact that Appendix S13 deals with non-GMDSS distress and safety communications, the Bureau considers that the IMO information on the coast stations that are providing NAVTEX services on the GMDSS frequencies 490 kHz, 518 kHz and 4 209.5 kHz is to be published only in List IV, as specified in Resolution 339 (WRC-97). List VI will continue to contain particulars of only those stations that are transmitting NAVTEX-type information on frequencies other than the GMDSS frequencies 490 kHz, 518 kHz and 4 209.5 kHz.

3.5 Additional search and rescue information in databases (Resolution 340 (WRC-97))

With this Resolution, administrations were invited to consider the incorporation of additional information (as listed in annex to Resolution 340 (WRC-97)) in their national maritime databases and to provide Rescue Coordination Centers (RCC) immediate access to these databases on an uninterrupted basis, with a view to support and facilitate the search and rescue activities. The Resolution further instructed the Director, BR, to consult the administrations with a view to incorporating these additional search and rescue information into the ITU maritime services database.

The Bureau initiated these consultations in February 1998, through the Circular-letter CM/6 of 27 February 1998. On that occasion, the Bureau explained the structure of its Maritime mobile Access and Retrieval System (MARS), and its plans concerning the introduction of additional data elements in MARS, with a view to allow RCC immediate and uninterrupted online access to all these information. Administrations were requested to inform the Bureau of their plans as to the providing the additional information to the Bureau, as well as their views as to the availability of these additional data to users other than RCC.

Based on the positive responses from many administrations, as well as on other suggestions from administrations, the Bureau has modified the structure of its Maritime mobile Access and Retrieval System (MARS) so as to incorporate the additional data elements. The additional information, submitted in accordance with the new formats, is being made accessible, through the Internet, to the following categories of users:

a) ***General users:*** all information as published in the List of Ship Stations, plus the additional information except names and addresses of the contact person ashore and the alternative 24-hour emergency telephone number.

b) ***Administrations and notified Rescue Coordination Centres/SAR authorities*****:** all information as published in the List of Ship Stations and **all** the new additional information referred to in Resolution 340 (WRC-97).

This modification is being carried out in two phases. Through phase one, which was completed at the end of 1999, all the new additional data elements for users of category a) was introduced into MARS. Through phase two, which is to be completed in the first quarter of 2000, the complete additional information for users of category b) will be introduced into MARS, using protected fields

In a parallel activity, the Bureau developed appropriate formats for submission, by administrations, of the additional data and communicated them to administrations with the Circular-letter CM/9 of 16 April 1999.

3.6 Exhaustion of the maritime mobile service identity numbering resources (issues referred to in Resolution 344 (WRC-97)) and other related issues

3.6.1 General

Resolution 344 (WRC-97) instructed the Director, BR to monitor the status of the MMSI resource, and to report to each WRC on the anticipated reserve capacity and expected exhaustion of the resource.

In its Report to WRC-97, the Bureau already reported on the near exhaustion of the international blocks of ship station numbers in the selective calling system (5-digit numbers). Similar concerns were reported with regard to MMSI, where the systematic assignment, by the administrations, of identities containing three-trailing zeroes, resulted in a drastic reduction of the capacity of the MID numbering plan and in ever increasing number of requests for additional MIDs.

This section summarizes the activities since WRC-97 and presents the current situation in this respect.

3.6.2 Blocks of selective call numbers for ship stations

In application of the provisions of Article S19 of the Radio Regulations, the Radiocommunication Bureau is responsible for the allocation of series of selective call numbers at the request of the administrations concerned.

Despite the very rigorous management of this resource, its capacity (1 000 blocks of 100 selective call numbers for ship stations) has been exhausted, as all series have been allocated to administrations. Consequently, as from 16 March 1999, the Bureau has not been in a position to supply any further series of five-digit selective call numbers to ship stations.

In BR Circular-letter CR/55 of 6 August 1996, the Bureau informed administrations on the near depletion of selective call number series and urged administrations to assign such identities to stations only when no other means of identification are applicable. The Bureau also invited administrations to re-examine their needs on blocks of ship station selective call numbers with a view to returning, to ITU, unused blocks of ship station selective call numbers, so as to provide for the possibility to make them available, when required, to other administrations. However, the response from the administrations to such an appeal from the Bureau was minimal.

On 16 March 1999, the Bureau allocated the last available block of selective call numbers. This information was communicated to administrations in the ITU Operational Bulletin No. 693 of 1 June 1999. In communicating that information, the Bureau also drew the attention of the administrations to the modified provisions of Article S19 of the Radio Regulations, notably S19.96A as adopted by WRC-97, which offer the possibility of reusing the same five-digit ship station selective call numbers within one administration, and which may be a solution for some problems. The Bureau also drew the attention of the administrations that, for operating the NBDP equipment in accordance with Recommendation ITU-R M.625, administrations may use the numerical identification system based on Maritime Identification Digits (MIDs), thus avoiding the use of 5-digit ship station selective call numbers.

With the same communication, the Bureau reiterated its appeal to administrations to re-examine their needs on blocks of ship station selective call numbers with a view to returning, to ITU, any unused blocks of ship station selective call numbers. However, not a single block of selective call numbers was returned to ITU.

It is to be noted that the Sequential Single Frequency Selective Calling System for use in the Maritime Mobile Service (SSFC) represents the first automatic international calling system, based on Recommendation ITU-R M.257, which was introduced at the World Administrative Radio Conference on the Maritime Mobile Service (Geneva, 1967). Originally this identification system was designed for maritime radiotelephony, however, at a later stage, the SSFC selective calling numbers were recommended for use in Narrow-Band Direct-Printing (NBDP) equipment in accordance with Recommendation ITU-R M.476. It was recommended that if both radiotelephony station and the NBDP equipment are installed on board a ship, the same selective calling number should be used for calling. With the introduction of other systems (e.g. digital selective calling, numerical identification system based on Maritime Identification Digits), the SSFC system is being progressively phased out and the exhaustion of five-digit selective call numbers for ship stations does not represent a considerable problem, as other means of identification are widely available to administrations.

3.6.3 Use of Maritime Identification Digits (MID)

The MID numbering system (based on 9-digit identities to stations in the Maritime Mobile and the Maritime Mobile-Satellite Services), which was introduced by WRC-97, is designed to meet the long-term requirements for establishment of an **unique ship identity** for both safety and telecommunication purposes, in a large variety of automated radiocommunication systems (e.g. with Digital Selective Calling (DSC) equipment at MF, HF and VHF; with NBDP equipment in accordance with Recommendation ITU-R M.625, with Inmarsat equipment), and within the GMDSS. However, the restrictions in the public switched networks is some countries (whose national networks were not able to transmit more than six digits of the MMSI) and the design specifications of some radiocommunication systems (whose number-translation algorithms were not able to handle nine significant digits), imposed some restrictions to administrations in assigning MMSI numbers to ships carrying alerting devices of the GMDSS and participating in different maritime radio services. This led to a situation where some administrations used to assign, on a systematic basis, only MMSI numbers with three trailing zeros, thus reducing the capacity of the relevant MID by a factor of 1 000.

In the period preceding the full implementation of the GMDSS (1 February 1999) and immediately after that date, the requests for additional MIDs have increased considerably, having in mind the requirements for mandatory carriage of alerting devices of the GMDSS and ever increasing number of installed ship earth stations. However, many of these requests were not justified as the conditions stipulated in the Radio Regulations, concerning the eligibility for additional MIDs, were not satisfied. In addition to the specific guidance suggested by the Bureau to each administration, the Bureau also prepared general guidelines to administrations in this respect (Circular-letter No. CM/4, dated 9 February 1998), drawing the attention of the administrations to the improvements in PSTN and in various Inmarsat systems, which made obsolete many previous restrictions as to the assigning identities to individual stations. Administrations were advised to review their assignment schemes so as to make optimum use of the possibilities of forming identities from the available MIDs, thus preserving the capacity of the numbering plan.

The Bureau wishes to report that there is no shortage yet in MIDs in any part of the world. However, the situation may change very rapidly if the current restrictions of the Inmarsat number-translation algorithm, related to standard systems B and M, are not resolved soon, having in mind the ever increasing trend of installing SES of these standards.

3.7 Implementation of Resolution 535 (WRC-97) (application of Article S12 of the Radio Regulations and related issues)

Provisions Nos. S12.9 and S12.33 indicated the need for Rules of Procedures for the definition of the technical analysis to be made by the Bureau. Criteria for this analysis were proposed by WRC-97 in Resolution 535 (WRC-97). After examination, the Bureau proposed to the RRB that it confirm the criteria of Resolution 535 (WRC-97). The corresponding Rule of Procedure was adopted by the RRB at its 14th meeting and was published in the consolidated edition of the Rules of Procedures, in 1998.

The appropriate software referred to in Resolution 535 (WRC-97) has been developed in time for the first season under the new procedure, with assistance from many administrations, broadcasters and regional coordination groups. Following the formal testing (initiated in July 1998 through the Circular-letter CR/100), the first release of that software, containing modules for data capture, propagation prediction and compatibility analysis, was communicated to administrations, on CD-ROM format, with Circular-letter CR/112 of 8 December 1998. The software was also made available from the ITU Website. The HFBC web page, on the ITU Website, is being kept updated permanently with updated reference tables and on-line help files, as well as with improved versions of the software.

Administrations from the least developed countries were provided with computer systems equipped to run the HFBC software, as well as BR TerRaSys software. Appropriate training and software demonstration was provided accordingly.

The Bureau also participated in several regional coordination groups. In the meetings of these groups, as well as in various radiocommunication seminars, the Bureau staff demonstrated the use of the HFBC software. Participants from developing countries were granted appropriate fellowships for some of these meetings.

The Bureau also provided various kinds of assistance to administrations requesting it, ranging from selection of appropriate frequency to application of different steps of the procedure.

3.8 Survey of HF broadcasting transmitter and receiver statistics (Resolution 537 (WRC-97))

With this Resolution, WRC-97 resolved that the first survey of transmitter and receiver statistics called for in Resolution 517 (Rev.WRC-97) should be conducted as a matter of urgency. In response to this Resolution, Working Party 10A of ITU-R Study Group 10 prepared a preliminary report on receiver and transmitter survey. The following conclusions were reported in this regard:[3]

- No SSB receiver equipped with a synchronous demodulator has been identified in the price range up to USD 200. Even in the price range from 200 to USD 600, only 15% of the HF receiver models identified are equipped with a synchronous detector.
- It is not known what percentage of the estimated 500 to 700 million HF receivers in the world are capable of SSB reception and have a synchronous detector.
- It is estimated that between 11 and 22% of the HF transmitters in the world are already capable of carrying SSB signals.

[3] The report itself, Document 10/47, is available from the Bureau for consultation; TIES registered users may obtain it from the address: www.itu.int/itudoc/itu-r/sg10/docs/sg10/1998-99/contrib/047e.html

- It is further estimated that between 9 and 14% of the HF transmitters in the world are already capable of being converted to carrying SSB signals.
- It is probable that most HF transmitter which can carry SSB signals, could also carry digital signals. However this assumption will need to be confirmed when the details of an ITU-R recommended digital AM system are available.

3.9 Application of Resolution 703 (Rev.WARC-92) relating to the calculation methodologies and interference criteria

This Resolution was established, in its initial form, by the World Administrative Radio Conference for Space Telecommunications, Geneva, 1971, as Resolution Spa2-6, as a means by which administrations could convey to the then IFRB their agreement or otherwise to the application of the revised or new CCIR Recommendations affecting the calculation methods or criteria relating to sharing of frequency bands between space and terrestrial radiocommunication services, or between space radiocommunication services, instead of those referred to in the relevant provisions of the Radio Regulations. Such a consultation was considered essential with a view to making possible, for the administrations that so wish, an early application of the improved calculation methods and interference criteria relating to coordination procedures, bearing in mind the fact that adoption of the relevant ITU-R (ex-CCIR) Recommendations followed shorter time periods than the periodicity of WARCs. Furthermore, such a procedure enabled many administrations to receive timely information on the relevant CCIR Recommendations dealing with calculation methodologies and interference criteria after the relevant meetings of the CCIR study groups and prior to the CCIR Assemblies, thus enabling timely preparation of the radio regulatory authorities whose experts could not take part in the activities preceding the adoption of the relevant CCIR Recommendations. However, the non-reply in the application of this consultation procedure had no impact on the rights of administrations that failed to reply, as the non-reply was considered as agreement by the concerned administration to the continuing application of the calculation methods and criteria defined in the Radio Regulations.

In pursuance of this Resolution, the consultation procedure has been conducted regularly for quite some time, involving the ITU Secretary-General, the ex-CCIR, the ex-IFRB and the Radiocommunication Bureau. However, the structural changes to ITU in 1992, which established new working arrangements based on biennial cycles of Radiocommunication Assemblies and WRCs, together with the new methods for approval of ITU-R Recommendations by correspondence which resulted in frequent modifications of the relevant ITU-R Recommendations, made this consultation procedure rather inefficient as many responses very often became obsolete even before the publication of the results of the consultation procedure having in mind the pace of change in the ITU-R Recommendations.

Furthermore, the low rate of response from administrations (rarely more than 15%) demonstrated that many administrations preferred the stable calculation methods as they appear in the Radio Regulations to the modified ones. For instance, in the last consultation procedure, which was performed by the Bureau in 1996-1997, only 16 replies were received (see Circular-letter CR/71 of 21 April 1997).

A further factor has been the application of "Incorporation by Reference" which has established a formal procedure for reviewing the provisions of the Radio Regulations which make reference to ITU-R Recommendations with a view to introducing normally the reference to the most recent version of the referred ITU-R Recommendation in the appropriate provision of the RR. Consequently, the consultation mechanism foreseen in Resolution 703 does not apply in these cases.

In view of the above, and bearing in mind the facts 1) that coordination is a bilateral matter for administrations which are free to adopt such criteria as they deem appropriate in the mutual coordination activities, and 2) that the ITU-R Recommendations are now available on-line in both their draft and final forms, administrations may wish to review the need for maintaining this Resolution and its time-consuming consultation procedure.

3.10 Use of bands around 2 GHz, by the fixed- and mobile-satellite services, and associated transition arrangements (Resolution 716 (WRC-95))

This Resolution covers several related issues concerning the use of the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz, in all three Regions, as well as the use of the bands 2 010-2 025 MHz and 2 160-2 170 MHz in Region 2, by the fixed- and mobile-satellite services.

3.10.1 Overview of the allocations

3.10.1.1 The bands 1 980-2 010 MHz and 2 170-2 200 MHz were allocated, by WARC-92, to the mobile-satellite service, in all three Regions. These bands were identified as host bands for the satellite component of IMT-2000, for those administrations that wish to implement IMT-2000. Initially, these bands should have been available for the MSS on 1 January 2005 (with the proviso that these bands may be available for MSS, in the United States, on 1 January 1996). Subsequently, WRC-95 has modified the relevant dates and, according to the WRC-95 decisions, these bands became available for the MSS on 1 January 2000 (except the band 1 980-1 990 MHz which will become available for the MSS, in Region 2, on 1 January 2005). However, the operation of the MSS, in the bands 1 980-2 010 MHz and 2 170-2 200 MHz, is subject to various restrictions which are summarized in Table 3 below.

TABLE 3

Summary of restrictions to the MSS (worldwide allocations)

Frequency band	Restriction	Provision No.
1 980-2 010 MHz	MSS shall operate on a non-interference basis with respect to, shall not claim protection from, and shall not hamper the development prior to 1 January 2005 of, the fixed and mobile services in Algeria, Benin, Cape Verde, Egypt, Mali, Syria and Tunisia	**S5.389F**
1 980-1 990 MHz	MSS shall operate on a non-interference basis with respect to, and shall not constrain the development of, the fixed and mobile services in Argentina, Brazil, Canada, Chile Ecuador, United States, Honduras, Jamaica, Mexico, Peru, Suriname, Trinidad and Tobago, Uruguay and Venezuela	**S5.389B**
2 170-2 200 MHz	MSS shall operate on a non-interference basis with respect to, shall not claim protection from, and shall not hamper the development prior to 1 January 2005 of, the fixed and mobile services in Algeria, Benin, Cape Verde, Egypt, Mali, Syria and Tunisia	**S5.389F**

3.10.1.2 With respect to other bands which are subject to Resolution 716, notably 2 010-2 025 MHz and 2 160-2 170 MHz, which are allocated to the MSS in Region 2, the situation is somewhat similar. According to the decisions of WRC-95, these bands should become available for MSS on 1 January 2005 (with the proviso that the allocation would become effective on 1 January 2000 in Canada and in United States). However, WRC-97 modified these dates and, according to the decisions of WRC-97, these bands would become available for MSS on 1 January 2002 (with the proviso that the allocation would become effective on 1 January 2000 in Canada and in United States). Here, as well, the operation of the MSS, in the bands 2 010-2 025 MHz and 2 160-2 170 MHz, is subject to various restrictions which are summarized in Table 4 below.

TABLE 4

Summary of restrictions to the MSS (Region 2 allocations)

Frequency band	Restriction	Provision No.
2 010-2 025 MHz	MSS in Region 2 shall operate on a non-interference basis with respect to, and shall not constrain the development of, the fixed and mobile services in Regions 1 and 3	**S5.389E**
2 010-2 025 MHz	MSS shall operate on a non-interference basis with respect to the fixed and mobile services in Argentina, Brazil, Chile, Colombia, Cuba, Ecuador and Suriname, until 1 January 2005	**S5.390**
2 160-2 170 MHz	MSS in Region 2 shall operate on a non-interference basis with respect to, and shall not constrain the development of, the fixed and mobile services in Regions 1 and 3	**S5.389E**
2 160-2 170 MHz	MSS shall operate on a non-interference basis with respect to the fixed and mobile services in Argentina, Brazil, Chile, Colombia, Cuba, Ecuador and Suriname, until 1 January 2005	**S5.390**

3.10.2 Sharing considerations and transition arrangements

3.10.2.1 Resolution 716 (WRC-95), in its *considering d)*, recognizes that the long-term sharing between the fixed service and the mobile-satellite service would be complex and difficult and that, consequently, it would be advisable to transfer the fixed service stations operating in these bands to other segments of the spectrum. Furthermore, and in order to ensure appropriate recognition of the frequency assignments to the fixed and mobile services in the concerned frequency coordination activities, administrations were requested to notify to the BR the basic characteristics of frequency assignments to existing or planned stations in the bands subjected to Resolution 716 (WRC-95), with the proviso that administrations may notify typical stations in the fixed and mobile services up until 1 January 2000. On the other hand, and bearing in mind, *inter alia*, the operational and economical aspects of the eventual transfer of the fixed and mobile services to other bands, WRC-95 resolved to invite various studies so as to facilitate the introduction and future use of the 2 GHz band by the MSS.

3.10.2.2 Based on the above considerations, ITU-R adopted Questions 201/8 and 118/9 and undertook a study with a view to establishing appropriate coordination methodologies (e.g. for evaluating potential for interference from MSS (Earth-to-space) transmissions into fixed services receivers, for assessing the impact of the MSS (space-to-Earth) systems to the performances in the fixed service receivers, for assessment of the potential of interference from fixed service transmitter to MSS space station receivers), as well as planning tools for transition of the FS systems from these bands to other segments of the spectrum. Several draft new recommendations were prepared in this regard, many of them jointly by Study Groups 8 and 9. A comprehensive list of the ITU-R Recommendations which should be considered in the coordination activities is included in Recommendation ITU-R F.1405, entitled "Guidance to facilitate coordination and use of frequency bands shared between the fixed service and the mobile-satellite service in the frequency range 1-3 GHz", as well as in draft new Recommendation ITU-R M.[Document 8/43], entitled "Guidance to facilitate coordination and use of frequency bands shared between the MSS and the fixed service in the frequency range 1-3 GHz". This latter ITU-R Recommendation, which was adopted at the meeting of Study Group 8, in November 1999, is undergoing the necessary procedure for approval by correspondence before WRC-2000, together with some other draft new recommendations on the same subject.

3.10.2.3 The application of the methodologies referred to in various ITU-R Recommendations requires, however, development of algorithms and calculation procedures that may be used in detailed bilateral coordination between concerned parties, and which are based, *inter alia*, on accurate terrain databases. Therefore, the practical value of these methodologies depends essentially on the availability of complex simulation tools which should be able to simulate a large variety of likely configurations which could occur in various countries. Such tools might have been developed in various administrations, but no software was submitted to the Bureau in this respect, despite the fact that the need for submitting such computer tools to the Bureau, by administrations, was identified by the ITU membership at various occasions. Given the lack of such tools[4], the Bureau is not in a position to provide the assistance referred to in *resolves* 6 of Resolution 716 (WRC-95). Fortunately, the Bureau has not yet been requested by any administration to provide such assistance.

3.10.2.4 Resolution 716 (WRC-95) also requested administrations to notify to the Bureau the basic characteristics of frequency assignments to existing or planned stations in the fixed and mobile stations so as to ensure their recognition in the subsequent coordination activities. The response of the administrations in this respect, as well as the overall situation concerning the recorded frequency assignments in the relevant bands is summarized in Table 5:

TABLE 5

Summary of notifications

Frequency band (MHz)	Notified frequency assignments (17.11.95 - 1.10.99)	Total number of recorded assignments (on 1.1.2000)
1 980-2 010 (all Regions)	• to individual stations: 226 • to typical stations: 8	1 399
2 170–2 200 (all Regions)	• to individual stations: 308 • to typical stations: 7	597
2 010-2 025	• From R2: 12 • From R1 and R3: 130	867 (from all Regions)
2 160-2 170	• From R2: 15 • From R1 and R3: 102	1 237 (from all Regions)

[4] Due to other priorities, the Bureau is not in a position to devote resources for development of complex computer modules in this respect.

3.10.2.5 Resolution 716 (WRC-95) also calls for phasing out, by 1 January 2000, the troposcatter systems operating in the bands 1 980-2 010 MHz (in all three Regions) and 2 010-2 025 MHz (in Region 2), bearing in mind that sharing between fixed service systems using tropospheric scatter and Earth-to-space links in MSS in the same frequency band segments is not possible. The relevant review of the Master Register, as of 1 January 2000, indicates that there were still ten such assignments in the band 1 980-2 010 MHz and two assignments in the band 2 010-2 025 MHz (R2 only).

ATTACHMENT 1

Example modification to Resolution 300

RESOLUTION 300 (Rev.~~Mob-87~~WRC-2000)

Use and notification of the paired frequencies reserved for narrow-band direct-printing telegraphy and data transmission systems in the HF bands allocated on an exclusive basis to the maritime mobile service

(See Appendix **S17** (Part B, Section II)~~/Appendix **32**~~)

The World~~ Administrative~~ Radiocommunication Conference~~ for the Mobile Services~~,~~ Geneva, 1987~~ Istanbul, 2000,

considering

a) that certain sections of the HF bands allocated to the maritime mobile service have been reserved for narrow-band direct-printing telegraphy and data transmission systems for use on a paired frequency basis only;

b) that Appendix **S17** (Part B, Section II)~~/Appendix **32**~~ contains a channelling arrangement in the maritime mobile HF bands for narrow-band direct-printing telegraphy and data systems (paired frequencies);

~~*c)* that this Conference has made available an increased number of paired frequencies reserved for narrow-band direct-printing telegraphy and data transmission systems for use on a paired basis only, and has modified Appendix **S17** (Part B, Section II)/Appendix **32** accordingly;~~

~~*d)* that WMARC-74 established interim measures for the orderly bringing into use of the paired frequencies;~~

~~*e)*~~ that ~~the~~ WMARC-74 and WARC-Mob-87 established a provisional procedure for the use and notification of paired frequencies for narrow-band direct-printing telegraphy and that the application of this procedure by administrations and by the Radiocommunication Bureau was satisfactory~~,~~;

d) that WRC-95 and WRC-97 have modified the relevant procedures for examination of the frequency assignments in the non-planned bands,

resolves

~~1~~ that paired frequencies in the HF bands reserved for narrow-band direct-printing telegraphy between coast stations and ship stations shall be used by these stations, notified to the Bureau and recorded in the Master International Frequency Register in ~~the following manner:~~accordance with the standard procedures of Article **S11**; as from [3 June 2000],

instructs the Bureau

to review the frequency assignments referred to in this Resolution, which are currently recorded in the Master Register, and to modify their findings so as to reflect the standard examination and recording procedures as stipulated in Article **S11**.

~~1.1 assignments of pairs of frequencies for transmission and reception shall be made solely to coast stations. Ship stations of any nationality shall use by right for their transmissions the receiving frequencies of the coast stations with which they exchange traffic;~~

~~1.2 each administration shall choose the pairs of frequencies for its requirements, if necessary with the assistance of the Bureau;~~

~~1.3 the assignments thus selected shall be notified to the Bureau in notices as shown in Appendix **S4/1** and administrations shall supply the basic characteristics listed in Annexes 1A and 1B/Section A or B of that Appendix, as appropriate;~~

~~1.4 whenever practicable, each notice should reach the Bureau before the date on which the assignment is brought into use. It must reach the Bureau not earlier than one year before the date on which it is to be brought into use but in any case not later than 30 days after it is actually brought into use;~~

~~1.5 assignments which are in conformity with the Radio Regulations, and in particular Appendix **S17** (Part B, Section II)/Appendix **32**, shall be examined by the Bureau from the viewpoint of the probability of harmful interference to be caused by or to other existing or proposed uses. The Bureau shall inform the administration concerned of the results of its examination and shall record the notified assignment with reference to this Resolution and without any date in Column 2. The date of receipt of the notice by the Bureau and the date of putting into use of the assignment shall be entered in the Remarks Column. In cases where the Bureau identifies incompatibilities, it shall make suggestions with a view to resolving them;~~

~~1.6 any notice not in conformity with the Radio Regulations shall be returned to the notifying administration by the Bureau, together with any suggestion which the Bureau may be able to submit in this respect;~~

~~1.7 should difficulties arise between administrations using the same channel, or adjacent channels, the matter shall be settled by agreement between the administrations concerned taking into account the information published by the Bureau;~~

~~2 that a future competent conference be invited to review this Resolution and examine any difficulties which may have arisen in its application;~~

~~3 that the entries made in the Master Register under this Resolution shall in no way prejudge any decisions which may be taken by the aforementioned conference,~~

~~*invites the Council*~~

~~*to place this Resolution on the agenda of the next competent conference in order to examine any difficulties which may have arisen in its application.*~~

ATTACHMENT 2

Cross-references to sections of the CPM Report to WRC-2000, or to other documents, containing additional material on some resolutions/recommendation

Resolution	Short title	Additional information in
27	Incorporation by reference	CPM Report (Section 7.3, Annexes 2-5 to Chapter 7)
29	Occupancy of some HF bands	See separate BR report (see Document 5)
30	Weekly Circular on CD-ROM	See separate BR report
60	Revision of Appendix S7/28	CPM Report (Section 7.2)
121	Sharing studies feeder links, non-GSO MSS/ GSO FSS	CPM Report (Section 6.4)
122	Sharing studies, HAPS	CPM Report (Section 6.2)
123	Sharing studies, non-GSO MSS feeder links	CPM Report (Section 6.5)
126	High density fixed service	CPM Report (Section 6.1.1)
128	Allocations to FSS in 42 GHz	CPM Report (Section 6.1.4)
129	Sharing FSS/other in 41 GHz	CPM Report (Section 6.1.5)
130	Use of non-GSO FSS in certain bands	CPM Report (Annex 5 to Chapter 3)
131	Pfd limits for non-GSO FSS in 11/18 GHz	CPM Report (Section 3.1.4.5, Annex 4 to Chapter 3)
133	Sharing FX/other in 40 GHz	CPM Report (Section 6.1.2)
134	FSS in 40.5-42.5 GHz	Related information in CPM Report (Section 6.1.5)
207	Monitoring, MMS/AM(R)S	CPM Report (Section 1.2.3.1)
212	Implementation of IMT-2000	CPM Report (Section 1.1)
213	Use of 1.7 GHz by MSS	CPM Report (Section 2.2)
214	Use of bands below 1 GHz by MSS	CPM Report (Sections 2.3.1 and 2.3.2)
218	MSS in 1.5/1.6 GHz	CPM Report (Section 2.1)
219	Allocation to MSS in 405-406 MHz	CPM Report (Section 2.3.3)
220	Allocation to MSS in portion of the band 1 559-1 567 MHz	CPM Report (Section 2.2)
342	Revision of App. S18	CPM Report (Section 1.3)
346	Protection of distress and safety frequencies in 12-16 MHz	CPM Report (Section 1.2)
538	Non-GSO FSS in the bands of App. S30 and S30A	CPM Report (Sections 3.1 and 3.2, Annex 5 to Chapter 5)
723	Allocations to space services	CPM Report (Sections 4.1.1 and 8.1.3.3)
726	Allocations for high-density FX above 30 GHz	CPM Report (Section 6.1.3.4)

Recommendation	Short title	Additional information in
35	Procedure for a modification of a Plan	Related information in CPM Report (Chapter 5)
66	Max. level of unwanted emissions	CPM Report (Section 7.1)
105	Coordination area	Related information in CPM Report (Section 7.2)
318	Improved App. S18	CPM Report (Section 1.3)
507	Spurious emissions in BSS	Related information in CPM Report (Section 7.1)
706	Passive sensors in 18 GHz	Related information in CPM Report (Section 7.2)

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Note by the Secretary-General

REPORT ON THE IMPLEMENTATION OF RESOLUTION 533 (WRC-97)

Pursuant to the provisions of Resolution 533 (WRC-97), attached is a report from the Director, Radiocommunication Bureau.

The Conference is also invited to consider the issue raised in the appendix to the report.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

CONTRIBUTION FOR THE BR REPORT TO WRC-2000

Report on the implementation of Resolution 533 (WRC-97)

1 The Bureau informed all ITU administrations in its Circular Letter CR/91 of 6 March 1998 that pursuant to the adoption of the revised Plan for the broadcasting-satellite service and the associated feeder links for Regions 1 and 3 by WRC-97, as contained in Appendices S30 and S30A and in accordance with Resolution 533 (WRC-97), the Radiocommunication Bureau was instructed to review the requirements for coordination of the satellite networks submitted under Article 4 of the above-mentioned appendices including those which were already published in the Special Sections annexed to the Bureau Weekly Circulars since the establishment of the initial Plans at WARC Sat-77 and WARC Orb-88.

2 According to this Resolution, the Bureau shall apply in its examinations of Article 4 submissions of Regions 1 and 3 the new technical planning criteria and reference situation of the revised Plan for Regions 1 and 3, derived, in particular, from the application of the protection ratios used for Equivalent Protection Margin (EPM) analyses at WRC-97 as defined in Annexes 5 and 3 to Appendices S30 and S30A respectively (protection ratios contained in Recommendation ITU-R BO.1297) instead of the protection ratios applied at WARC Sat-77 and WARC Orb-88.

3 It is worth mentioning that, for assignments which are in conformity with Appendices S30 and S30A notified to the Bureau under Article 5 of these appendices, brought into use before 27 October 1997 and for which the date of bringing into use has been confirmed to the Bureau in accordance with paragraph 5.2.8 of these appendices, parameters used for the establishment of the initial Plans at WARC Sat-77 and WARC Orb-88, or those published in the corresponding Special Sections, as the case may be, were utilized.

4 WRC-97 decided that the Bureau shall use the EPM criteria instead of the Overall Equivalent Protection Margin (OEPM) criteria to establish a new reference situation for the revised Regions 1 and 3 broadcasting-satellite service and the associated feeder-link Plans. In creating the new reference situation, the Bureau shall convert the merged OEPM Plan file into separate feeder-link and downlink EPM Plan files. WRC-97 also adopted the following new technical parameters:

4.1 reference receiving earth station antenna pattern (Recommendation ITU-R BO.1213) as defined in Figure 7*bis*, paragraph 3.7.2 of Annex 5 to Appendix S30;

4.2 reference transmitting earth station antenna pattern (Recommendation ITU-R BO.1295) as defined in curves A' and B' of Figure A, paragraph 3.5.3 of Annex 3 to Appendix S30A;

4.3 reference receiving space station antenna pattern (Recommendation ITU-R BO.1296) as defined in curves A' and B' of Figure B, paragraph 3.7.3 of Annex 3 to Appendix S30A;

4.4 downlink transmitting space station fast roll-off antenna patterns as defined in Figure 11b, paragraph 3.13.3 of Annex 5 to Appendix S30;

4.5 receiving space station pointing accuracy: 0.1° instead of 0.2° (as defined in paragraph 3.7.4 of Annex 3 to Appendix S30A);

4.6 angular rotation of the transmitting space station beam about its axis not exceeding ±1° instead of ±2° (as defined in section 3.14 of Annex 5 to Appendix S30);

4.7 reduced feeder-link receiver system noise temperature (as defined in section 3.8 of Annex 3 to Appendix S30A).

5 For the revised Regions 1 and 3 Plan, the Conference also applied the transmitting and receiving space station East-West station keeping error of ±0.1° (as defined in section 3.11 of Annex 5 to Appendix S30 and section 3.15 of Annex 3 to Appendix S30A), as well as the new rain climatic zones (Recommendation ITU-R P.837-1) as defined in Figures 1 and 2, section 2.1 of Annex 5 to Appendix S30 and Figures 1 and 3, section 2.2 of Annex 3 to Appendix S30A.

6 In view of the above, the Radiocommunication Bureau in its technical examination of pending Article 4 modifications, as well as for the review of all Special Sections previously published, took the following actions:

6.1 A message was sent to each individual administration which has submitted modification(s) under Article 4 of Appendices S30 and/or S30A informing them of the situation of their respective submitted network in order to take necessary action, as appropriate, with respect to the applicability of the new technical parameters adopted by WRC-97.

6.2 For the identification of affected administrations under provisions 4.3.1.1 and 4.2.1.1 of Article 4 of Appendices S30 and S30A respectively, the new protection ratios were used for EPM analyses as defined in Annexes 5 and 3 to Appendices S30 and S30A respectively, instead of those applied for the establishment of the initial Plans at WARC Sat-77 and WARC Orb-88, except for assignments referred to in paragraph 3 above.

In this examination, the Bureau, in accordance with *resolves* 3 of Resolution 533 (WRC-97), used the feeder-link and downlink files which have been derived from the merged plan file adopted by WRC-97 and complemented then by including the feeder links of Radiosat-6 and Radiosat-7 networks[1]. Reference situations calculated from these feeder-link and downlink files were published in a separate Circular Letter (CR/105 of 18 November 1998).

6.3 As a result of the individual consultation referred to in point 6.2 above, the Bureau determined the revised list of administrations likely to be affected by the subject network, should the modified parameters of a network have an impact on:

6.3.1 the pfd levels already calculated by the Bureau in application of provisions 4.3.1.2 to 4.3.1.5 of Article 4 of Appendix S30;

6.3.2 the coordination areas already calculated by the Bureau in application of provisions 4.2.1.2 and 4.2.1.3 of Article 4 of Appendix S30A (WRC-97);

6.3.3 the $\Delta T/T$ level already calculated by the Bureau in application of provision 4.2.1.4 of Article 4 of Appendix S30A;

6.3.4 the $\Delta T/T$ level already calculated by the Bureau in application of provision 4.2.3.4 of Article 4 of Appendix S30A.

7 Administrations were also informed that in the examination of all pending Article 4 networks, including those submitted by administrations of Region 2 as well as for the Special Sections previously published, in using the new technical parameters and criteria adopted by

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[1] Radiosat-6 and Radiosat-7 were provisionally added to the feeder-link Plan at WRC-97 subject to the examination by the Bureau of the impact on the revised Regions 1 and 3 Plan. After WRC-97, the Bureau reviewed the situation and found that the procedure of Article 4 for these networks were successfully completed. They were therefore definitively included in the revised Plan.

WRC-97, only those parameters mentioned in paragraph 4 above would be subject to a possible modification. Any other cases of modification that are requested by an administration in reply to the Bureau's message referred to in point 6.2 above, would be treated in accordance with the related Rules of Procedure.

8 In order to implement the decisions of WRC-97, a considerable amount of time and resources were devoted to the preparation of the draft new and/or draft modifications to the current Rules of Procedures. These drafts were submitted to the RRB in its 13th and 14th meetings in 1998 and were considered by the Board and approved as amended.

9 In the meantime several new software packages were developed and some packages already being used were revised or enhanced to cope with the decisions of WRC-97. They were then carefully tested before being put into production. These latter courses of action took a considerable amount of time and resources in particular, during a period that the Bureau was experiencing a shortage of expert staff and had many other post-WRC-97 tasks. In some cases the changes and/or enhancements were substantial due to the fact that complex new subsidiary software needed to be developed when the main software was partially or totally not available. Initially, the following new or enhanced software was developed:

9.1 Software for BSS - BSS analysis (MSPACEg and related utilities)

The MSPACEg software, used for the identification of affected administrations under provisions 4.3.1.1 and 4.2.1.1 of Article 4 of Appendices S30 and S30A respectively, was revised to be aligned with the new protection ratios used for EPM analyses as defined in Annexes 5 and 3 to Appendices S30 and S30A respectively (protection ratios contained in Recommendation ITU-R BO.1297) instead of the protection ratios applied at WARC Sat-77 and WARC Orb-88. However, the protection ratios used at these two Conferences continue to be applied to the case of assignments of the Regions 1 and 3 feeder-link or downlink Plans with status code PE or AE[2].

This software was also modified to cope with the decision to use EPM criteria and establish new separated reference situations for the revised downlink and associated feeder-link Plans instead of the merged OEPM Plan file, as well as to comply with the new technical parameters referred to in paragraph 4 above.

Special utilities have been developed and used for splitting the merged Plan into separate feeder-link and downlink Plans. These utilities were also used for eliminating redundant beams which were introduced to provide different strapping between feeder-link and downlink channels.

In addition, MSPACEg was enhanced with the development of a more precise calculation for the station-keeping error (see Attachment 1) and the introduction of protection masks to derive the so called "worst-case approach" (see Attachment 2).

9.2 GIMS/pfd

The GIMS/pfd package, used for the identification of affected administrations under provisions 4.3.1.2/4.3.3.2 to 4.3.1.5/4.3.3.5/4.3.3.6 of Article 4 of Appendix S30, was enhanced with the development of more precise subroutines for calculation and interpolation of antenna gain contours thus generating more accurate pfd levels.

[2] See Articles 11 and 9A of Appendices S30 and S30A respectively.

10 Based on the available tools referred to above, the Bureau performed the technical examinations and published the results in the corresponding new AP30 (Resolution 533) and AP30A (Resolution 533) Special Sections relating to all previously published Article 4 networks. Concerning the examinations for which the corresponding software was not fully available, the results based on the parts available were published on a provisional basis with an indication that the definitive results would be included in a corrigenda once the tools became available. A total of 90 Special Sections for downlink and 95 Special Sections for feeder links were published during the six months from September 1998 to February 1999.

11 The following new or enhanced software was further developed:

11.1 CONVTODB

The CONVTODB software was developed for the preparation of the new merged SNS database containing the APS30/S30A Plans and Article 4 networks as well as all the FSS networks. It converts the technical parameters of the APS30/S30A Plans and Article 4 networks contained in the MSPACE files into a database format in order to, with the aid of some additional adjustments, insert them in the SNS database.

11.2 GIBC/PFD/PXT

The GIBC/PFD/PXT package, used for the identification of affected administrations under provisions 4.3.1.2/4.3.3.2 to 4.3.1.5/4.3.3.5/4.3.3.6 of Article 4 of Appendix S30, was developed to work with the new database referred to in paragraph 11.1 above and to provide the more precise and detailed definitive results referred to in paragraph 10 above. In particular, the information provided under paragraphs 4.3.1.5, 4.3.3.5 or 4.3.3.6 will now offer the possibility to identify directly all the administrations responsible for FSS networks and/or BSS networks in non-planned bands which are likely to be affected.

12 After the release of the final version of these latest developed software packages, the Bureau published the corresponding corrigenda to the above-mentioned AP30 (Resolution 533) Special Sections including the definitive results of the technical re-examinations. A total of 85 Special Sections corrigenda were published during three months from August 1999 to October 1999.

13 The implementation of Resolution 533 (WRC-97) in so far as the revision of the Special Sections related to broadcasting-satellite service (downlink and feeder-link Plans) was concerned, was completed at the end of October 1999.

14 As of November 1999, the Bureau resumed its activities relating to the technical examination of the requests for modification submitted under Article 4 with the earliest date of receipt 18 March 1996.

ATTACHMENT 1

Implementation of the station keeping error

1 The Bureau has reviewed the impact of inclusion of space station keeping errors in interference analyses. From the analyses performed, it appears that the current assumption used in MSPACE is that the worst-case space station keeping will be calculated taking into account the combined effect of both easterly and westerly sources of interference. This may result in overestimation of interference due to the fact that when easterly interferers are examined, the wanted satellite will be considered to be offset towards the east and at the same time, when westerly interferers are examined, the wanted satellite is considered to be offset towards the west. Currently MSPACE combines the results of these two situations.

2 It is therefore necessary that calculations of space station keeping errors for both uplink and downlink be performed, for each channel and at each test point, by separately calculating the "westerly worst case" and "easterly worst case" and then taking whichever of the two results gives the worst reference situation.

3 Furthermore, for cases in which the interfering beams are co-located with the wanted beam as a result of the space station keeping errors, the wanted beam is assumed to be co-located with each of the interfering beams.

4 From the analyses performed by the Bureau it appears that the reference values produced by the new method are closer to the realistic values than those of the existing method. The new method requires more computing time, however, this seemed to be resolved by using high performance computers.

5 Therefore, the new methodology reviewed by the Bureau, and confirmed by the RRB and ITU-R relevant study groups, concerning the space station keeping error has been included in interference analyses of the MSPACEg software (see MSPACEg v1.42 manual).

6 As for the application of the new methodology mentioned in paragraphs 2 and 3 above for the Region 2 Plan, more study is required due to the fact that some parameters used in the Plan are different from Regions 1 and 3 Plans.

ATTACHMENT 2

Implementation of the worst-case interference calculation method with respect to sections 3.5.1 and 3.8 of Annex 5 to Appendix S30 and section 1.7 of Annex 3 to Appendix S30A

1 WRC-97 adopted new versions of Annexes 5 and 3 to Appendices S30 and S30A respectively and instructed the Bureau to apply, as of 22 November 1997, the technical data contained in these revised annexes to submissions made under Articles 4 and 5 of these appendices (Resolution 534).

2 Annex 5 to Appendix S30 and Annex 3 to Appendix S30A permit the use of bandwidths and/or channel spacings different from those specified in these annexes (sections 3.5.1, 3.8 of Annex 5 and section 1.7 of Annex 3) and instructs the Bureau to treat submissions using bandwidths and/or channel spacings differing from those of sections 3.5.1, 3.8 of Annex 5 and section 1.7 of Annex 3 in accordance with applicable ITU-R recommendations for protection masks, when available. In the absence of such recommendations, the Bureau shall use the worst-case approach as adopted by the Radio Regulations Board.

3 For cases where the interferer is a digital emission, ITU-R recommendations (e.g. Recommendation ITU-R BO.1293) provide guidance for treatment of assignments which use a channel spacing and/or bandwidth different from values given in sections 3.5.1 and 3.8 of Annex 5 to Appendix S30.

4 For cases where the interferer is an analogue emission, interference calculation methods used so far by the Bureau, in accordance with advice provided by JWP 10-11S (note to the Director, Radiocommunication Bureau, November 1994), are as follows:

- when analogue is interfering with analogue: the Bureau should treat analogue transmissions with different channel centre frequencies (within ±10 MHz) and/or different bandwidth and/or different frequency deviations as if they were standard emissions[1] for the purpose of determining their effect into standard transmissions and for establishing their reference margins;
- when analogue is interfering with digital: the Bureau should assume that digital carriers are equivalent to standard analogue signals for the purpose of determining the way they are affected by analogue carriers and for establishing their reference margins.

5 Application of these methods is not the worst-case approach as required by WRC-97 and may lead to the following undesirable results:

- completely ignoring interference in Regions 1 and 3 Plans when the assigned (centre) frequency of the interfering emission falls in the second adjacent channel as shown in Figure 2 (cases 1.1, 1.2, 1.3) of Annex 2 to this document;
- calculation of the interference in cases where there is no overlap as shown in Figure 3 (cases 2.1, 2.2, 2.3) of Annex 2 to this document;

---

[1] Standard emissions are those emissions which use the following parameters:

- **for Regions 1 and 3:** 27 MHz bandwidth, 19.18 MHz channel spacing and the assigned frequencies as specified in Articles 11 and 9A of Appendices S30 and S30A.
- **for Region 2:** 24 MHz bandwidth, 14.58 MHz channel spacing and the assigned frequencies as specified in Articles 10 and 9 of Appendices S30 and S30A.

- overestimating the interference level as shown in Figure 4 (cases 3.2, 3.3) of Annex 2 to this document;
- underestimating the interference level as shown in Figure 4 (case 3.1) of Annex 2 to this document.

6 The Bureau has received many Article 4 submissions which use channel spacings and/or bandwidths different from the values given in sections 3.5.1 and 3.8 of Annex 5 to Appendix S30.

7 To allow the Bureau to treat Article 4 submissions with parameters different from those described in Annexes 5 and 3 to Appendices S30 and S30A, new Rules of Procedure relating to sections 3.5.1 and 3.8 of Annex 5 to Appendix S30 and 1.7 of Annex 3 to Appendix S30A have been adopted by the Radio Regulations Board at its 12th meeting (20-24 April 1998).

8 The new rules adopted by the RRB contain references to the worst-case approach presented in Annex 1 to this attachment, which has been applied provisionally in interference analyses of the MSPACEg software (see MSPACEg v1.42 manual) for all regional BSS Plans to deal with analogue interferers until the relevant ITU-R recommendations become available as required by WRC-97.

ANNEX 1

(to Attachment 2)

Description of the provisional worst-case "analogue" approach to deal with interference from assignments using analogue modulations involving non-standard interfering or wanted assignments

1 Introduction

The purpose of this document is to describe a worst-case approach for calculating interference from assignments using analogue modulations where either the wanted (analogue or digital) or the interfering (analogue) assignments use channel spacing and/or bandwidth different from the values given in sections 3.5 and 3.8 of Annex 5 to Appendix S30[1].

2 Principles and assumptions

In the case of assignments of the Regions 1 and 3 feeder-link or downlink Plans with status code P or A[2], the worst-case approach is based on the consideration of:

a) the provisional status of the proposed worst-case approach, which will be applied by the Bureau until relevant ITU-R recommendations become available;

b) the variation of the relative protection ratio in dB as a linear function of the overlapping bandwidth. This relative protection ratio is the difference between the co-channel protection ratio and a protection ratio at a given frequency offset. It has a purpose similar to the adjustment factor described in Recommendation ITU-R BO.1293, but with an opposite sign;

c) the relative protection ratio of –8 dB for the first standard adjacent channel, which is the difference between the co-channel and the adjacent channel protection ratios, for a frequency offset of 19.18 MHz and a frequency bandwidth of 27 MHz for both the interfering and the wanted channels (i.e. an overlapping bandwidth of 7.82 MHz);

d) the shape of the WARC Sat-77 protection mask provided in Figure 1 of Annex 6 of Appendix S30, i.e.:

   1) a flat part, corresponding to a frequency offset where the plateau part[3] of the interfering signal still overlaps with the plateau part[3] of the wanted signal; and

   2) a variation of the relative protection ratio as a linear function of the overlapping bandwidth which is also a linear function of the frequency offset.

In the case of the Region 2 Plan, the worst-case approach is based on the consideration of:

a) the provisional status of the proposed worst-case approach, which will be applied by the Bureau until relevant ITU-R recommendations will become available;

[1] This would also apply for Appendix S30A.

[2] See Articles 11 and 9A of Appendices S30 and S30A respectively.

[3] Corresponds to the part of the signal where the spectral power density has an almost constant maximum value.

b) the variation of the relative protection ratio in dB as a linear function of the overlapping bandwidth. This relative protection ratio is the difference between the co-channel protection ratio and a protection ratio at a given frequency offset. It has a purpose similar to the adjustment factor described in Recommendation ITU-R BO.1293, but with an opposite sign;

c) the relative protection ratio of –14.4 dB for the first standard adjacent channel, which is the difference between the co-channel and the adjacent channel protection ratios, for a frequency offset of 14.58 MHz and a frequency bandwidth of 24 MHz for both the interfering and the wanted channels (i.e. an overlapping bandwidth of 9.42 MHz);

d) the relative protection ratio of –37.9 dB for the second standard adjacent channel, which is the difference between the co-channel and the adjacent channel protection ratios, for a frequency offset of 29.16 MHz and a frequency bandwidth of 24 MHz for both the interfering and the wanted channels (i.e. an "equivalent overlapping bandwidth" of –5.16 MHz);

e) the shape of the RARC-Sat-83 protection mask provided in Figure 6 of Annex 5 of Appendix S30:

1) a flat part, corresponding to a frequency offset where the plateau part[3] of the interfering signal still overlaps with the plateau part[3] of the wanted signal; and

2) a variation of the relative protection ratio as three linear functions of the overlapping bandwidth which are also linear functions of the frequency offset.

In the case of assignments of the Regions 1 and 3 feeder-link or downlink Plans with status code PE or AE[2], the worst-case approach is based on the consideration of:

a) the provisional status of the proposed worst-case approach, which will be applied by the Bureau until relevant ITU-R recommendations become available;

b) the variation of the relative protection ratio in dB as a linear function of the overlapping bandwidth. This relative protection ratio is the difference between the co-channel protection ratio and a protection ratio at a given frequency offset. It has a purpose similar to the adjustment factor described in Recommendation ITU-R BO.1293, but with an opposite sign;

c) the relative protection ratios of –19 dB and –16 dB for the feeder-link and the downlink Plans respectively, both for the first standard adjacent channel, which is the difference between the co-channel and the adjacent channel protection ratios, for a frequency offset of 19.18 MHz and a frequency bandwidth of 27 MHz for both the interfering and the wanted channels (i.e. an overlapping bandwidth of 7.82 MHz);

d) the shape of the WARC SAT-77 protection mask provided in Figure 1 of Annex 6 of Appendix S30, i.e.:

1) a flat part, corresponding to a frequency offset where the plateau part[3] of the interfering signal still overlaps with the plateau part[3] of the wanted signal; and

2) a variation of the relative protection ratio as a linear function of the overlapping bandwidth which is also a linear function of the frequency offset.

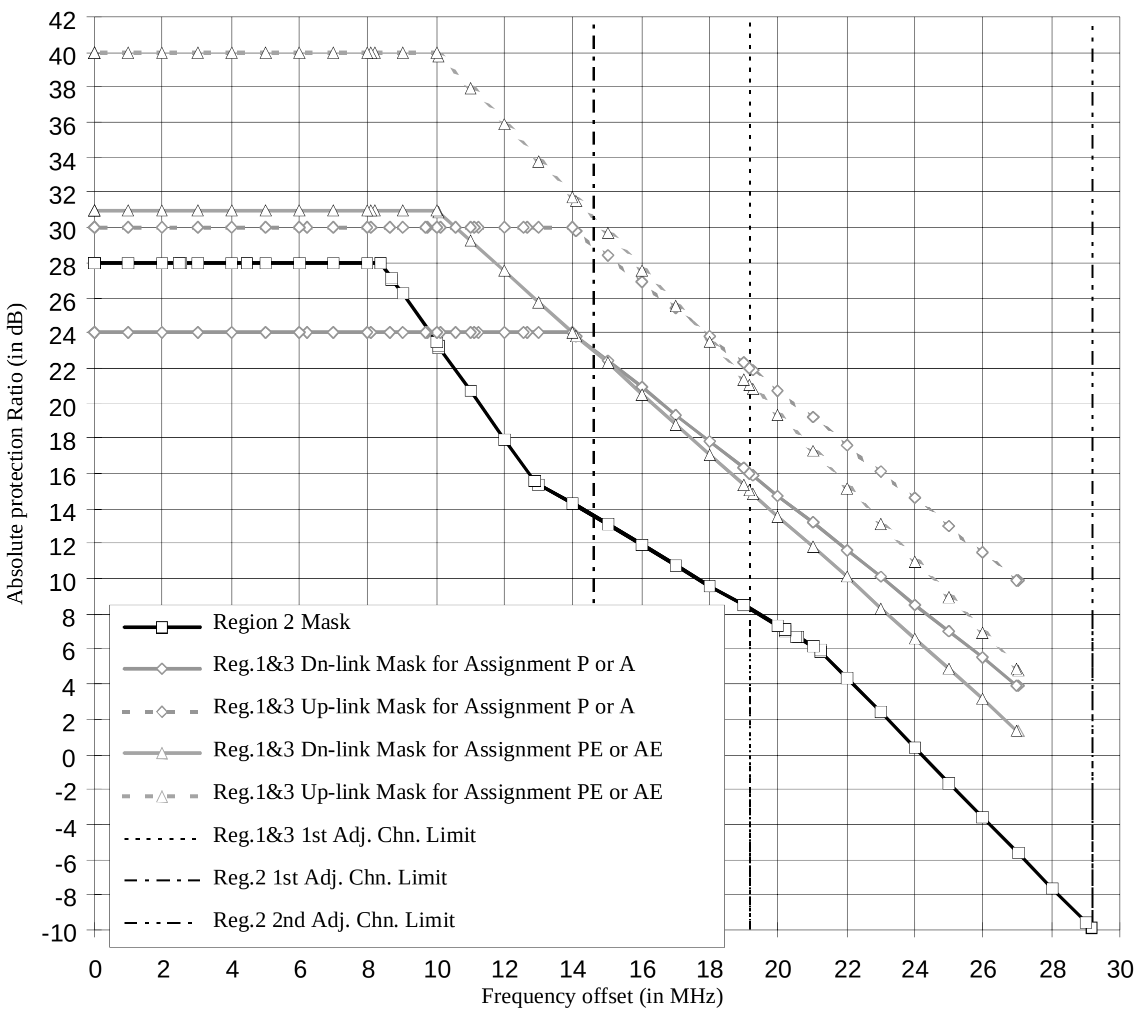
3 Examples of various protection masks using absolute protection ratios

Figure 1 below describes a comparison of various protection masks, based on absolute protection ratios.

In the case of the Regions 1 and 3 protection masks, the Regions 1 and 3 Plans standard bandwidth of 27 MHz is assumed for both the wanted and interfering assignments, and in the case of the Region 2 protection mask the Region 2 Plan standard bandwidth of 24 MHz is assumed both the wanted and interfering assignments.

FIGURE 1

Comparison between various standard protection masks of the analogue worst case approach



CMR2000/17-01

ANNEX 2

(to Attachment 2)

FIGURE 2

Cases of second adjacent channel emissions causing interference to the Regions 1 and 3 Plan

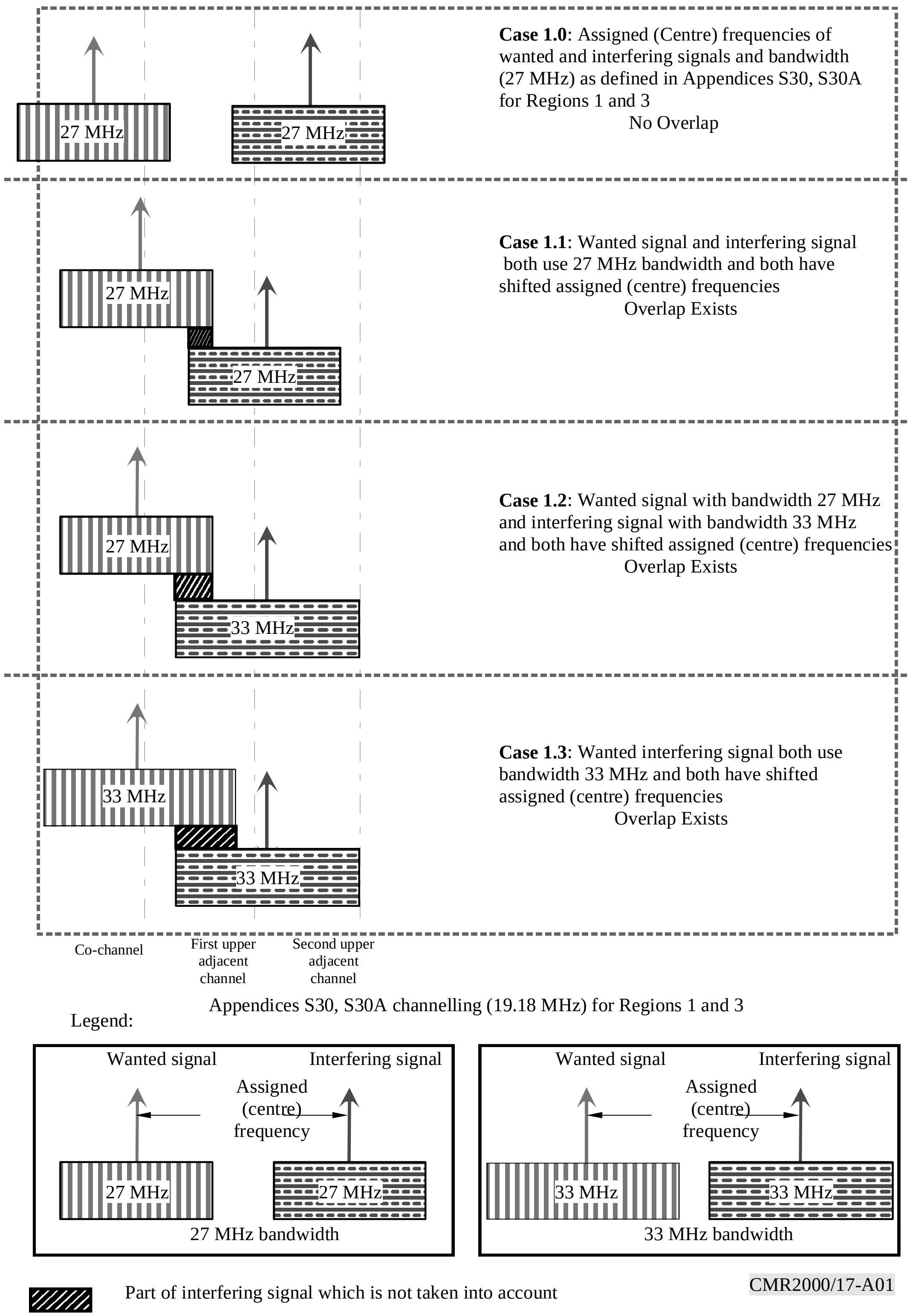
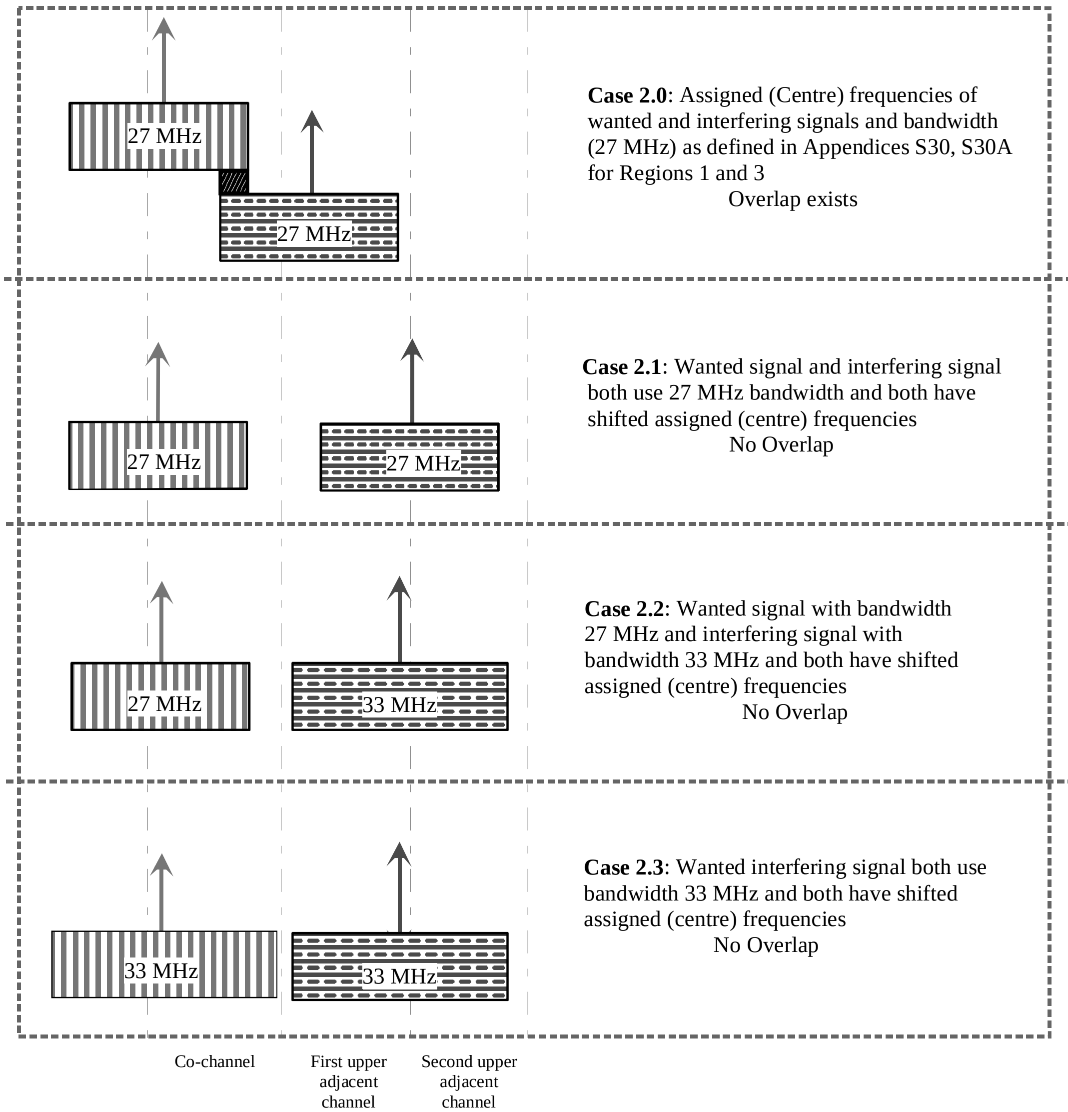


FIGURE 3

Cases when the assigned frequency of an interfering signal falls into the first adjacent channel but does not cause interference to the Regions 1 and 3 Plan

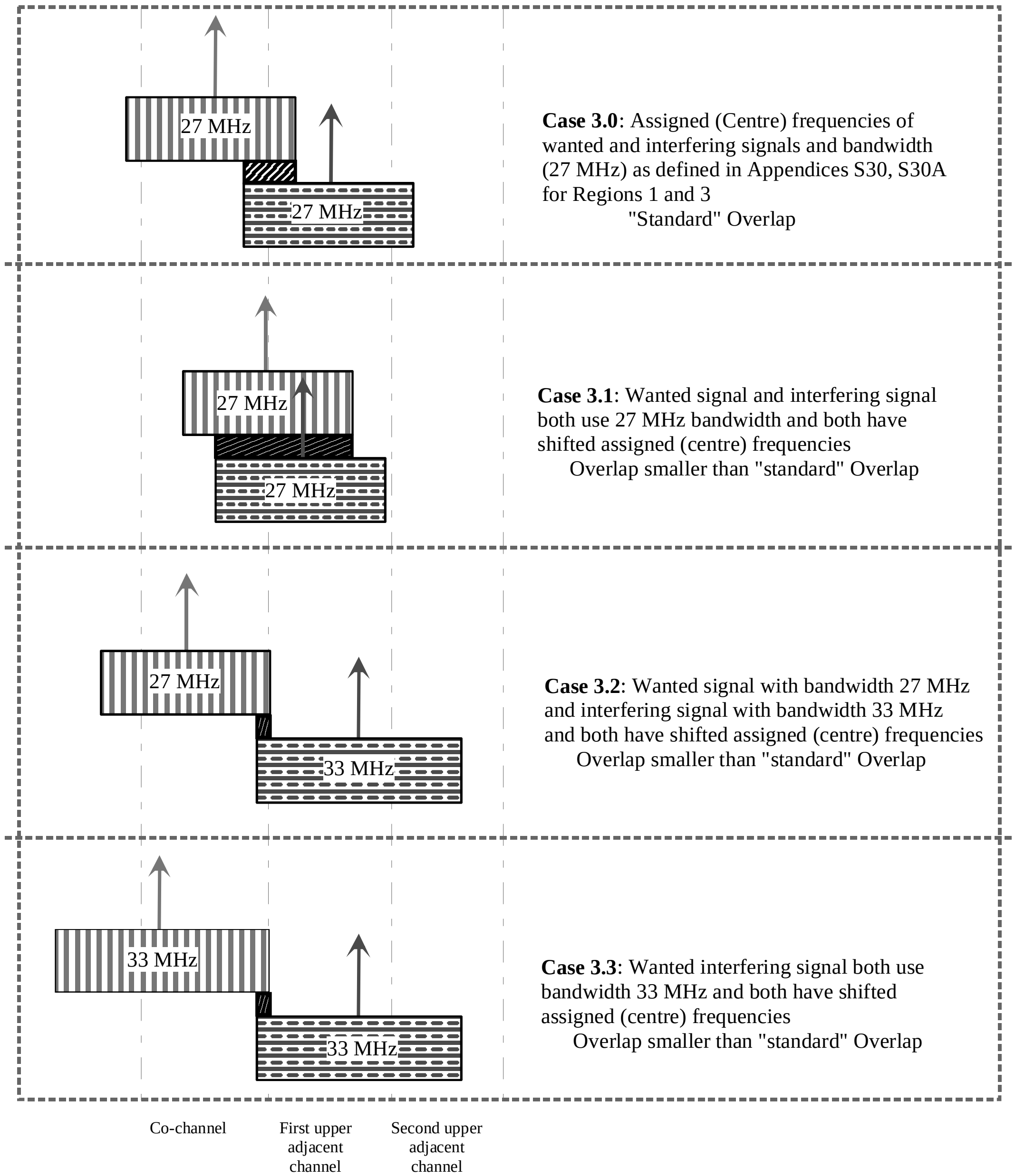


Appendices S30, S30A channelling (19.18 MHz) for Regions 1 and 3

CMR2000/17-A02

FIGURE 4

Cases when interference level is lower or higher than the interference level between assignments which use technical parameters (channelling spacing and/or bandwidth) defined in Annexes 5 and 3 to Appendices S30 and S30A



Appendices S30, S30A channelling (19.18 MHz) for Regions 1 and 3 CMR2000/17-A03

APPENDIX

Report on the implementation of Resolution 533 (WRC-97)

Possible inconsistency between the text of the *resolves* 2 (3rd indent) of Resolution 533 (WRC-97) and that of the Plans remarks column with respect to Hispasat-2 analogue and digital emissions at 30° W

1 The request for modification to Appendices S30/S30A Plans (addition of Hispasat-2) was received by the Radiocommunication Bureau on 7 March 1991.

2 The Bureau published the relevant Special Sections in application of the various provisions of Article 4 of the above-mentioned appendices.

3 The analogue emission (27 MHz) of that network was included in the Plans at WRC-97. The digital emission (27 MHz) of that network was still at the stage of coordination at that time.

4 According to the definition of the symbols contained in columns 16 and 18 of sections 11.1 and 9A.1 of Articles 11 and 9A of Appendices S30 and S30A respectively (pages 433 and 598 of Volume 2 of the Radio Regulations refer), the date of bringing into use of both analogue (27 MHz) and digital (27 MHz) emissions of Hispasat-2 was subject to the eight years regulatory time limit referred to in paragraphs 4.3.5 and 4.2.5 of Article 4 of Appendices S30 and S30A.

5 Based on the information available to the Bureau, the assignments in question (analogue (27 MHz) and digital (27 MHz)) were not brought into use within that time limit. The Bureau therefore, in application of paragraphs 4.3.5 and 4.2.5 of Article 4 of Appendices S30 and S30A and its associated Rules of Procedure, suppressed them from its files.

6 The Spanish Administration disagreed with the course of action taken by the Bureau and in its letter of 22 October 1999 requested the Director, Radiocommunication Bureau to submit the case to the 18th meeting of the Radio Regulations Board (8-12 November 1999, Geneva) for its consideration. In that letter, the Administration of Spain, **based on its interpretation of Resolution 533 (WRC-97) and in particular the wording of the 3rd indent of *resolves* 2 of that Resolution**, "requests the Board to review the finding of the Bureau in order to keep the assignments of Hispasat-2 in the Plans contained in Appendices S30 and S30A with the view to take them into account when processing modifications to these appendices. Should the matter be left for consideration by the future conference, the Spanish Administration sees no objection to associate the Hispasat-2 assignments with a note indicating that they are maintained in the Plans subject to their review by the next WRC. In such a case, the Spanish Administration would submit a document on the inconsistency among the different decisions of WRC-97 for its consideration by the WRC".

7 At the 18th meeting of the Radio Regulations Board (8-12 November 1999, Geneva), the RRB considered the matter and the following decisions were taken:

Quote

1) The RRB confirmed the decision of the Bureau on the cancellation of the Hispasat-2 analogue and digital satellite network at 30° W.

2) In reviewing the Spanish Administration's request, the RRB recognized a potential ambiguity between the text of *resolves* 2 of Resolution 533 (WRC-97) and that contained in sections 11.1 and 9A.1 of Articles 11 and 9A of Appendices S30 and S30A

respectively. Consequently the Board decided to refer the matter to WRC-2000 for its consideration and appropriate action. In this connection, the Board is aware of a potential retroactive impact of a conference decision on the above-mentioned matter.

3) In order to avoid suspension of the processing of submissions from administrations or consequential additional workload for the Bureau, the Board decided to instruct the Bureau to continue to take into account Hispasat-2 in its calculations on a provisional basis pending the decision of WRC-2000 on the matter. In so doing the Bureau shall indicate appropriately, in its Weekly Circular Special Sections, the provisional nature of Hispasat-2 assignments when that network is identified in the results of the compatibility analysis.

4) Depending on the conference decision on the matter, the Bureau shall, either definitively remove Hispasat-2 assignments from the Plans, its files and the Special Sections already published, or remove the provisional nature of the results of its calculations. The results of the above, shall be reflected by the Bureau in its Weekly Circular Special Sections.

Unquote

8 Pursuant to the decisions taken at the 18th meeting of the RRB, the cancellation of the analogue (27 MHz) and digital (27 MHz) assignments of Hispasat-2 were withdrawn and the corresponding Special Sections were published and annexed to Weekly Circular 2409 of 21 December 1999.

9 In view of the above, the Conference is invited to consider this matter and instruct the Bureau accordingly.

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WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Sweden

PROPOSAL FOR THE WORK OF THE CONFERENCE

The Administration of Sweden has examined the footnotes to the Table of Frequency Allocations under agenda item 1.1 and concluded that the following footnote should be modified by deleting the name of Sweden.

MOD S/18/1

S5.514 *Additional allocation:* in Algeria, Germany, Angola, Saudi Arabia, Austria, Bahrain, Bangladesh, Bosnia and Herzegovina, Cameroon, Costa Rica, El Salvador, the United Arab Emirates, Finland, Guatemala, Honduras, India, the Islamic Republic of Iran, Iraq, Israel, Japan, Jordan, Kuwait, Libya, Nepal, Nicaragua, Oman, Pakistan, Qatar, Slovenia, Sudan~~, Sweden~~ and Yugoslavia, the band 17.3-17.7 GHz is also allocated to the fixed and mobile services on a secondary basis. The power limits given in Nos. **S21.3** and **S21.5** shall apply.

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PLENARY MEETING

Lithuania (Republic of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.1

Introduction

Item 1.1 of the agenda for WRC-2000 refers to the deletion of country names from the footnotes of the RR Table of Frequency Allocations, whenever such reference is no longer necessary.

Therefore, the Republic of Lithuania submits the following proposal for deletion of its country name from footnote S5.177.

The following proposal is being submitted for consideration by WRC-2000:

MOD LTU/19/1

S5.177 *Additional allocation:* in Armenia, Azerbaijan, Belarus, Bulgaria, Estonia, Georgia, Kazakstan, Latvia, ~~Lithuania,~~ Moldova, Mongolia, Uzbekistan, Poland, Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the band 73-74 MHz is also allocated to the broadcasting service on a primary basis, subject to agreement obtained under No. **S9.21**.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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Addendum 1 to
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PLENARY MEETING

Asia-Pacific Telecommunity (APT)

CONFERENCE PREPARATORY GROUP (APG)

COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.1 (page 3)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 1.2 (page 5)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 1.3 (page 9)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 1.4 (page 24)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 1.5

Extension of Resolution 122 (page 34)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Introduction of HAPS in the band 27.5-28.5 GHz and 31.0-31.3 GHz (page 38)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

ADD ASP/20/63 (page 39)

S5.5SSS

In the list of country names, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

ADD ASP/20/64 (page 39)

S5.5RRR

In the list of country names, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

New resolution for studies related to HAPS in bands above 3 GHz for terrestrial radiocommunications (page 43)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 1.6.1

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In the list of contributors, **add** Afghanistan (Islamic State of), India (Republic of) and Lao People's Democratic Republic

ISSUE B: IMT-2000 satellite component (page 58)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

ISSUE C: IMT-2000 HAPS (page 63)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 1.6.2 (page 70)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 1.7 (page 71)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 1.8 (page 75)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 1.9 (page 82)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 1.10 (page 83)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

Agenda item 1.11 (page 88)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 1.12 (page 90)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

Agenda item 1.13.1

PART 1: Proposed modifications to Article S22 (page 91)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

PART 2: Proposed Resolution WWW (WRC-2000) (page 110)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

PART 3: Proposed modifications for coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antennas (page 119)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

PART 4: Proposed modifications to Article S21 (page 128)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

PART 5: Proposed modifications to Resolutions 130 (WRC-97) and 538 (WRC-97) (page 131)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

PART 6: Proposed modifications to footnotes in Article S5 (Resolutions 130 (WRC-97) and 538 (WRC-97)) (page 132)

6.1 Proposed modifications to footnotes based on Resolutions 130 (WRC-97) and 538 (WRC-97) (page 132)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

6.2 Proposed modifications to footnotes S5.488 and S5.491 to reflect relevant RRB Rule of Procedure (page 133)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

PART 7: Proposed additional data items required in Appendix S4 for the epfd calculations (page 135)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

PART 8: Proposed modification to Article S5 (page 138)

In the list of contributors, **add** Afghanistan (Islamic State of) and India (Republic of)

PART 9: Interference from non-GSO FSS systems to GSO FSS and GSO BSS services (page 139)

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Agenda item 1.14 (page 143)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

Agenda item 1.15.1 (page 144)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

Agenda item 1.15.2 (page 146)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

Agenda item 1.16 (page 148)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 1.17 (page 176)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of), Lao People's Democratic Republic and New Zealand

Agenda item 1.19

A Principles for consideration of BSS replanning (page 178)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

B Other issues related to agenda item 1.19 (page 182)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

C Regions 1 and 3 compatibility issues (page 183)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

D Regions 1 and 3 BSS-BSS compatibility/Region 3 BSS arc concept (page 185)

In the list of contributors, **add** Afghanistan (Islamic State of) and India (Republic of)

E Concept of Region 3 arc for BSS Plan (page 186)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

Agenda item 1.20 (page 187)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

Agenda item 1.21 (page 192)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

Agenda item 4 (page 193)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia, India (Republic of) and Lao People's Democratic Republic

Agenda item 7.2 (page 199)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

Resolution 86 (PP-98) (page 213)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

Resolution EEE (WRC-2000) (page 214)

In the list of contributors, **add** Afghanistan (Islamic State of), Australia and India (Republic of)

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Asia-Pacific Telecommunity (APT)
Conference Preparatory Group (APG)

COMMON PROPOSAL FOR THE WORK OF THE CONFERENCE

Delete the name of the Kingdom of Tonga as a co-sponsor to proposal ASP/20/152.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Asia-Pacific Telecommunity (APT)
Conference Preparatory Group (APG)

COMMON PROPOSALS FOR THE WORK OF THE CONFERENCE

Introduction

This document provides the common proposals of the Asia-Pacific Telecommunity (APT) Members that were developed through the fourth meeting of the APT Conference Preparatory Group for WRC-2000 (APG2000-4) held in Tokyo, Japan from 31 January - 4 February 2000.

CONTENTS

Agenda item 1.1

1.1 requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, if in accordance with Resolution **26 (Rev.WRC-97)**

Submitted by the following administrations:

Bhutan (Kingdom of), China (People’s Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Philippines (Republic of the), Democratic People’s Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

In Circular Letter CR/131, the Radiocommunication Bureau requests administrations to review those footnotes to the Table of Frequency Allocations (Article S5 of the Radio Regulations) where their country names appear in order to identify any footnotes that may be reduced in scope or deleted. The need for a regular review of footnotes was established by Resolution 26 (Rev.WRC-97).

APT Members generally support deletion of country names and country footnotes in accordance with the principles embodied in Resolution 26 (Rev.WRC-97). APT Members have considered all footnotes which include their name and have developed an agreed common proposal. In some cases the deletion of footnotes is delayed until a specified future date.

APT supports the removal of footnotes S5.181, S5.197, S5.259, S5.355 and S5.359 by administrations when no longer needed.

MOD ASP/20/1

S5.77 *Different category of service:* in Australia, China, the French Overseas Territories of Region 3, India, Indonesia (until 1 January 2005), the Islamic Republic of Iran, Japan, Pakistan, Papua New Guinea and Sri Lanka, the allocation of the band 415-495 kHz to the aeronautical radionavigation service is on a primary basis. Administrations in these countries shall take all practical steps necessary to ensure that aeronautical radionavigation stations in the band 435-495 kHz do not cause interference to reception by coast stations of ship stations transmitting on frequencies designated for ship stations on a worldwide basis (see No. **S52.39**).

Reasons: In order to safeguard existing services, it is imperative that the relative status of assignments in the band 415-495 kHz do not change until 1 January 2005.

MOD ASP/20/2

S5.262 *Additional allocation:* in Saudi Arabia, Armenia, Azerbaijan, Bahrain, Belarus, Bosnia and Herzegovina, Bulgaria, Colombia, Costa Rica, Cuba, Egypt, the United Arab Emirates, Ecuador, Estonia, Georgia, Hungary, ~~Indonesia,~~ the Islamic Republic of Iran, Iraq, Israel, Jordan, Kazakstan, Kuwait, Liberia, Malaysia, Moldova, Nigeria, Uzbekistan, Pakistan, the Philippines, Qatar, Syria, Kyrgyzstan, Slovakia, Romania, Russian Federation, Singapore, Somalia, ~~Sri Lanka,~~ Tajikistan, Turkmenistan, Ukraine and Yugoslavia, the band 400.05-401 MHz is also allocated to the fixed and mobile services on a primary basis.

Reasons: No further requirement for such use in Indonesia and Sri Lanka.

MOD ASP/20/3

S5.355 *Additional allocation:* in Bahrain, Bangladesh, the Congo, Egypt, the United Arab Emirates, Eritrea, Ethiopia, the Islamic Republic of Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Malta, Morocco, Oman, Qatar, Syria, Somalia, Sudan, ~~Sri Lanka,~~ Chad, Togo, Yemen and Zambia, the bands 1 540-1 645.5 MHz and 1 646.5-1 660 MHz are also allocated to the fixed service on a secondary basis.

Reasons: No further requirement for such use in Sri Lanka.

MOD ASP/20/4

S5.432 *Different category of service:* in the Republic of Korea, ~~Indonesia,~~ Japan and Pakistan, the allocation of the band 3 400-3 500 MHz to the mobile, except aeronautical mobile, service is on a primary basis (see No. **S5.33**).

Reasons: No further requirement for such use in Indonesia.

MOD ASP/20/5

S5.505 *Additional allocation:* in Algeria, Angola, Saudi Arabia, ~~Australia,~~ Bahrain, Bangladesh, Botswana, Brunei Darussalam, Cameroon, China, the Congo, the Republic of Korea, Egypt, the United Arab Emirates, Gabon, Guatemala, Guinea, India, Indonesia, the Islamic Republic of Iran, Iraq, Israel, Japan, Jordan, Kuwait, Lesotho, Lebanon, Malaysia, Mali, Morocco, Mauritania, Oman, Pakistan, the Philippines, Qatar, Syria, the Democratic People's Republic of Korea, Senegal, Singapore, Somalia, Sudan, Swaziland, Tanzania, Chad and Yemen, the band 14-14.3 GHz is also allocated to the fixed service on a primary basis.

Reasons: No further requirement.

Agenda item 1.2

1.2 to finalize remaining issues in the review of Appendix **S3** to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation **66 (Rev.WRC-97)** and the decisions of WRC-97 on adoption of new values, due to take effect at a future time, of spurious emissions for space services

Submitted by the following administrations:

Bhutan (Kingdom of), China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

Recommendation 66 (Rev.WRC-97) directs ITU-R to submit a report to WRC-2000 with a view to finalizing the space services spurious emissions limits in Appendix S3 of the Radio Regulations. APT proposes text that would remove the "design objectives" designation from the space services spurious emissions limits and make into regulatory limits (as suggested in the CPM-99 Report) applicable to deep-space systems, satellites with spurious emissions falling within the necessary bandwidth of another transmitter on the same satellite, and amateur earth stations below 30 MHz. Also, APT proposes to adequately recognize the case of very narrow-band and unmodulated signals, particularly for the space services. Furthermore, APT proposes to correct an oversight in Appendix S3 regarding limits for the radiodetermination service, and specify that spurious emission levels for radar systems be determined from radiated emissions.

APPENDIX S3

MOD ASP/20/6

6 ~~The measurement methods for radar systems should be guided by Recommendation ITU-R M.1177. For those radar systems for which acceptable methods of measurement do not exist, the lowest practicable power of spurious emission should be achieved.~~Radar systems are exempt from spurious emission limits under this section. The lowest practicable power of spurious emission should be achieved.

ADD ASP/20/7

11*bis* As an emitted signal becomes more and more narrow (to the limiting case of an unmodulated carrier with theoretical necessary bandwidth of zero), the application of the term "necessary bandwidth" as used in determining the region where spurious emission limits apply to space services, becomes more and more difficult. In the limit ±250% of necessary bandwidth (generally recognized as establishing the region beyond which spurious emissions are defined), approaches zero. Beacons and other unmodulated signals, such as those used in uplink and downlink circuits in control and tracking of satellites, are examples of a case where it is difficult to practically apply the term “necessary bandwidth” in determining where out-of-band emissions end, and spurious emissions begin. Pending further studies and definitive action by a future world radiocommunication conference, in calculating the region where spurious emission limits apply for transmitters using amplifiers to pass essentially an unmodulated signal (or a signal with very small bandwidth), the amplifier bandwidth is taken to be the necessary bandwidth (in calculating the regions where spurious emissions apply).

ADD ASP/20/8

11*ter* For satellites employing more than one transponder, and when considering the limits for spurious emission as indicated by Headnote 11 to Appendix **S3**, spurious emission from one transponder may fall on a frequency at which a companion, second transponder is transmitting, or in the guardband between two transponders. In this situation, the level of spurious emission from the first transponder is well exceeded by fundamental emissions of the second transponder or by out-of-band emissions into the guardband. Therefore, limits in this section do not apply to those spurious emissions on a satellite which fall either within the bands where there are transmissions from different transponders on the same satellite, into the same service area or within the guardbands between the different transponders.

MOD ASP/20/9

TABLE II

Attenuation values used to calculate maximum permitted spurious emission power levels for use with radio equipment

Service category in accordance with Article S1, or equipment type[15]	**Attenuation (dB) below the power supplied to the antenna transmission line**
All services except those services quoted below:	43 + 10 log (*P*), or 70 dBc, whichever is less stringent
Space services (earth stations) [10, 1~~4~~6]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Space services (space stations) [10, 1~~4~~7]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Radiodetermination[18]	43 + 10 log (*PEP*), or 60 dB, whichever is less stringent
Broadcast television[11]	46 + 10 log (*P*), or 60 dBc, whichever is less stringent, without exceeding the absolute mean power level of 1 mW for VHF stations or 12 mW for UHF stations. However, greater attenuation may be necessary on a case by case basis.
Broadcast FM	46 + 10 log (*P*), or 70 dBc, whichever is less stringent; the absolute mean power level of 1 mW should not be exceeded
Broadcasting at MF/HF	50 dBc; the absolute mean power level of 50 mW should not be exceeded
SSB from mobile stations[12]	43 dB below *PEP*
Amateur services operating below 30 MHz (including with SSB)[1~~2~~6]	43 + 10 log (*PEP*), or 50 dB, whichever is less stringent
Services operating below 30 MHz, except space, radiodetermination, broadcast, those using SSB from mobile stations, and amateur[12]	43 + 10 log (*X*), or 60 dBc, whichever is less stringent, where *X* = *PEP* for SSB modulation, and *X* = *P* for other modulation

TABLE II (*end*)

Service category in accordance with Article S1, or equipment type[15]	**Attenuation (dB) below the power supplied to the antenna transmission line**
Low-power device radio equipment[13]	56 + 10 log (*P*), or 40 dBc, whichever is less stringent
Emergency position-indicating radio beacon Emergency locator transmitter Personal location beacon Search and rescue transponder Ship emergency, lifeboat and survival craft transmitters Land, aeronautical or maritime transmitters when used in emergency	No limit

P: mean power in watts supplied to the antenna transmission line, in accordance with No. **S1.158**. When burst transmission is used, the mean power *P* and the mean power of any spurious emissions are measured using power averaging over the burst duration.

PEP: peak envelope power in watts supplied to the antenna transmission line, in accordance with No. **S1.157**.

dBc: decibels relative to the unmodulated carrier power of the emission. In the cases which do not have a carrier, for example in some digital modulation schemes where the carrier is not accessible for measurement, the reference level equivalent to dBc is decibels relative to the mean power *P*.

[10] Spurious emission limits for all space services are stated in a 4 kHz reference bandwidth.

[11] For analogue television transmissions, the mean power level is defined with a specified video signal modulation. This video signal has to be chosen in such a way that the maximum mean power level (e.g. at the video signal blanking level for negatively modulated television systems) is supplied to the antenna transmission line.

[12] All classes of emission using SSB are included in the category “SSB”.

[13] Low-power radio devices having a maximum output power of less than 100 mW and intended for short-range communication or control purposes; such equipment is in general exempt from individual licensing.

~~[14] These values are “design objectives”. This note will not be applicable after WRC-99.~~

[15] In some cases of digital modulation (including digital broadcasting), broadband systems, pulsed modulation and narrow-band high-power transmitters for all categories of services, there may be difficulties in meeting limits close to ±250% of the necessary bandwidth.

[16] Amateur earth stations operating below 30 MHz are in the service category "Amateur services operating below 30 MHz (including with SSB)."

[17] Space stations in the space research service intended for operation in deep space, as defined by Article **S1**, are exempt from spurious emission limits.

[18] Radiodetermination (radar) system spurious emission dB attenuation shall be determined for radiated emission levels, not at the antenna transmission line. The measurement methods for determining the radiated spurious emission levels from the radar systems should be guided by Recommendation ITU-R M.1177.

Reasons: To correct the deficiencies identified in the CPM-99 Report.

Agenda item 1.3

1.3 to consider the results of ITU-R studies in respect of Appendix **S7/28** on the method for the determination of the coordination area around an earth station in frequency bands shared among space services and terrestrial radiocommunication services, and take the appropriate decisions to revise this Appendix

Submitted by the following administrations:

Bhutan (Kingdom of), China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

The above countries support amending Appendix S7 in accordance with the following proposals. There will be consequential amendments required in Appendix S5 and the need for new resolutions to keep the technical parameter up to date.

Agenda item 1.3 - Review of Appendix S7

The following proposal is to revise Appendix S7 according to Method 3 as set out in Chapter 7.2 of the CPM Report. The main revision is derived from new Recommendation ITU-R SM.1003. This replaces the use of Recommendations ITU-R IS.847, IS.848 and IS.849 and references to these Recommendations are suppressed. The tables of predetermined coordination distances found in Appendix S5 are proposed to be moved to Appendix S7 for convenience of location. Other changes are consequential to these revisions.

MOD ASP/20/10

APPENDIX S7

Replacement of the text in Appendix S7

Replace the entire text by the text derived from draft Recommendation ITU-R SM.1003, together with the modified material from Appendix S5 relating to predetermined coordination distances proposed by Task Group 1/6 and currently located in Annex 5 of Document 1-6/93.

Reasons: ITU-R Task Group 1/6 has completed its studies and has developed a new Recommendation ITU-R SM.(Document 1-6/93 Annex 6) on Methods for the determination and the coordination area around earth stations in the frequency range 100 MHz to 105 GHz. This Recommendation is identified in the CPM Report § 7.2.1 as the appropriate text to be used as the basis of a revision of Appendix S7.

MOD ASP/20/11

S1.171 *coordination area:* When determining the need for coordination, t~~T~~he area ~~associated with~~surrounding an *earth station* ~~outside of which a *terrestrial station* sharing the same frequency band neither causes nor is subject to interfering *emissions* greater than a permissible level~~sharing the same frequency band with *terrestrial stations*, or surrounding a transmitting *earth station* sharing the same bidirectionally allocated frequency band with *receiving earth stations*, beyond which the permissible level of interference will not be exceeded and coordination is therefore not required.

NOC ASP/20/12

S1.172 *coordination contour:* The line enclosing the *coordination area*.

MOD ASP/20/13

S1.173 *coordination distance:* When determining the need for coordination, the d~~D~~istance on a given azimuth from an *earth station* sharing the same frequency with terrestrial stations, or from a transmitting earth station sharing the same bidirectionally allocated frequency band with receiving earth stations, beyond which ~~a *terrestrial station* sharing the same frequency band neither causes nor is subject to interfering *emissions* greater than a~~the permissible level of interference will not be exceeded and coordination is therefore not required.

Reasons: Consequential change identified by Task Group 1/6. See § 7.2.3.2 of the CPM Report.

ADD ASP/20/14

S1.173A *coordination:* is the process, undertaken between administrations, for ensuring that proposed frequency assignments may be brought into use in a manner which is compatible with existing assignments, or with other proposed assignments; the process may involve the adjustment of technical characteristics and a detailed evaluation of the propagation conditions using methods agreed by the administrations concerned.

Reasons: The new definitions given refer to the process of coordination. Coordination is not currently defined in Article S1.

Modifications to Annex 2A of Appendix S4

A.7 Earth station site characteristics

For a specific earth station:

a) The horizon elevation angle in degrees and, in the case of a station submitted in accordance with Appendix **S30A**, the antenna gain in the direction of the horizon for each azimuth around the earth station.

ADD ASP/20/15

b) The distance in kilometres from the earth station to the horizon for each azimuth around the earth station.

(SUP) ASP/20/16

b)

(SUP) ASP/20/17

c)

ADD ASP/20/18

c) That is operating to an associated geostationary space station and having due regard to possible inclined-orbit operation of the associated space station:

i) the planned minimum angle of elevation of the antenna in the direction of maximum radiation in degrees from the horizontal plane;

ii) the planned range of operating azimuthal angles for the direction of maximum radiation in degrees, clockwise from true north.

ADD ASP/20/19

cbis) That is operating to associated non-geostationary space stations, the minimum angle of elevation of the antenna in the direction of maximum radiation in degrees from the horizontal plane for each azimuth around the earth station.

(MOD) ASP/20/20

d) The altitude (metres) of the antenna above mean sea level.

Reasons: Additional provisions are needed in Appendix S4 to cover all data elements required to determine the coordination area of a particular earth station using the revised Appendix S7.

TABLE S5-1 *(continued)*

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks

MOD ASP/20/21

No. **S9.15** Non-GSO/ terrestrial	A specific earth station or a typical earth station in respect of terrestrial stations in frequency bands for which a footnote refers to No. **S9.11A** allocated with equal rights to space and terrestrial services, where the coordination area of the earth station includes the territory of another country	~~See Table S5-2~~Frequency bands for which a footnote refers to No. **S9.11A**	The coordination area of the earth station covers the territory of another administration	~~See § 2 of Annex 1 of this~~ Appendix **S7**	

MOD ASP/20/22

No. **S9.16** Terrestrial/ non-GSO	A transmitting station in a terrestrial service within the coordination area of an earth station in a non-GSO network in frequency bands for which a footnote refers to No. **S9.11A**	~~See Table S5-2~~Frequency bands for which a footnote refers to No. **S9.11A**	Transmitting terrestrial station is situated within the coordination area of a receiving earth station	~~See § 2 of Annex 1 of this~~ Appendix **S7**	The coordination area of the affected earth station has already been determined using the calculation method of ~~No. **S9.15**~~Appendix **S7**

MOD ASP/20/23

No. **S9.17** GSO, non-GSO/ terrestrial	A specific earth station or a typical mobile earth station in frequency bands above ~~1 GHz~~100 MHz allocated with equal rights to space and terrestrial services in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**	Any frequency band allocated to a space service, except those mentioned in the Plans in Appendix **S30A**	The coordination area of the earth station covers the territory of another administration	Appendix **S7** ~~(for earth stations in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz, 2 483.5-2 500 MHz and 2 500-2 516.5 MHz, see Remarks column)~~ ~~1) The coordination area of aircraft earth stations is determined by increasing the service area by 1 000 km with respect to the aeronautical mobile service (terrestrial) or 500 km with respect to terrestrial services other than the aeronautical mobile service~~	~~NOTE – For RDSS earth stations, a uniform coordination distance of 400 km corresponding to an airborne earth station shall be used. In cases where the earth stations are all ground-based, a coordination distance of 100 km shall be used~~	

MOD ASP/20/24

No. **S9.17** GSO, non-GSO/ terrestrial (*cont.*)				~~2) For receiving earth stations in the meteorological-satellite service in frequency bands shared with the meteorological aids service, the coordination distance is considered to be the visibility distance as a function of the earth station horizon elevation angle for a radiosonde at an altitude of 20 km above mean sea level, assuming 4/3 Earth radius~~	Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices	

MOD ASP/20/25

No. **S9.17A** GSO, non-GSO/ GSO, non-GSO	A specific earth station in respect of other earth stations operating in the opposite direction of transmission in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission, where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of a coordinated earth station, with the exception of the frequency bands subject to the Plans in Appendix **S30A**	Any frequency band allocated to a space service	The coordination area of the earth station covers the territory of another administration or the earth station is located within the coordination area of an earth station	~~i) For bands in Table S5-2, see § 2 of Annex 1 of this Appendix~~ ~~ii) See Recommendations ITU-R IS.847, ITU-R IS.848 and ITU-R IS.849~~ <u>Appendix **S7**</u>	

<u>NOC</u> ASP/20/26

No. **S9.18** Terrestrial/ GSO, non-GSO	Any transmitting station of a terrestrial service in the bands referred to in No. **S9.17** within the coordination area of an earth station, in respect of this earth station, with the exception of the coordination under Nos. **S9.16** and **S9.19**	Any frequency band allocated to a space service.	Transmitting terrestrial station is situated within the coordination area of a receiving earth station	See Remarks column	The coordination area of the affected earth station has already been determined using the calculation method of No. **S9.17**

Suppression of section 3 of Annex 1 to Appendix S5

SUP ASP/20/27

3 Coordination areas for mobile earth stations operating below 3 GHz and earth stations providing feeder links for non-GSO satellites operating in the MSS and for non-GSO FSS earth stations

Reasons: The relevant material with appropriate modifications will now be available in Appendix S7. Relocating the material in a central location in Appendix S7 avoids the present duplication of text in Appendix S5.

ANNEX 4 TO RESOLUTION 27 (Rev.WRC-97)

List of ITU-R Recommendations referred to in the Radio Regulations[1]

Recommendation	Title	Status[2]	Document	RR provision[3]

SUP ASP/20/28

ITU-R SF.356-4	Maximum allowable values of interference from line-of-sight radio-relay systems in a telephone channel of a system in the fixed-satellite service employing frequency modulation, when the same frequency bands are shared by both systems	NOC	1997 SF Series	AP S7, § 2.3.1, Note 2

SUP ASP/20/29

ITU-R SF.357-4	Maximum allowable values of interference in a telephone channel of an analogue angle-modulated radio-relay system sharing the same frequency bands as systems in the fixed-satellite service	MOD	1997 SF Series	AP S7, § 2.3.1, Note 2

SUP ASP/20/30

ITU-R IS.847-1	Determination of the coordination area of an earth station operating with a geostationary space station and using the same frequency band as a system in a terrestrial service	NOC	1997 IS Series	**AP S5**, **Table S5-1** **AP S5**, **Annex 2**, **Tables 2** and **3**

SUP ASP/20/31

ITU-R IS.848-1	Determination of the coordination area of a transmitting earth station using the same frequency band as receiving earth stations in bidirectionally allocated frequency bands	NOC	1997 IS Series	**AP S5**, **Table S5-1**

SUP ASP/20/32

ITU-R IS.849-1	Determination of the coordination area for earth stations operating with non-geostationary spacecraft in bands shared with terrestrial services	NOC	1997 IS Series	**AP S5**, **Table S5-1** **AP S5**, **Annex 2**, **Tables 2** and **3**

SUP ASP/20/33

ITU-R M.1185-1	Method for determining coordination distance between ground based mobile earth stations and terrestrial stations operating in the 148.0-149.9 MHz band	MOD	1997 M Series, Part 5	**AP S5**, **Annex 1**, **§ 3.2, Table 1** Resolution 46 (Rev.WRC-97), Annex 2, Table 1

Reasons: Consequential change identified by Task Group 1/6. Section 7.2 of Chapter 7 of the CPM Report indicates that Recommendation ITU-R SM.(Document 1-6/93 Annex 6) has drawn extensively upon the material of these Recommendations. Where material from these Recommendations has not been used, more recent technical material provided by Task Group 1/6 or the Working Parties of the service study groups has replaced it. Therefore, these three Recommendations no longer need to be incorporated by reference within the Radio Regulations.

NOTE - It is assumed that this action and the modifications to Appendix S5 will cause the deletion of these Recommendations from Volume 4 of the Radio Regulations.

SUP ASP/20/34

RESOLUTION 60

Relating to information on the propagation of radio waves used in the determination of the coordination area

Reasons:

1 Resolution 60 provided a mechanism for the updating of the propagation material in Appendix S7 independently from full updates of the Appendix S7 text. Recommendation ITU-R SM.(Doc. 1-6/93 Annex 6) contains new calculation methodologies that have a greater degree of interaction with the propagation models, and it is now less straight forward to adopt new propagation material without checking for consequential changes that might be necessary elsewhere in the text.

2 New arrangements will need to be made for the ongoing maintenance of Recommendation ITU-R SM.(Document 1-6/93 Annex 6). The relevant lead group might prefer to request changes to the propagation material and/or be notified of improvements made by Study Group 3 via the now effective liaison statement process.

3 The CPM Report notes that although Resolution 60 has been in place since 1979 it has not been used.

SUP ASP/20/35

RECOMMENDATION 105 (WRC-95)

Further work by ITU-R on determination of the coordination area around earth stations operating with geostationary-satellite networks in the fixed-satellite service and earth stations providing feeder links to non-geostationary-satellite networks in the mobile-satellite service operating in opposite directions of transmission

Reasons: With the updating of Appendix S7 using the material in Recommendation ITU-R SM.(Doc. 1-6/93 Annex 6) the action called for within Recommendation 105 will have been fulfilled.

SUP ASP/20/36

RECOMMENDATION 711

Relating to the coordination of earth stations

Reasons: If Method 2 for fulfilling the agenda item is adopted there would be a permanent agenda item at future conferences for the updating or addition of the parameters in Tables 1, 2 and 3 of Appendix S7. If Method 3 is selected, a new Resolution ZZZ would make provisions for the addition or modification of the table parameters.

MOD ASP/20/37

RESOLUTION 712 (Rev.WRC-~~95~~2000)

Consideration by a future competent World Radiocommunication Conference of issues dealing with allocations to space services

The World Radiocommunication Conference (~~Geneva, 1995~~Istanbul, 2000),

considering

a) that the agenda of WARC-92 called for the development of new Recommendations and Resolutions relating to allocations to space services which were not placed on the agenda of that Conference;

b) that Recommendation ITU-R SA.363-5 recommends that frequencies below 1 GHz are technically suitable for telecommand of satellites operating below an altitude of 2 000 km;

c) that the United Nations Conference on Environment and Development (UNCED) (Rio de Janeiro, 1992) identified an urgent need for systematic observations of forest cover, and that such observations can best be performed using frequencies in the range 420-470 MHz;

d) that Resolution 35 of the Plenipotentiary Conference (Kyoto, 1994) considered that application of the latest telecommunication and information technologies, especially those associated with space systems, can be extremely useful in implementing and conducting environment protection activities such as monitoring air, river, harbour and sea pollution, remote sensing, wildlife studies, forestry development, and others;

e) that the status of existing allocations available for use by active space-based sensors between 1 and 25 GHz, in frequency bands shared with radiolocation or radionavigation systems, needs to be reviewed in order to facilitate worldwide usage by active space-based sensors;

f) that the allocations to the Earth exploration-satellite service in the frequency bands 8.025-8.4 GHz and 18.6-18.8 GHz are complex and not uniform worldwide, and that the band 18.6-18.8 GHz is vital for passive sensing of ecologically important data;

g) that the allocation of the frequency band 13.75-14 GHz to the fixed-satellite service by WARC-92 reduced the total bandwidth available for active space-based sensors in the frequency range 13-14 GHz, which is important for wideband sensor instruments, e.g. radar altimeters, scatterometers;

h) that future active Earth sensing requirements for monitoring environmental data in the 35 GHz and 95 GHz ranges have been identified;

i) that ITU-R has agreed to certain important technical parameters required for coordination of the space services under Appendix **S7**,

resolves

that, based on proposals from administrations and taking into account the results of studies in the Radiocommunication Study Groups and the 1997 Conference Preparatory Meeting (CPM-97), WRC-97 should consider the following matters:

1 provision of up to 3 MHz of frequency spectrum for the implementation of telecommand links in the space research and space operation services in the frequency range between 100 MHz and 1 GHz;

2 provision of up to 3.5 MHz of frequency spectrum to the Earth exploration-satellite service (active sensors) in the frequency range 420-470 MHz;

3 use of existing allocations by space-based active sensors operating in the Earth exploration-satellite and space research services in frequency bands shared with the radiolocation or radionavigation services, between 1 GHz and 25 GHz, with a view to the possibility of establishing common worldwide primary allocations;

4 use of existing allocations in the frequency range from 7 GHz to 20 GHz to the Earth exploration-satellite, meteorological-satellite, space research and space operation services, with a view to the possibility of establishing common worldwide primary allocations to these services in appropriate bands, taking into account Recommendation **706**;

5 provision of up to 500 MHz of frequency spectrum around 35 GHz and up to 1 GHz of frequency spectrum around 95 GHz for use by space-based active Earth sensors;

6 inclusion of ITU-R approved technical coordination parameters in Appendix **S7**, taking into account Resolution ~~**60** and Recommendation **711**~~**ZZZ**,

invites the Radiocommunication Study Groups

to carry out the necessary studies, taking into account the present uses of allocated bands, with a view to presenting, at the appropriate time, the technical information likely to be required as a basis for the work of the Conference,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

Reasons: CPM Report Method 3 calls for the suppression of Resolution 60 and Recommendation 711.

ADD ASP/20/38

RESOLUTION ZZZ (WRC-2000)

Consideration by a future competent world radiocommunication conference of updates to system parameter tables for use in Appendix S7

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that Appendix **S7** to the Radio Regulations provides a method for the determination of the coordination area which requires assumed technical coordination parameters for the unknown terrestrial station or earth station;

b) that these technical coordination parameters are contained in [Tables 1, 2 and 3 of Annex 2 of Appendix **S7**] [(WRC-2000)];

c) that the technical coordination parameter tables contained in Appendix **S7** are based directly on texts of ITU-R;

d) that ITU-R studies on radiocommunication systems are continuing, and therefore the conclusions of these studies are subject to change and may in future show the need to revise those sections of Appendix **S7** which incorporate the technical coordination parameter tables;

e) that the technical coordination parameter tables may require to be updated when new frequency allocations are made at WRCs;

f) that the technical coordination parameter tables do not show numerical values for all the necessary parameters of certain space radiocommunication services and terrestrial radiocommunication services sharing frequency bands with equal rights,

recognizing

a) that Recommendation ITU-R SM.[Doc. 1/1004] was developed by ITU-R as a basis for revision to Appendix **S7**;

b) that there is a need for future conferences to consider the revision of the tables of technical coordination parameters on an irregular basis,

resolves

1 that ITU-R should come to a conclusion as to whether, according to the latest available information on technical coordination parameter values contained in Annex 2 to Recommendation ITU-R SM.[Doc. 1/1004] that a revision of the technical coordination parameter tables contained in [Annex 2] of Appendix **S7** is warranted;

2 that when ITU-R has come to the conclusion that a revision of [Annex 2] of Appendix **S7** is warranted, the Director of the Radiocommunication Bureau shall so inform the Secretary-General of ITU and send him the proposed amendments to Appendix **S7**, given in the most recent version of Recommendation ITU-R SM.[Doc. 1/1004],

requests

1 ITU-R to continue to study technical parameters concerned with the determination of the coordination area, and to maintain the relevant ITU-R texts in a format which would permit direct insertion into Appendix **S7** in place of the existing [Annex II];

2 that the Council then place, as an extraordinary item, on the agenda of the next world radiocommunication conference, the consideration of the conclusion of ITU-R;

3 that, if the said world radiocommunication conference decides that the technical coordination parameter tables contained in Appendix **S7** are to be revised, the Secretary-General, in consultation with the Bureau, incorporate the amendments agreed at the said conference in a document which contains the new text of [Annex II] of Appendix **S7** in a form suitable for direct substitution in Appendix **S7**,

decides

that from a date established by the said conference, the revised text shall form the basis of all subsequent determinations of the coordination area using Appendix **S7**.

Reasons: Resolution ZZZ provides the framework for updating the system parameter tables in support of Method 3 for fulfilling the agenda item as set out in § 7.2.3.1 of Chapter 7 of the CPM Report.

Modifications to Article S9 to make additional clarity with respect to earth stations in the broadcasting services

Under WRC-2000 agenda item 1.3 ITU-R Task Group 1/6 has prepared a draft new Recommendation called “Determination of the coordination area around an earth station in frequency bands between 0.1 and 105 GHz”. This contribution addresses clarifications needed to certain provisions in Article S9 to clearly incorporate the outcome of the work of Task Group 1/6 with respect to the determination of coordination areas around the earth stations in the broadcasting-satellite service. As stated in section 7.2.2 of the CPM Report the Task Group 1/6 Recommendation enables administrations and the BR to determine coordination areas for mobile earth stations and earth stations in the broadcasting-satellite service (in the non-planned bands) operating within a defined service area. Currently the provision in Article S9 are clear with regard to the mobile earth stations but additional clarity with respect to the earth stations in the broadcasting-satellite service requires minor modifications to a limited number of S9 provisions.

MOD ASP/20/39

S9.17 *f)*[13] for any specific earth station ~~or~~, typical mobile earth station or typical earth station in the broadcasting-satellite service in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services, in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15** and Article 4 of Appendix **S30A** and the coordination of earth stations in the broadcasting-satellite service which are subject to the Appendix **S30** Plans;

MOD ASP/20/40

S9.19 *i)* for any transmitting station of a terrestrial service in a frequency band shared on an equal primary basis with the broadcasting-satellite service, with respect to an earth station or earth stations defined within a service area of the broadcasting-satellite service, except where this service is subject to the Appendix **S30** Plans;

MOD ASP/20/41

S9.31 The information sent under No. **S9.29** shall also, in the cases covered by Nos. **S9.15**, **S9.17** or **S9.17A**, include a copy of diagrams drawn to appropriate scale indicating, for both transmission and reception, the location of the earth station and its associated coordination area, or the coordination area related to the service area in which it is intended to operate the mobile earth station or earth station in the broadcasting-satellite service except where this service is subject to the Appendix **S30** plan, and the data on which the diagrams are based. In respect of terrestrial stations, in the cases covered by Nos. **S9.16**, **S9.18** and **S9.19** the information shall include the locations of terrestrial stations within the coordination area of the relevant earth station.

Reasons: Taking into account the result of the work of Task Group 1/6 it is appropriate to modify S9.17, S9.19 and S9.31 to clearly state that the earth stations of BSS, in the unplanned bands, are to be coordinated on a service area basis.

Agenda item 1.4

1.4 to consider issues concerning allocations and regulatory aspects related to Resolutions **126 (WRC-97), 128 (WRC-97), 129 (WRC-97), 133 (WRC-97), 134 (WRC-97)** and **726 (WRC-97)**

Submitted by the following administrations:

Bhutan (Kingdom of), Brunei Darussalam, Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Philippines (Republic of the), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

Introduction

WRC-97 made some provisions for the use of high-density applications in the fixed service (HDFS) above 30 GHz. The frequency bands 31.8-33.4 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are listed for HDFS in footnote S5.547 and in Resolution 726. APT considers these bands should be made available for high-density applications to the greatest extent possible. Furthermore, APT considers the bands 37-40 GHz and 40.5-42.5 GHz are also suitable for HDFS. Therefore, appropriate sharing criteria to protect the fixed service from other services to which are allocated in these bands should be established in each band. In the band 41.5-42.5 GHz, the fixed-satellite service may cause interference to the radio astronomy service in the band 42.5-43.5 GHz, and the study under Resolution 128 has not been completed. Therefore, the study on sharing criteria to protect the radio astronomy service should be continued.

The studies under Resolution 726 have basically been completed. However, some studies under this Resolution should be continued, in particular for studies on sharing feasibility between the fixed service and the Earth exploration-satellite service in the band 55.78-59 GHz.

1 Proposal for the high-density applications in the fixed service in the band 31.8-33.4 GHz (Resolution 126 (WRC-97))

MOD ASP/20/42

TABLE **S21-4** *(end)*

Frequency band	Service*	Limit in dB(W/m^2) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
31.8-33.0 GHz	Space research Inter-satellite	–120 –135	–120 + 0.75(δ – 5) –135 + (δ – 5)	–105 –115	1 MHz

Reasons: To make the bands 31.8-33.4 GHz available for high-density applications in the fixed service, appropriate pfd masks are needed to protect the fixed service from other services.

MOD ASP/20/43

29.9-34~~,~~.2 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
31.8-32	FIXED MOD S5.547A RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) MOD S5.547 S5.547B S5.548	
32-32.3	FIXED MOD S5.547A INTER-SATELLITE RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) MOD S5.547 S5.547C S5.548	
32.3-33	FIXED MOD S5.547A INTER-SATELLITE RADIONAVIGATION MOD S5.547 S5.547D S5.548	
33-33.4	FIXED MOD S5.547A RADIONAVIGATION MOD S5.547 S5.547E	

MOD ASP/20/44

S5.547 The bands 31.8-33.4 GHz, 37-40 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are available for high-density applications in the fixed service (HDFS) ~~(see Resolution **726(WRC-97)**).~~ Administrations should take this into account, when considering regulatory provisions in relation to these bands.

The band 40.5-42.5 GHz can also be used for HDFS taking into account potential constraints because of usage of high-density FSS sharing the same frequency band.

Reasons: APT considers that the bands 37-40 GHz and 40.5-42.5 GHz are also suitable for HDFS. The study under Resolution 726 which requires ITU-R to study sharing criteria between fixed service and other services in the bands 31.8-33.4 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz is completed and the *resolves* of Resolution 726 should be transferred to footnote MOD S5.547. Since this footnote relates to the listed bands, several parts of the Radio Regulations are to be modified.

MOD ASP/20/45

S5.547A ~~Use of the band 31.8-33.4 GHz by the fixed service shall be in accordance with Resolution **126 (WRC-97)**.~~Stations in the fixed service in the band 31.8-33.4 GHz may occasionally receive interference from airborne stations of the radionavigation service. Administrations should take practical measures to minimize such interference, taking into account No. **S4.10**.

Reasons: APT supports the introduction of HDFS in these bands.

SUP ASP/20/46

RESOLUTION 126 (WRC-97)

Use of the frequency band 31.8-33.4 GHz for high-density systems in the fixed service

Reasons: Since the study under Resolution 126 has been completed, S5.547A and the Resolution are no longer needed.

2 Proposal for the high-density application in the fixed service in the band 37-40 GHz (Resolution 133 (WRC-97))

The pfd values provided in Table S21-4 below may be further adjusted to provide adequate protection of high-density applications in the fixed service, which may require review of Resolution 133 (WRC-97) including its suppression.

MOD ASP/20/47

TABLE **S21-4** *(end)*

Frequency band	Service*	Limit in dB(W/m^2) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	**5°-25°**	**25°-90°**	
31.0-31.3 GHz 34.7-35.2 GHz (space-to-Earth transmissions referred to in No. **S5.550** on the territories of countries listed in No. **S5.549**) ~~37.0-40.5 GHz~~	Fixed-satellite Mobile-satellite Space research	-115 [10]	$-115 + 0.5(\delta - 5)$ [10]	-105 [10]	1 MHz
37.0-40.0 GHz	Space research (non-geostationary-satellite orbit)	-120	$-120 + 0.75(\delta - 5)$	-105	1 MHz
	Space research (geostationary-satellite orbit)	-125			
	Mobile-satellite	-115	$-115 + 0.5(\delta - 5)$	-105	
	Fixed-satellite (non-geostationary-satellite orbit)	-120	$-120 + 0.75(\delta - 5)$	-105	
	Fixed-satellite (geostationary-satellite orbit)	-125	$-125 + (\delta - 5)$	-105	

Reasons: Appropriate pfd masks are needed to protect the fixed service from other services.

MOD ASP/20/48

34.2-40.5 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
37-37.5	FIXED MOBILE SPACE RESEARCH (space-to-Earth) MOD S5.547	
37.5-38	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE SPACE RESEARCH (space-to-Earth) Earth exploration-satellite (space-to-Earth) MOD S5.547	
38-39.5	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Earth exploration-satellite (space-to-Earth) MOD S5.547	
39.5-40	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) Earth exploration-satellite (space-to-Earth) MOD S5.547	

Reasons: The band 37-40 GHz should be made available for high-density applications to the greatest extent possible (see also modification of S5.547).

3 Proposal for the high-density application in the fixed service above 30 GHz (Resolution 726 (WRC-97))

MOD ASP/20/49

40.5-55.78 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
51.4-52.6	FIXED MOBILE MOD S5.547 S5.556	

MOD ASP/20/50

55.78-66 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
64-65	FIXED INTER-SATELLITE MOBILE except aeronautical mobile MOD S5.547 S5.556	
65-66	EARTH EXPLORATION-SATELLITE FIXED INTER-SATELLITE MOBILE except aeronautical mobile SPACE RESEARCH MOD S5.547	

Reasons: Consequence of modifying S5.547.

MOD ASP/20/51

55.78-66 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
55.78-56.9	EARTH EXPLORATION-SATELLITE (passive) FIXED ADD S5.ZZZ INTER-SATELLITE S5.556A MOBILE S5.558 SPACE RESEARCH (passive) MOD S5.547 S5.557	
56.9-57	EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE S5.558A MOBILE S5.558 SPACE RESEARCH (passive) MOD S5.547 S5.557	
57-58.2	EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE S5.556A MOBILE S5.558 SPACE RESEARCH (passive) MOD S5.547 S5.557	
58.2-59	EARTH EXPLORATION-SATELLITE (passive) FIXED MOBILE SPACE RESEARCH (passive) MOD S5.547 S5.556	

ADD ASP/20/52

S5.ZZZ In the band 55.78-56.26 GHz, the output power density of stations in the fixed service shall be limited to –21.5 dB(W/MHz), and the far side-lobe antenna gain above 40° from the main beam shall comply with the following mask:

– for $40° < \theta < 65°$ $G = -(3/25) \times \theta - 11/5$ (dBi);

– for $\theta > 65°$ $G = -10$ dBi;

where θ is the off-axis angle.

Reasons: Pre-WRC-97 studies showed that, based on technical parameters for the FS given in Recommendation ITU-R SA.1259, the sharing between the FS and EESS is feasible in the 55.78-59 GHz band. In order to minimize the possibilities of unacceptable interference to passive sensors in the band 55.78-56.26 GHz, FS parameters should be limited in this sub-band to those which are consistent with Recommendation ITU-R SA.1259.

4 Proposal for the use of the 40.5-42.5 GHz band in the fixed-satellite service and protection of the radio astronomy service in the 42.5-43.5 GHz band (Resolutions 128 (WRC-97), 129 (WRC-97) and 134 (WRC-97))

MOD ASP/20/53

RESOLUTION 128 (Rev.WRC-~~97~~2000)

Allocation to the fixed-satellite service (space-to-Earth) in the 41.5-42.5 GHz band and protection of the radio astronomy service in the 42.5-43.5 GHz band

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that ~~this Conference~~WRC-97 has added a primary allocation to the fixed-satellite service (space-to-Earth) in the band 41.5-42.5 GHz in Regions 2 and 3 and in certain countries in Region 1 and that this band is adjacent to the band 42.5-43.5 GHz which is allocated, *inter alia*, to the radio astronomy service for both continuum and spectral line observations;

b) that unwanted emissions from space stations in the fixed-satellite service (space-to-Earth) in the band 41.5-42.5 GHz may result in harmful interference to the radio astronomy service in the band 42.5-43.5 GHz;

c) that various technical means may be used to reduce these unwanted emissions from space stations in the fixed-satellite service;

d) that a limited number of radio astronomy stations worldwide require protection, and that there may be means to limit the susceptibility of radio astronomy receivers to interference,

taking into account

the relevant provisions of the Radio Regulations,

resolves

that administrations shall not implement fixed-satellite systems in the band 41.5-42.5 GHz until technical and operational measures have been identified and agreed within ITU-R to protect the radio astronomy service from harmful interference in the band 42.5-43.5 GHz,

invites ITU-R

1 to study, as a matter of urgency, the harmful interference that space stations in the fixed-satellite service (space-to-Earth) operating in the band 41.5-42.5 GHz may cause to stations in the radio astronomy service operating in the band 42.5-43.5 GHz;

2 to identify technical and operational measures that may be taken to protect stations in the radio astronomy service operating in the band 42.5-43.5 GHz, including geographical separation and out-of-band emission limits to be applied to space stations operating in the fixed-satellite service in the band 41.5-42.5 GHz, as well as measures that may be implemented to reduce the susceptibility of stations in the radio astronomy service to harmful interference;

3 to report on the results of these studies to the Conference Preparatory Meeting for WRC-~~99~~02/03,

urges administrations

to participate actively in the aforementioned studies by submitting contributions to ITU-R,

requests

WRC-~~99~~02/03 to take appropriate action based on those studies.

Reasons: Since the technical work for Resolution 128 (WRC-97) has not been completed, it should be continued.

The pfd values provided in Table S21-4 below may be further adjusted to provide adequate protection of high-density applications in the fixed service, taking into account the usage by high-density applications in the fixed-satellite service.

MOD ASP/20/54

TABLE **S21-4** *(end)*

Frequency band	Service*	Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
40.5-42.5 GHz	Fixed-satellite (non-geostationary-satellite orbit)	–115	–115 + 0.5(δ – 5)	–105	1 MHz
	Fixed-satellite (geostationary-satellite orbit)	–120	–120 + (δ – 5) for 5°-15° –110 + 0.5(δ – 15) for 15°-25°	–105	

Reasons: Appropriate pfd masks are needed to protect the fixed service from other services.

MOD ASP/20/55

40.5-55.78 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
40.5-42.5 FIXED BROADCASTING BROADCASTING-SATELLITE Mobile MOD S5.547 S5.551B MOD S5.551D	**40.5-42.5** FIXED FIXED-SATELLITE (space-to-Earth) S5.551B ~~S5.551E~~ BROADCASTING BROADCASTING-SATELLITE Mobile MOD S5.547 S5.551C S5.551F	

Reasons: The band 40.5-42.5 GHz should be made available for high-density applications to the greatest extent possible (see also modification of S5.547).

MOD ASP/20/56

S5.551D *Additional allocation:* in Algeria, Saudi Arabia, Bahrain, Benin, Cameroon, Egypt, United Arab Emirates, Israel, Jordan, Kuwait, Lebanon, Libya, Mali, Morocco, Mauritania, Nigeria, Oman, Qatar, Syria, Tunisia and Yemen, the band 40.5-42.5 GHz is also allocated to the fixed-satellite service (space-to-Earth) on a primary basis. ~~The use of this band by the fixed-satellite service shall be in accordance with Resolution **134 (WRC-97)**~~.

SUP ASP/20/57

S5.551E

SUP ASP/20/58

RESOLUTION 129 (WRC-97)

Criteria and methodologies for sharing between the fixed-satellite service and other services with allocations in the band 40.5-42.5 GHz

SUP ASP/20/59

RESOLUTION 134 (WRC-97)

Use of the frequency band 40.5-42.5 GHz by the fixed-satellite service

Reasons: Studies on criteria and methodologies for sharing between the fixed-satellite service and other services with allocations in the band 40.5-42.5 GHz have been completed, and the result of the studies can be reflected on Table S21-4.

Agenda item 1.5

1.5 to consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution **122 (WRC-97)**

Extension of Resolution 122

Submitted by the following administrations:

Bhutan (Kingdom of), Brunei Darussalam, Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Maldives (Republic of), Mongolia, Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

Introduction

ITU-R has concluded that there is merit in revising Resolution 122 to better accommodate the needs of many Region 3 countries for alternative spectrum allocations for HAPS in the 18-32 GHz range as a matter of urgency, because the 47-48 GHz band is more susceptible to rain attenuation in certain areas, especially in Region 3. In addition, the revision places emphasis on the need to progress study of all sharing issues as a matter of urgency.

CPM-99 developed an "example draft modification to Resolution 122 (Rev.WRC-2000)" which had the support of many countries at that meeting. It has been agreed within the APT that the best way to progress this matter is to support, as a minimum first step, the adoption of the CPM text as the basis of a common proposal to WRC-2000.

APT proposals

It is proposed that the time-frame of Resolution 122 should be extended to the next WRC and that recognition be given to the need for further urgent studies related to the use of HAPS in the range 18-32 GHz. The APT has agreed that the modifications to the text of Resolution 122 proposed by CPM-99 should be accepted. However, for Region 3, the APT is also proposing some modifications to Article S5 to enable HAPS to be developed within specific sub-bands within the range 18-32 GHz, and this will require some further consequential amendment of Resolution 122; however here it is proposed that Resolution 122 (WRC-97) be modified based on the following changes which are in line with the text contained in the CPM Report prepared for WRC-2000.

MOD ASP/20/60

RESOLUTION 122 (Rev.WRC-~~97~~2000)

Use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz by high altitude platform stations in the fixed service and by other services and the potential use of bands below 47 GHz by HAPS in the fixed service

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that the band 47.2-50.2 GHz is allocated to the fixed, mobile and fixed-satellite services on a co-primary basis;

b) that ~~this Conference~~WRC-97 has made provision for operation of high altitude platform stations, also known as stratospheric repeaters, within the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz;

c) that ITU has among its purposes “to promote the extension of the benefit of the new telecommunication technologies to all the world’s inhabitants” (No. 6 of the Constitution of the ITU (Geneva, 1992));

d) that systems based on new technologies using high altitude platforms will be able to provide high-capacity, competitive services to urban and rural areas;

e) that the development of any service requires major investment and that manufacturers and operators should be given the confidence to make the necessary investment;

~~e~~f) that high altitude platform systems are in an advanced stage of development and some countries have notified such systems to ITU;

~~f~~g) that the Radio Regulations Board issued a provisional rule of procedure concerning notification periods in No. **S11.24/1228** in February 1997;

~~g~~h) that in spite of the urgency attached to the development of such systems, technical, sharing and regulatory issues should be further studied in order to achieve the most efficient use of the spectrum available for these systems;

~~h~~i) that technical studies ~~are required in order to ascertain the extent to which sharing of the~~have been undertaken on the characteristics of a HAPS system in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz ~~is feasible between systems using high altitude platforms in the fixed service and systems in the fixed, fixed-satellite and mobile services, and to ascertain the requirements to protect radio astronomy services in adjacent bands from spurious emissions~~and on the coordination and sharing requirements between HAPS systems and systems in the conventional fixed service and in other services, but that further studies are still in progress on the potential for interference between such systems;

~~i~~j) that the radio astronomy service has primary allocations in the bands 42.5-43.5 GHz and 48.94-49.04 GHz;

~~*j)* that ITU-R studies are already under way on the preferred characteristics of systems using high altitude platforms and the feasibility of sharing between these systems and systems of other services and between these systems and other systems in the fixed service (Questions ITU-R 212/9, ITU-R 218/9 and ITU-R 251/4);~~

k) that ITU-R study results have been presented which indicate that in WRC-97 designated bands at 47.2-47.5/47.9-48.2 GHz, sharing between fixed service systems using HAPS and other conventional fixed service systems in the same area will require appropriate interference mitigation techniques to be developed and implemented;

~~k~~l) that No. **S5.552** urges administrations to reserve fixed-satellite service use of the band 47.2-49.2 GHz for feeder links for the broadcasting-satellite service, and that ~~preliminary~~ ITU-R studies indicate that high altitude platform stations in the fixed service may share with broadcasting-satellite feeder links;

~~*l)* that the development of services using high altitude platform stations in these bands requires major investment and that manufacturers and operators should be given the confidence to make the necessary investment in these applications,~~

m) that ITU-R studies in the bands 47.2-47.5 GHz and 47.9-48.2 GHz indicate that sharing between fixed service systems using HAPS and FSS could be feasible under certain limitations, such as geographical separation between HAPS-based systems and FSS earth stations;

n) that since 47 GHz bands are more susceptible to the rain attenuation in certain areas of Region 3, the range 18-32 GHz has been considered for possible identification of additional spectrum in ITU-R and preliminary studies are in progress for these bands;

o) that the 18-32 GHz range is already heavily used by a number of different services,

resolves

1 to urge administrations to facilitate coordination between high altitude platform stations in the fixed service operating in the bands 47.2-47.5 GHz and 47.9-48.2 GHz and other co-primary services in their territory and adjacent territories;

2 that, on a provisional basis, the procedures of Article **S9** shall be used for coordination between satellite systems and high altitude platform systems;

3 to request ITU-R to continue to carry out urgently studies on the appropriate technical sharing criteria for the situations referred to in *considering ~~h~~i)*~~, with priority given to the sharing with other systems in the fixed and fixed-satellite services, in particular the determination of the appropriate geographical separation from feeder links in the broadcasting-satellite service~~;

4 to request ITU-R, taking into account the requirements of other fixed service systems and other services, to urgently conduct studies on the feasibility of identifying additional frequencies for the use of HAPS in the fixed service in the range 18-32 GHz;

~~4~~5 that WRC-~~99~~02 should review the results of these studies and consider refinement of the regulatory provisions that might facilitate a broader application of these high altitude platform technologies,

instructs the Director of the Radiocommunication Bureau

1 that notices concerning high altitude platform stations that were received by the Bureau prior to 22 November 1997, and provisionally recorded in the Master International Frequency Register in accordance with the provisional rule of procedure issued by the Board, shall be maintained;

2 that from 22 November 1997, and pending review of the sharing studies in *considering* ~~*h*~~*i)* and review of the notification process by WRC-~~99~~02, the Bureau shall accept notices in the bands 47.2-47.5 GHz and 47.9-48.2 GHz only for high altitude platform stations in the fixed service and for feeder links for the broadcasting-satellite service, shall continue to process notices for fixed-satellite service networks (except for feeder links for the broadcasting-satellite service) for which complete information for advance publication has been received prior to 27 October 1997, and shall inform the notifying administrations accordingly.

Reasons: Some of the studies decided by Resolution 122 (WRC-97) have not been completed. Also because of rain attenuation considerations and the technical difficulties in using the current allocation, some countries have sought alternate fixed service allocations in the range 18-32 GHz and for which study of the feasibility of identifying such spectrum has been initiated.

Agenda item 1.5

1.5 to consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution **122 (WRC-97)**

Introduction of HAPS in the bands 27.5-28.5 and 31.0-31.3 GHz

Submitted by the following administrations:

Bhutan (Kingdom of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Maldives (Republic of), Mongolia, Myanmar (Union of), Pakistan (Islamic Republic of), Democratic People's Republic of Korea, Sri Lanka (Democratic Socialist Republic of), Viet Nam (Socialist Republic of)

Introduction

CPM-99 developed an "example draft modification to Resolution 122 (Rev.WRC-2000)" which had the support of many countries at that meeting. It has been agreed within the APT that the best way to progress this matter is to support, as a minimum first step, the adoption of the CPM text as the basis of a common proposal for WRC-2000.

However, in at least one country in Region 3, there is a plan to introduce HAPS in a band in the range 18 to 32 GHz as a domestic fixed service. This plan has the support of APT countries and it is recognized that suitable footnotes must be added to the Table of Frequency Allocations and that it would be desirable to reflect this also in the proposed new Resolution LLL.

APT proposals

The APT has concluded that the revisions proposed by CPM-99 to Resolution 122 (WRC-97) should be extended and modified and a proposal to achieve this has been submitted to achieve this. It has also concluded that a modification should be made to Article S5 to enable at least one country in this region to accelerate plans related to the introduction of HAPS to meet their particular needs within this region. The existing allocation for HAPS identified in S4.15A states that transmissions to or from high altitude platform stations shall be limited to bands specifically identified in Article S5. To meet these needs a consequential amendment is required to Article S5 and also consequential development of the new resolution will be required.

MOD ASP/20/61

24.75-29.9 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
27.5-28.5	FIXED ADD S5.5SSS FIXED-SATELLITE (Earth-to-space) S5.484A S5.539 MOBILE S5.538 S5.540	

MOD ASP/20/62

29.9-34,.2 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
31-31.3	FIXED ADD S5.5RRR MOBILE Standard frequency and time signal-satellite (space-to-Earth) Space research S5.544 S5.545 S5.149	

ADD ASP/20/63

S5.5SSS For Region 3 in [Bhutan, Indonesia, Iran (Islamic Republic of), Japan, Maldives, Mongolia, Myanmar, Pakistan, Dem. People's Rep. of Korea, Sri Lanka and Viet Nam], the allocation to the fixed service in the band 27.5-28.5 GHz may also be used by high altitude platform stations. The use of the band 27.5-28.5 GHz by high altitude platform stations is limited to the operation in the opposite direction of transmission for the fixed-satellite service and shall not cause harmful interference to or claim protection from co-primary services, and is subject to the provisions of Resolution **LLL (WRC-2000)**.

ADD ASP/20/64

S5.5RRR For Region 3 in [Bhutan, Indonesia, Iran (Islamic Republic of), Japan, Maldives, Mongolia, Myanmar, Pakistan, Dem. People's Rep. of Korea, Sri Lanka and Viet Nam], the allocation to the fixed service in the bands 31.0-31.3 GHz may also be used by high altitude platform stations in the direction of ground to high altitude platform stations. The use of the band 31.0-31.3 GHz shall not cause harmful interference to or claim protection from co-primary services and is subject to the provisions of Resolution **LLL (WRC-2000)**.

MOD ASP/20/65

S11.26 Notices relating to assignments for high altitude platform stations in the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz and the bands 27.5-28.5 GHz and 31.0-31.3 GHz shall reach the Bureau not earlier than five years before the assignments are brought into use.

Reasons: ITU-R has concluded that in many Region 3 countries, alternative spectrum identified for HAPS applications in the fixed service bands within the range 18-32 GHz are necessary as a matter of urgency. Preliminary study results have indicated the potentials for sharing the bands in the 18-32 GHz range with FSS systems by reverse band working mode and other FS systems in case the band allocated for FS is applied to HAPS using adequate mitigation techniques. In fact the concrete bands 29.5-29.9 GHz and 31.0-31.3 GHz are being studied successfully in ITU-R and there would not be much difference between the bands 29.5-29.9 GHz and 27.5-28.5 GHz technically. Moreover, no use of the band 31.0-31.3 GHz as HAPS downlink further enhances the potentials in the viewpoint of the protection of RAS in the band 31.3-31.8 GHz. Continuous studies will be undertaken intensively under the proposed Resolution LLL (WRC-2000), and for which further consequential amendments are necessary.

ADD ASP/20/66

RESOLUTION LLL (WRC-2000)

Use of the bands 47.2-47.5 GHz, 47.9-48.2 GHz, 27.5-28.5 GHz and 31.0-31.3 GHz by high altitude platform stations in the fixed service and by other services and the potential use of bands below 47 GHz by HAPS in the fixed service

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the band 47.2-50.2 GHz is allocated to the fixed, mobile and fixed-satellite services on a co-primary basis;

b) that WRC-97 made provision for operation of high altitude platform stations, also known as stratospheric repeaters, within the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz;

c) that ITU has among its purposes "to promote the extension of the benefit of the new telecommunication technologies to all the world's inhabitants" (No. 6 of the Constitution of ITU (Geneva, 1992));

d) that systems based on new technologies using high altitude platforms will be able to provide high-capacity, competitive services to urban and rural areas;

e) that the development of any service requires major investment and that manufacturers and operators should be given the confidence to make the necessary investment;

f) that high altitude platform systems are in an advanced stage of development and some countries have notified such systems to ITU;

g) that the Radio Regulations Board issued a provisional rule of procedure concerning notification periods in No. **S11.24/1228** in February 1997;

h) that in spite of the urgency attached to the development of such systems, technical, sharing and regulatory issues should be further studied in order to achieve the most efficient use of the spectrum available for these systems;

i) that technical studies have been undertaken on the characteristics of a HAPS system in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz and on the coordination and sharing requirements between HAPS systems and systems in the conventional fixed service and in other services, but that further studies are still in progress on the potential for interference between such systems;

j) that the radio astronomy service has primary allocations in the bands 42.5-43.5 GHz and 48.94-49.04 GHz;

k) that ITU-R study results have been presented which indicate that, in WRC-97 designated bands at 47.2-47.5/47.9-48.2 GHz, sharing between fixed service systems using HAPS and other conventional fixed service systems in the same area will require appropriate interference mitigation techniques to be developed and implemented;

l) that No. **S5.552** urges administrations to reserve fixed-satellite service use of the band 47.2-49.2 GHz for feeder links for the broadcasting-satellite service, and that ITU-R studies indicate that high altitude platform stations in the fixed service may share with broadcasting-satellite feeder links;

m) that ITU-R studies in the bands 47.2-47.5 GHz and 47.9-48.2 GHz indicate that sharing between fixed service systems using HAPS and FSS could be feasible under certain limitation, such as geographical separation between HAPS-based systems and FSS earth stations;

n) that, since 47 GHz bands are more susceptible to the rain attenuation in certain areas of Region 3, the range 18-32 GHz has been considered for possible identification of additional spectrum in ITU-R;

o) that the 18-32 GHz range is already heavily used by a number of different services;

p) that preliminary study results have indicated the potential for sharing the bands in the 18-32 GHz range between systems in the fixed-satellite service and systems using high altitude platforms operating in the opposite direction of transmission and between systems using high altitude platforms and other systems in the fixed service in case the band allocated for the fixed service is applied to high altitude platform stations in the direction of ground to high altitude platform stations, using adequate mitigation techniques;

q) that WRC-2000 made some provision for the bands 27.5-28.5 GHz and 31.0-31.3 GHz within the range 18-32 GHz but that studies are still in progress for these bands for use of high altitude platform stations in the fixed service,

resolves

1 to urge administrations to facilitate coordination between high altitude platform stations in the fixed service operating in the bands 47.2-47.5 GHz and 47.9-48.2 GHz and 27.5-28.5 GHz and 31.0-31.3 GHz within the range 18-32 GHz, and other co-primary services in their territory and adjacent territories;

2 that, on a provisional basis, the procedures of Article **S9** shall be used for coordination between satellite systems and high altitude platform systems;

3 to request ITU-R to continue to carry out urgently studies on the appropriate technical sharing criteria for the situations referred to in *considering i)*;

4 to request ITU-R, taking into account the requirements of other fixed service systems and other services, to urgently conduct studies on the feasibility of identifying additional frequencies for the use of HAPS in the fixed service in the range 18-32 GHz;

5 that WRC-02 should review the results of these studies and consider refinement of the regulatory provisions that might facilitate a broader application of these high altitude platform technologies,

instructs the Director of the Radiocommunication Bureau

1 that notices concerning high altitude platform stations that were received by the Bureau prior to 22 November 1997, and provisionally recorded in the Master International Frequency Register in accordance with the provisional rule of procedure issued by the Board, shall be maintained;

2 that from 22 November 1997, and pending review of the sharing studies in *considering i)* and review of the notification process by WRC-02, the Bureau shall accept notices in the bands 47.2-47.5 GHz and 47.9-48.2 GHz only for high altitude platform stations in the fixed service and for feeder links for the broadcasting-satellite service, shall continue to process notices for fixed-satellite service networks (except for feeder links for the broadcasting-satellite service) for which complete information for advance publication has been received prior to 27 October 1997, and shall inform the notifying administrations accordingly.

Reasons: ITU-R has concluded that, in many Region 3 countries, alternative spectrum allocations for HAPS in the 18-32 GHz range should be identified for HAPS applications in the fixed service band as a matter of urgency, because the 47-48 GHz band is more susceptible to rain attenuation in certain areas, especially in Region 3. Therefore *considering p)* and *q)* are proposed in Resolution LLL in order to reflect the progress of studies of ITU-R accurately. The Resolution should be developed to reflect the additional spectrum identified in the revision of Tables S5.

Agenda item 1.5

1.5 to consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution **122 (WRC-97)**

New resolution for studies related to HAPS in bands above 3 GHz for terrestrial radiocommunications

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Iran (Islamic Republic of), Japan, Maldives (Republic of), Mongolia, Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Democratic People’s Republic of Korea, Sri Lanka (Democratic Socialist Republic of), Viet Nam (Socialist Republic of)

Introduction

At least one administration has the intention to deploy HAPS for national use. Urgent studies are needed to develop sharing criteria and operational conditions to be met in the implementation of such services and frequency bands above 3 GHz allocated exclusively for terrestrial radiocommunications.

It has been agreed within the APT that the best way to progress this matter is to support the development of a new resolution to address this issue.

ADD ASP/20/67

RESOLUTION XXX (WRC-2000)

High altitude platform stations in the frequency bands above 3 GHz allocated exclusively for terrestrial radiocommunications

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that ITU has among its purposes “to promote the extension of the benefit of the new telecommunication technologies to all the world’s inhabitants” (No. 6 of the Constitution of ITU, Geneva, 1992);

b) that systems based on new technologies using high altitude platform stations (HAPS) has potential applicability to various services such as high-capacity, competitive services to urban and rural areas;

c) that WRC-97 made minimum provision to be required for operation of HAPS for the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz;

d) that WRC-97 adopted a resolution that WRC-2000 should consider refinement of the regulatory provisions;

e) that the visible area from HAPS would be within a country or neighbouring countries, which is much narrower than that of the satellite system, taking into account HAPS’s altitude;

f) that some administrations intend to operate the HAPS system in the bands allocated only for terrestrial radiocommunications such as the fixed service and mobile service,

recognizing

a) the progress in ITU-R studies relating to geometrical coordination distance for the visible distance from HAPS; that could allow use of HAPS systems within one country, and subject to coordination with neighbouring countries within the visible area from HAPS, as described in Recommendation ITU-R F.[Doc. 9/1018];

b) that HAPS systems could be operated with a minimum requirement for coordination to provide terrestrial radiocommunications if neighbouring countries are not included in the visible areas from HAPS,

resolves

to request ITU-R to carry out urgently studies for regulatory provisions and frequency sharing to allow HAPS systems in additional bands above 3 GHz exclusively allocated for terrestrial radiocommunications, *instructs ITU-R*

to urgently study techniques to enable for the frequency sharing with services for terrestrial radiocommunications, protection of space systems from unwanted emissions, operational conditions and co-existence of space systems and HAPS systems, and provision for sharing with future space systems,

encourages administrations

planning to use HAPS systems to contribute actively to the sharing studies in accordance with this Resolution.

Reasons: Systems using HAPS (HAPS-based system) for terrestrial applications in bands above 3 GHz have a potential applicability to various services such as high-capacity communications and Earth observation (note that the option for the provision of IMT-2000 services using HAPS is dealt with under agenda item 1.6).

Since the HAPS airship is located at lower altitude compared with the satellite, the transmission delay and path loss in the HAPS-based system is smaller than in the satellite systems. Therefore, it would easily bring about size reduction of communication terminals and realization of high-capacity communications.

A HAPS-based system has flexible design possibilities such as number of airships, service area and offered services and applications, so as to fit the area size of land and the status of the infrastructures construction in each country.

Therefore, each country can define and operate service items such as offered applications, communication fee and service area, based on the designed system. Further studies within ITU-R are needed to allow HAPS systems in additional bands above 3 GHz exclusively allocated for terrestrial radiocommunications.

It is also important that the studies include the operational and regulatory considerations as well as those related to sharing of the spectrum between services.

Agenda item 1.6.1

1.6.1 review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

Submitted by the following administrations:

Bhutan (Kingdom of), Brunei Darussalam, Korea (Republic of), Japan, Malaysia, Maldives (Republic of), Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand

ISSUE A: IMT-2000 terrestrial component

The need to identify global additional frequency bands for the terrestrial component of IMT-2000, beyond those identified in S5.388, to satisfy future spectrum requirements which have been based on projected market demand.

Introduction

1 WARC-92 identified, in footnote S5.388, the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz for IMT-2000, including 1 980-2 010 MHz (uplink) and 2 170-2 200 MHz (downlink) for the satellite component. This is reflected in Resolution 212, which was drafted at WARC-92 and amended at WRC-95 and WRC-97. Further developments at WRC-95 led to the allocation in Region 2 of the frequency bands 2 010-2 025 MHz (uplink) and 2 160-2 170 MHz (downlink), from within the IMT-2000 range, for MSS.

2 With respect to satisfying future spectrum requirements for IMT-2000, WRC-2000 agenda item 1.6.1 addresses the need to consider "spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component…".

In line with the wording of the agenda item, APT has decided to place priority on the spectrum requirements of the terrestrial component of IMT-2000 over those of the satellite component.

3 The CPM text concludes on total spectrum requirements for the terrestrial element of IMT-2000 for the three Regions[1], which are based on the sum of the spectrum currently identified for IMT-2000 in S5.388, the spectrum currently identified in the Regions for existing first and second generation systems (e.g. AMPS, GSM, PDC, CDMA, PCS) and an additional spectrum requirement to meet the forecasted traffic volume in geographic areas where the traffic is the highest. This additional spectrum is estimated to be 160 MHz in all three Regions by 2010.

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[1] 555 MHz in Region 1, 390 MHz in Region 2 and 480 MHz in Region 3.

4 For the terrestrial component, the purpose of WRC-2000 should find global bands for all three Regions to meet the requirement of 160 MHz of additional spectrum. Globally harmonized spectrum will facilitate worldwide roaming and reduce cost, size and complexity of IMT-2000 on a large scale in the 2000 terminals. WRC-2000 should also identify for IMT-2000 spectrum which is currently used in various Regions for existing first and second generation cellular/PCS systems within which IMT-2000 may be implemented in the longer term, depending on national regulation. Because the location of existing first and second generation spectrums are not common to the three Regions, the location of additional spectrum for IMT-2000 may similarly vary. As a result, some flexibility in the identification of additional spectrum for IMT-2000 may be needed.

5 First and second generation mobile systems will continue to operate in the short and medium term and their availability for IMT-2000 will depend on national situations and national regulatory regimes concerning migration and evolution of existing systems towards IMT-2000. As the first and second generation spectrums were already taken into account and it cannot be part of the 160 MHz additional spectrum requirement, that means that global additional spectrum satisfying the additional 160 MHz spectrum requirement is to be identified outside the first and second generation mobile systems bands.

6 For the terrestrial component, the identification of the additional bands should be done through a new footnote(s) in Article S5, referring to a supporting resolution. It is believed that this approach, whereby the identification of spectrum is made by a footnote in association with a RR Resolution, rather than the use of a RR Resolution alone which is generally considered to apply to transitional matters, gives the most stable identification of spectrum for IMT-2000. This is important to facilitate global roaming and global economies of scale in the manufacture of equipment, and is particularly important for developing countries to gain the greatest benefit from IMT-2000. This approach also gives a status to the spectrum identified for IMT-2000 over other mobile systems, which is believed to be particularly important in view of the importance of the IMT-2000 project within ITU, and the significant efforts both within ITU and external standardization bodies in the development of harmonized radio standards for IMT-2000.

7 In addition to the band 806-960 MHz which is currently widely used for first and second generation cellular systems, APT is proposing for identification for IMT-2000 terrestrial component, the frequency bands 1 710-1 885 MHz and 2 520-2 670 MHz. This identification does not preclude other systems and other services to continue to operate in this band, according to national choice. Region 3 administrations will decide on a national basis, based on their own market requirement, to open either band or both or a portion of these bands.

8 The CPM text states that "provisions should be made for some common additional spectrum from the total designation for IMT-2000 extension bands, from which frequencies can be made available in a harmonized way globally, in order to facilitate global operation of IMT-2000". For this purpose, Region 3 countries are considering that, providing that harmonized channelling plans are developed by ITU-R, global operation will be offered with multi-band terminals able to operate within the initial band, the frequency band 2 520-2 670 MHz and the frequency band 1 710-1 885 MHz. If an administration does not wish to make part of these bands available, it may still be possible to make a portion of the band available for international roaming.

9 In relation to frequency bands currently used for first and second generation mobile systems, future frequency arrangements should aim to achieve compatibility with the existing frequency arrangements in operation, including the current duplex spacing and direction employed.

10 This proposal is divided into three parts:

– the first part proposes that no change is needed for the current footnote S5.388;

– the second part addresses spectrum which is proposed to satisfy the additional global requirement;

– the third part introduces a new resolution to be introduced at WRC-2000;
Resolution ZZZ concerning the extension bands for the implementation of IMT-2000.

PART 1

Proposal on initial IMT-2000 spectrum identified in S5.388

1 885-2 200 MHz

No change to the Article S5 Table of Allocations and the associated footnote for this frequency range.

NOC ASP/20/68

S5.388 The bands 1 885-2 025 MHz and 2 110-2 200 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of these bands by other services to which they are allocated. The bands should be made available for IMT-2000 in accordance with Resolution **212 (Rev.WRC-97)**.

Reasons: Implementation of IMT-2000 in the bands identified in the Radio Regulations at WARC-92 is already planned in many countries, including the transitional arrangement of existing services. It is therefore essential to maintain the existing provisions within the Radio Regulations relating to these frequency bands.

NOC ASP/20/69

(for frequencies from 1 885-2 200 MHz, but see also ASP/20/73)

1 710-2 170 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 710-1 930	FIXED MOBILE S5.380 S5.149 S5.341 S5.385 S5.386 S5.387 S5.388	
1 930-1 970 FIXED MOBILE S5.388	**1 930-1 970** FIXED MOBILE Mobile-satellite (Earth-to-space) S5.388	**1 930-1 970** FIXED MOBILE S5.388
1 970-1 980	FIXED MOBILE S5.388	
1 980-2 010	FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.388 S5.389A S5.389B S5.389F	
2 010-2 025 FIXED MOBILE S5.388	**2 010-2 025** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.388 S5.389C S5.389D S5.389E S5.390	**2 010-2 025** FIXED MOBILE S5.388

2 025-2 110	SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE S5.391 SPACE RESEARCH (Earth-to-space) (space-to-space) S5.392	
2 110-2 120	FIXED MOBILE SPACE RESEARCH (deep space) (Earth-to-space) S5.388	
2 120-2 160 FIXED MOBILE S5.388	**2 120-2 160** FIXED MOBILE Mobile-satellite (space-to-Earth) S5.388	**2 120-2 160** FIXED MOBILE S5.388
2 160-2 170 FIXED MOBILE S5.388 S5.392A	**2 160-2 170** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) S5.388 S5.389C S5.389D S5.389E S5.390	**2 160-2 170** FIXED MOBILE S5.388

PART 2

Proposals for bands to meet additional spectrum requirement for IMT-2000

The following bands are proposed to be identified for IMT-2000 to satisfy the requirement for additional terrestrial IMT-2000 spectrum referred to in the CPM Report.

MOD ASP/20/70

470-890 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="6">470-790
BROADCASTING
S5.149 S5.291A S5.294 S5.296 S5.300 S5.302 S5.304 S5.306 S5.311 S5.312</td><td>470-512
BROADCASTING
Fixed
Mobile
S5.292 S5.293</td><td rowspan="2">470-585
FIXED
MOBILE
BROADCASTING
S5.291 S5.298</td></tr>
<tr><td rowspan="2">512-608
BROADCASTING
S5.297</td></tr>
<tr><td rowspan="2">585-610
FIXED
MOBILE
BROADCASTING
RADIONAVIGATION
S5.149 S5.305 S5.306 S5.307</td></tr>
<tr><td rowspan="2">608-614
RADIO ASTRONOMY
Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)</td></tr>
<tr><td rowspan="5">610-890
FIXED
MOBILE ADD S5.AAA
BROADCASTING
S5.149 S5.305 S5.306 S5.307 S5.311 S5.320</td></tr>
<tr><td rowspan="2">614-806
BROADCASTING
Fixed
Mobile
S5.293 S5.309 S5.311</td></tr>
<tr><td rowspan="2">790-862
FIXED
BROADCASTING
S5.312 S5.314 S5.315 S5.316 S5.319 S5.321</td></tr>
<tr><td rowspan="2">806-890
FIXED
MOBILE ADD S5.AAA
BROADCASTING
S5.317 S5.318</td></tr>
<tr><td>862-890
FIXED
MOBILE except aeronautical mobile ADD S5.AAA
BROADCASTING S5.322
S5.319 S5.323</td></tr>
</table>

MOD ASP/20/71

890-1 350 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="3">890-942
FIXED
MOBILE except aeronautical mobile ADD S5.AAA
BROADCASTING S5.322
Radiolocation

S5.323</td><td>890-902
FIXED
MOBILE except aeronautical mobile ADD S5.AAA
Radiolocation
S5.318 S5.325</td><td rowspan="3">890-942
FIXED
MOBILE ADD S5.AAA
BROADCASTING
Radiolocation

S5.327</td></tr>
<tr><td>902-928
FIXED
Amateur
Mobile except aeronautical mobile ADD S5.AAA
Radiolocation
S5.150 S5.325 S5.326</td></tr>
<tr><td>928-942
FIXED
MOBILE except aeronautical mobile ADD S5.AAA
Radiolocation
S5.325</td></tr>
<tr><td>942-960
FIXED
MOBILE except aeronautical mobile ADD S5.AAA
BROADCASTING S5.322
S5.323</td><td>942-960
FIXED
MOBILE ADD S5.AAA</td><td>942-960
FIXED
MOBILE ADD S5.AAA
BROADCASTING

S5.320</td></tr>
</table>

ADD ASP/20/72

S5.AAA Portions of 806-960 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of this band for other services to which the band is allocated. This band should be made available for IMT-2000 in accordance with Resolution **ZZZ (WRC-2000)**.

Reasons: The band 862-960 MHz in Region 1, 806-902 MHz in Region 2 and 806-960 MHz in Region 3 is allocated on a primary basis to the mobile service, and is currently already used for first and second generation mobile systems in many countries according to national frequency plans. The band 806-960 MHz is therefore an obvious candidate for terrestrial IMT-2000, based on market demand, for use in the longer term where and when the use by existing systems is decreasing.

MOD ASP/20/73

1 710-2 170 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td>1 710-1 930</td><td colspan="2">FIXED
MOBILE S5.380 ADD S5.BBB
S5.149 S5.341 S5.385 S5.386 S5.387 S5.388</td></tr>
</table>

ADD ASP/20/74

S5.BBB The whole band or portions of 1 710-1 885 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of this band for other services to which the band is allocated. This band should be made available for IMT-2000 in accordance with Resolution **ZZZ (WRC-2000)**.

Reasons: As indicated in the CPM Report, the band 1 710-1 885 MHz is allocated worldwide to the fixed and mobile services on a primary basis. Many countries can accommodate a significant part of requirement in this band, and in other countries large parts of this band are used for second generation mobile systems. This band is therefore an obvious candidate for identification for terrestrial IMT-2000 extension, based on market demand, for use when and where the use by existing systems is decreasing.

MOD ASP/20/75

2 520-2 700 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="2">2 520-2 655
FIXED S5.409 S5.410 S5.411
MOBILE except aeronautical mobile
BROADCASTING-SATELLITE S5.413 S5.416
S5.339 S5.403 S5.405 S5.408
S5.412 S5.417 S5.418
ADD S5.CCC</td><td rowspan="2">2 520-2 655
FIXED S5.409 S5.411
FIXED-SATELLITE (space-to-Earth) S5.415
MOBILE except aeronautical mobile
BROADCASTING-SATELLITE S5.413 S5.416
S5.339 S5.403 ADD S5.CCC</td><td>2 520-2 535
FIXED S5.409 S5.411
FIXED-SATELLITE (space-to-Earth) S5.415
MOBILE except aeronautical mobile
BROADCASTING-SATELLITE S5.413 S5.416
S5.403 S5.415A ADD S5.CCC</td></tr>
<tr><td>2 535-2 655
FIXED S5.409 S5.411
MOBILE except aeronautical mobile
BROADCASTING-SATELLITE S5.413 S5.416
S5.339 S5.418 ADD S5.CCC</td></tr>
</table>

2 655-2 670 FIXED S5.409 S5.410 S5.411 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.412 S5.417 S5.420 ADD S5.CCC	**2 655-2 670** FIXED S5.409 S5.411 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) S5.415 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.420 ADD S5.CCC	**2 655-2 670** FIXED S5.409 S5.411 FIXED-SATELLITE (Earth-to-space) S5.415 MOBILE except aeronautical mobile BROADCASTING-SATELLITE S5.413 S5.416 Earth exploration-satellite (passive) Radio astronomy Space research (passive) S5.149 S5.420 ADD S5.CCC

ADD ASP/20/76

S5.CCC The whole band or portions of 2 520-2 670 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of this band for other services to which the band is allocated. This band should be made available for IMT-2000 in accordance with Resolution **ZZZ (WRC-2000)**.

Reasons:

1 The CPM Report concludes that there is a requirement for 160 MHz of additional spectrum for the terrestrial component of IMT-2000, beyond the spectrum already identified in RR No. S5.388 and beyond the spectrum used in the three Regions for first and second generation mobile systems.

2 This band offers the potential to contribute a significant portion of the additional spectrum requirement for IMT-2000. Geographical sharing (urban/rural) might facilitate the transition or possibly enable, in the longer term, remaining operation of other services.

PART 3

Proposal for a resolution regarding the implementation of IMT-2000

The CPM text states that at least a large portion of the additional spectrum could be used in a harmonized way to facilitate global roaming. It is therefore proposed that a new RR Resolution should be developed to implement the additional IMT-2000 spectrum identified at WRC-2000, and that this Resolution should ensure that harmonized frequency arrangements are developed to facilitate coordinated global deployment of IMT-2000. Where necessary, consideration should be given to compatibility with current usage and transition of existing services.

In relation to frequency bands currently used for first and second generation mobile systems, future frequency arrangements should aim to achieve compatibility with the existing frequency arrangements in operation, including the current duplex spacing and direction employed.

For the 806-960 MHz frequency band, where a variety of existing first and second generation arrangements are currently in operation, the studies undertaken should consider the possibility to limit the number of future frequency plans used in the longer term for IMT-2000 deployment in these bands.

ADD ASP/20/77

RESOLUTION ZZZ (WRC-2000)

Extension bands for implementation of International Mobile Telecommunications-2000 (IMT-2000)

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that ITU-R has recommended the 1-3 GHz range as the most suitable for IMT-2000;

b) that WARC-92 identified the bands 1 885-2 025 MHz and 2 110-2 200 MHz, intended for use on a worldwide basis for IMT-2000, including the bands 1 980-2 010 MHz and 2 170-2 200 MHz for the satellite component of IMT-2000 in RR **S5.388** and under the provisions of Resolution **212 (Rev.WRC-97)**;

c) that ITU-R studies forecasted that additional spectrum requirement of 160 MHz for the terrestrial component, in addition to the initial IMT-2000 bands in **S5.388** and in addition to bands used for first and second generation cellular systems in the various regions, is required for identification to provide IMT-2000 in those areas where the traffic is the highest;

d) that ITU-R studies concluded that the bands used by first and second generation systems in the various regions are required for identification for IMT-2000, to be implemented when the use of these bands by first and second generation terrestrial systems has decreased;

e) that, in **S5.CCC** of the Radio Regulations, this Conference has identified additional global spectrum for IMT-2000, in order to meet the additional spectrum requirement;

f) that, in **S5.AAA** and **S5.BBB** of the Radio Regulations, this Conference has identified further spectrum for the terrestrial component of IMT-2000, of which various portions are currently used for first and second generation mobile systems to meet the total spectrum requirement;

g) that the band 2 520-2 670 MHz is allocated to the BSS service on a primary basis according to **S5.416** and to the MSS service on a primary basis according to Nos. **S5.403** and **S5.420** and the broadcasting-satellite service (sound) and complementary terrestrial broadcasting service on a primary basis according to No. **S5.418** of the Radio Regulations;

h) that WRC-02/03 will have on its agenda the review of radiolocation allocations in the band 2 700-3 400 MHz under agenda item 2.6,

noting

a) that globally harmonized operation of IMT-2000 can only be envisaged in frequency bands which are allocated to the mobile service in all three ITU Regions;

b) that, in the frequency bands identified in **S5.AAA** and **S5.BBB**, harmonization to the greatest extent practicable should be aimed for, noting however that frequency arrangements should be compatible with existing first and second generation plans;

c) that harmonized use of the additional global bands identified in **S5.CCC** will facilitate, by offering possibilities of global roaming, the worldwide success of IMT-2000 to the benefit of consumers, manufacturers and operators;

d) that not all administrations may need, or be able to implement, all of the IMT-2000 extension bands identified at this Conference due to the existing services;

e) that Recommendation ITU-R [IMT.RSPC] describes the detailed interface for IMT-2000 and that ITU-R is studying unwanted emission levels for IMT-2000, and administrations can use the level to define unwanted emission limits, but such a level does not necessarily fulfil needs of every administration,

recognizing

a) that administrations might decide to make available, according to their own market demand and using their own time-frame, only portions of the frequency bands identified for IMT-2000 and might also impose operational and technical constrain on IMT-2000 in order to facilitate co-frequency sharing with other existing services;

b) that administrations might take into account the results of the ITU-R work as mentioned in *requests ITU-R* 1 to 3 before introducing IMT-2000 systems in the additional bands,

resolves to invite administrations

to make available, based on market demand, extension bands, up to the projected requirements of 160 MHz, for the terrestrial component of IMT-2000 to meet the forecasted growth of these systems, giving due consideration to the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT-2000 as indicated in *noting b)* and *c)* above, taking into account the use of these bands by the other services to which these bands are allocated,

requests ITU-R

1 to develop harmonized frequency arrangements for operation of the terrestrial component of IMT-2000 in the expansion spectrum identified in **S5.CCC** of this Conference, and study the feasibility of sharing between services allocated in this band;

2 to study the feasibility of sharing in the band 2 700-2 900 MHz between RNS and the mobile services such as IMT-2000, and to report to WRC-02/03 on the results of this study, and on the need for identifying available additional usable spectrum for IMT-2000 in this band;

3 to develop frequency arrangements for operation of IMT-2000 in the spectrum identified in **S5.AAA** and **S5.BBB** of this Conference, aiming to achieve compatibility with existing frequency arrangements in use by first and second generation systems,

further resolves

1 that these studies should be commenced forthwith;

2 that these frequency arrangements should be published by ITU-R in one or more recommendations.

Agenda item 1.6.1

1.6.1 review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

Submitted by the following administrations:

Bhutan (Kingdom of), Brunei Darussalam, Korea (Republic of), Japan, Malaysia, Maldives (Republic of), Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Thailand, Viet Nam (Socialist Republic of)

ISSUE B: IMT-2000 satellite component

The need to identify global additional frequency bands for the satellite component of IMT-2000, beyond those identified in S5.388 and Resolution 212 (Rev.WRC-97), to satisfy future spectrum requirements which have been based on projected market demand.

Introduction

1 WARC-92 identified, in footnote S5.388, the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz for IMT-2000, including 1 980-2 010 MHz (uplink) and 2 170-2 200 MHz (downlink) for the satellite component. This is reflected in Resolution 212, which was drafted at WARC-92 and amended at WRC-95 and WRC-97. Further developments at WRC-95 led to the allocation in Region 2 of the frequency bands 2 010-2 025 MHz (uplink) and 2 160-2 170 MHz (downlink), from within the IMT-2000 range, for MSS.

2 WRC-2000, under agenda item 1.6.1, needs to ensure that enough spectrum is identified for the satellite component of IMT-2000 to satisfy the projected spectrum requirements. The CPM Report concludes that there is a need for 2×31.5 MHz by 2005 and 2×67 MHz by 2010 for the satellite component of IMT-2000. This exceeds the spectrum currently identified for the satellite component of IMT-2000 through S5.388 and Resolution 212.

MOD ASP/20/78

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 525-1 530 SPACE OPERATION (space-to-Earth) FIXED MOBILE-SATELLITE (space-to-Earth) ADD S5.SSS Earth exploration-satellite Mobile except aeronautical mobile S5.349 S5.341 S5.342 S5.350 S5.351 S5.352A S5.354	**1 525-1 530** SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) ADD S5.SSS Earth exploration-satellite Fixed Mobile S5.343 S5.341 S5.351 S5.354	**1 525-1 530** SPACE OPERATION (space-to-Earth) FIXED MOBILE-SATELLITE (space-to-Earth) ADD S5.SSS Earth exploration-satellite Mobile S5.349 S5.341 S5.351 S5.352A S5.354
1 530-1 535 SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) S5.353A ADD S5.SSS Earth exploration-satellite Fixed Mobile except aeronautical mobile S5.341 S5.342 S5.351 S5.354	**1 530-1 535** SPACE OPERATION (space-to-Earth) MOBILE-SATELLITE (space-to-Earth) S5.353A ADD S5.SSS Earth exploration-satellite Fixed Mobile S5.343 S5.341 S5.351 S5.354	
1 535-1 559	MOBILE-SATELLITE (space-to-Earth) ADD S5.SSS S5.341 S5.351 S5.353A S5.354 S5.355 S5.356 S5.357 S5.357A S5.359 S5.362A	

MOD ASP/20/79

1 610-1 660 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 610-1 610.6 MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS AERONAUTICAL RADIONAVIGATION S5.341 S5.355 S5.359 S5.363 S5.364 S5.366 S5.367 S5.368 S5.369 S5.371 S5.372	**1 610-1 610.6** MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) S5.341 S5.364 S5.366 S5.367 S5.368 S5.370 S5.372	**1 610-1 610.6** MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) S5.341 S5.355 S5.359 S5.364 S5.366 S5.367 S5.368 S5.369 S5.372
1 610.6-1 613.8 MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION S5.149 S5.341 S5.355 S5.359 S5.363 S5.364 S5.366 S5.367 S5.368 S5.369 S5.371 S5.372	**1 610.6-1 613.8** MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) S5.149 S5.341 S5.364 S5.366 S5.367 S5.368 S5.370 S5.372	**1 610.6-1 613.8** MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) S5.149 S5.341 S5.355 S5.359 S5.364 S5.366 S5.367 S5.368 S5.369 S5.372
1 613.8-1 626.5 MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) S5.341 S5.355 S5.359 S5.363 S5.364 S5.365 S5.366 S5.367 S5.368 S5.369 S5.371 S5.372	**1 613.8-1 626.5** MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) S5.341 S5.364 S5.365 S5.366 S5.367 S5.368 S5.370 S5.372	**1 613.8-1 626.5** MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) Radiodetermination-satellite (Earth-to-space) S5.341 S5.355 S5.359 S5.364 S5.365 S5.366 S5.367 S5.368 S5.369 S5.372
1 626.5-1 660	MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS S5.341 S5.351 S5.353A S5.354 S5.355 S5.357A S5.359 S5.362A S5.374 S5.375 S5.376	

MOD ASP/20/80

1 660-1 710 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 660-1 660.5	MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS RADIO ASTRONOMY S5.149 S5.341 S5.351 S5.354 S5.362A S5.376A	

MOD ASP/20/81

2 170-2 520 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 483.5-2 500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) ADD S5.SSS Radiolocation S5.150 S5.371 S5.397 S5.398 S5.399 S5.400 S5.402	**2 483.5-2 500** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) ADD S5.SSS RADIOLOCATION RADIODETERMINATION-SATELLITE (space-to-Earth) S5.398 S5.150 S5.402	**2 483.5-2 500** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) ADD S5.SSS RADIOLOCATION Radiodetermination-satellite (space-to-Earth) S5.398 S5.150 S5.400 S5.402
2 500-2 520 FIXED S5.409 S5.410 S5.411 MOBILE except aeronautical mobile MOBILE-SATELLITE (space-to-Earth) S5.403 ADD S5.SSS S5.405 S5.407 S5.408 S5.412 S5.414	**2 500-2 520** FIXED S5.409 S5.411 FIXED-SATELLITE (space-to-Earth) S5.415 MOBILE except aeronautical mobile MOBILE-SATELLITE (space-to-Earth) S5.403 ADD S5.SSS S5.404 S5.407 S5.414 S5.415A	

MOD ASP/20/82

2 520-2 700 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 670-2 690 FIXED S5.409 S5.410 S5.411 MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS Earth exploration-satellite (passive) Radio astronomy Space research (passive)	**2 670-2 690** FIXED S5.409 S5.411 FIXED-SATELLITE (Earth-to-space) (space-to-Earth) S5.415 MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS Earth exploration-satellite (passive) Radio astronomy Space research (passive)	**2 670-2 690** FIXED S5.409 S5.411 FIXED-SATELLITE (Earth-to-space) S5.415 MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) ADD S5.SSS Earth exploration-satellite (passive) Radio astronomy Space research (passive)
S5.149 S5.419 S5.420	S5.149 S5.419 S5.420	S5.149 S5.419 S5.420 S5.420A

ADD ASP/20/83

S5.SSS The bands 1 525-1 544 MHz, 1 545-1 559 MHz, 1 610-1 626.5 MHz, 1 626.5-1 645.5 MHz, 1 646.5-1 660.5 MHz, 2 483.5-2 500 MHz, 2 500-2 520 MHz and 2 670-2 690 MHz are intended for use, on a worldwide basis, by administrations wishing to implement the satellite component of International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of these bands by other services to which they are allocated. (See also **S5.353A** and **S.357A**.)

Reasons:

1 The CPM Report concludes that there is a need for 2×31.5 MHz by 2005 and 2×67 MHz by 2010 for the satellite component of IMT-2000. This exceeds the spectrum currently identified for the satellite component of IMT-2000.

2 The bands 1 525-1 544 MHz, 1 545-1 559 MHz, 1 610-1 626.5 MHz, 1 626.5-1 645.5 MHz, 1 646.5-1 660.5 MHz, 2 483.5-2 500 MHz, 2 500-2 520 MHz and 2 670-2 690 MHz are already allocated globally on a primary basis to the mobile-satellite service.

3 These bands are used and will continue to be used also by non-IMT-2000 MSS systems. By identifying these bands for the satellite component of IMT-2000, administrations are given maximum flexibility for accommodating the deployment of satellite IMT-2000 systems.

Agenda item 1.6.1

1.6.1 review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

Submitted by the following administrations:

Bhutan (Kingdom of), Brunei Darussalam, Korea (Republic of), Japan, Malaysia, Maldives (Republic of), Myanmar (Union of), New Zealand, Papua New Guinea, Democratic People's Republic of Korea, Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

ISSUE C: IMT-2000 HAPS

Introduction

The purpose of this proposal is to address the use of high altitude platform stations (HAPS) systems as an optional possibility for the delivery of terrestrial IMT-2000 services, within the bands identified for terrestrial IMT-2000 systems in S5.388 subject to licensing, coordination and sharing requirements of administrations. The proposal deals with the regulatory considerations related to HAPS in the context of IMT-2000 only. It does not involve the matter of additional spectrum for the terrestrial component of IMT-2000 and the related considerations of candidate bands.

A high altitude platform station (HAPS) is defined in S1.66A as "a station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth". Each HAPS deploys a multibeam antenna capable of projecting numerous spot beams within its coverage area. The role of HAPS is equivalent to the terrestrial base station. Accordingly, IMT-2000 terminals are identical to those terminals used with HAPS.

Each HAPS will be positioned above commercial airspace at an altitude that is high enough to provide service to a large footprint but that is low enough to provide dense coverage. HAPS will offer a new means of providing IMT-2000 with minimal ground network build out.

The Radio Regulations, under S4.15A, states that "transmissions to or from high altitude platform stations shall be limited to bands specifically identified in Article S5". The only identification currently in Article S5 is the footnote S5.552A that states that "the allocation to the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz is designated for use by high altitude platform stations. The use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz is subject to the provisions of Resolution 122 (WRC-97)".

The use of HAPS as a means of providing IMT-2000 type services has been the subject of extensive studies in the Study Group 8 process. In particular Task Group 8/1 recognized that the high altitude platform stations could provide base stations enabling optional means of transmission of IMT-2000 services. In relation to identification within Article S5, it is proposed that an additional footnote would be necessary to enable HAPS operation within a terrestrial IMT-2000 system, with the wording of the footnote along the lines of that proposed in S5.HHH in § 1.1.1.5.2 of the CPM Report.

Draft new Recommendation ITU-R M.[Doc. 8/115] as agreed by ITU-R Study Group 8 for adoption by correspondence the minimum performance characteristics, the sharing and coordination requirements associated with the use of HAPS as part of a terrestrial IMT-2000 system. It is appropriate that those characteristics and related requirements be suitably reflected in regulatory provisions and in including in particular the antenna patterns and operational spectral power flux-density (spfd) limits for coordination purposes and to ensure protection of adjacent band operations and services in neighbouring administrations.

Further, the use of HAPS in the currently identified IMT-2000 bands shall be optional for administrations. Each administration shall retain its individual authority over technical and regulatory matters pertaining to the sharing, coordination and implementation of HAPS in these bands.

RR S11.26 states that notification for HAPS in the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz may reach the Bureau as early as five years before the assignments are brought into use. Such a regulatory priority is not appropriate for the IMT-2000 situation, and no provision for any priority of notification is being proposed.

For the possible implementation of HAPS in an IMT-2000 system, the following regulatory changes are proposed:

MOD ASP/20/84

1 710-2 170 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 710-1 930	FIXED MOBILE S5.380 S5.149 S5.341 S5.385 S5.386 S5.387 S5.388 ADD S5.HHH	
1 930-1 970 FIXED MOBILE S5.388 ADD S5.HHH	**1 930-1 970** FIXED MOBILE Mobile-satellite (Earth-to-space) S5.388 ADD S5.HHH	**1 930-1 970** FIXED MOBILE S5.388 ADD S5.HHH
1 970-1 980	FIXED MOBILE S5.388 ADD S5.HHH	
1 980-2 010	FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.388 S5.389A S5.389B S5.389F	
2 010-2 025 FIXED MOBILE S5.388 ADD S5.HHH	**2 010-2 025** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.388 S5.389C S5.389D S5.389E S5.390	**2 010-2 025** FIXED MOBILE S5.388 ADD S5.HHH
2 025-2 110	SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE S5.391 SPACE RESEARCH (Earth-to-space) (space-to-space) S5.392	
2 110-2 120	FIXED MOBILE SPACE RESEARCH (deep space) (Earth-to-space) S5.388 ADD S5.HHH	
2 120-2 160 FIXED MOBILE S5.388 ADD S5.HHH	**2 120-2 160** FIXED MOBILE Mobile-satellite (space-to-Earth) S5.388 ADD S5.HHH	**2 120-2 160** FIXED MOBILE S5.388 ADD S5.HHH
2 160-2 170 FIXED MOBILE S5.388 S5.392A ADD S5.HHH	**2 160-2 170** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) S5.388 S5.389C S5.389D S5.389E S5.390	**2 160-2 170** FIXED MOBILE S5.388 ADD S5.HHH

ADD ASP/20/85

S5.HHH In Regions 1 and 3, the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, and in Region 2, the bands 1 885-1 980 MHz and 2 110-2 160 MHz, may be used by high altitude platform stations as base stations to provide International Mobile Telecommunications-2000 (IMT-2000) (see Resolution **XXX (WRC-2000)**).

ADD ASP/20/86

S11.8A *g)* if it is a high altitude platform station.

For purposes of enabling HAPS operation in the bands identified in No. **S5.HHH**, No. **S11.26** should not apply to the bands identified for IMT-2000.

ADD ASP/20/87

ARTICLE S27A

ADD ASP/20/88

High altitude platform stations

ADD ASP/20/89

S27A.1 High altitude platform stations implemented within a terrestrial IMT-2000 system shall conform to the minimum performance characteristics and operational conditions given in Resolution **XXX (WRC-2000)**.

ADD ASP/20/90

S27A.2 The spectral power flux-density limit at the border of a neighbouring administration shall be as provided in Resolution **XXX (WRC-2000)** unless otherwise agreed by the affected administration.

ADD ASP/20/91

RESOLUTION XXX (WRC-2000)

Minimum performance characteristics and operating conditions for high altitude platform stations providing IMT-2000 services in the bands 1 885-1 980 MHz, 2 010-2 025 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that high altitude platform stations (HAPS) have the possibility of delivering IMT-2000 mobile and fixed wireless access using the proposed IMT-2000 terrestrial component radio transmission technologies and protocols;

b) that each HAPS uses a phased array antenna to project hundreds of spot beams to provide telecommunications services to coverage areas that range in size from metropolitan to wider areas;

c) that for non-HAPS terrestrial base stations, such as tower-based systems, the illumination of areas outside the intended operational area is dependent on the characteristics of the tower-mounted antenna and the propagation attenuation. For HAPS, the dependence is more on the characteristics of the HAPS mounted antenna especially the side-lobe performance and the pointing accuracy and as the coverage area increases the antenna performance becomes more demanding;

d) that the characteristics of co-channel sharing and coordination between HAPS systems and other IMT-2000 are determined by the performance of the HAPS antennas, the IMT-2000 radio interface used by HAPS, and the HAPS coverage area;

e) that the level of out-of-band interference from HAPS antennas, the IMT-2000 radio interface used by HAPS and the HAPS coverage area;

f) that HAPS is proposed to be used as a base station of terrestrial IMT-2000 and should not have any priority over other terrestrial IMT-2000 use,

resolves

1 that for the purpose of protecting stations operated by neighbouring administrations from co-channel interference, administrations using HAPS as base stations to provide IMT-2000 shall use antennas that comply with the following antenna pattern:

$$G(\psi) = G_m - 3(\psi/\psi_b)^2 \quad \text{dBi} \quad \text{for} \quad 0 \le \psi \le \psi_1$$

$$G(\psi) = G_m + L_N \quad \text{dBi} \quad \text{for} \quad \psi_1 < \psi \le \psi_2$$

$$G(\psi) = X - 60\log(\psi) \quad \text{dBi} \quad \text{for} \quad \psi_2 < \psi \le \psi_3$$

$$G(\psi) = L_F \quad \text{dBi} \quad \text{for} \quad \psi_3 < \psi \le 90^\circ$$

where:

$G(\psi)$: gain at the angle ψ from the main beam direction (dBi)

G_m: maximum gain in the main lobe (dBi)

ψ_b: one-half of the 3 dB beamwidth in the plane of interest (3 dB below G_m) (degrees)

L_N: near-in-side-lobe level in dB relative to the peak gain required by the system design, and as a maximum value of −25 dB

L_F = G_m – 73 dBi far side-lobe level (dBi)

$$\psi_1 = \psi_b \sqrt{-L_N/3} \quad \text{degrees}$$

$$\psi_2 = 3.745\psi_b \quad \text{degrees}$$

$$X = G_m + L_N + 60\log(\psi_2) \quad \text{dB}$$

$$\psi_3 = 10^{(X - L_F)/60} \quad \text{degrees}$$

The 3 dB beamwidth ($2\psi_b$)is again estimated by:

$$(\psi_b)^2 = 7\,442/(10^{0.1G_m}) \quad \text{(in degrees}^2\text{)}$$

where G_m is the peak aperture gain (dBi);

2 that a HAPS operating as a base station to provide IMT-2000 shall not exceed a co-channel spectral power flux-density (spfd) level of −121.5 dB(W/($m^2 \cdot$ MHz)) on the Earth's surface outside an administration's boundaries unless agreed otherwise with the affected neighbouring administration;

3 that a HAPS operating as a base station to provide IMT-2000, in order to protect mobile earth stations from interference, shall not exceed an out-of-band spfd level of −165 dB(W/($m^2 \cdot$ 4 kHz)) on the Earth's surface in the bands 2 160-2 200 MHz in Region 2 and 2 170-2 200 MHz in Regions 1 and 3;

4 that a HAPS operating as a base station to provide IMT-2000, in order to protect fixed stations from interference, shall not exceed an out-of-band spfd level on the Earth's surface in the bands 2 025-2 110 MHz of:

a) −165 dB(W/($m^2 \cdot$ MHz)) for angles of arrival (θ) less than 5° above the horizontal plane;

b) −165 + 1.75 (θ – 5) dB (W/($m^2 \cdot$ MHz)) for angles of arrival between 5° and 25° above the horizontal plane; and

c) −130 dB(W/($m^2 \cdot$ MHz)) for angles of arrival between 25° and 90° above the horizontal plane.

Reasons: Studies for HAPS within IMT-2000 systems have been completed in Task Group 8/1 and Study Group 8 has agreed to the new Recommendation ITU-R M.[Doc. 8/115] on "Minimum performance characteristics and operational conditions for high altitude platform stations providing IMT-2000 in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2" for adoption by correspondence. This Recommendation provides methods both for the administration putting HAPS into service and for other administrations to evaluate the potential impact of interference, by specifying spfd levels, both co-channel and in adjacent bands, and by specifying the antenna radiation pattern.

RR S4.15A limits transmission to and from HAPS to bands specifically identified in the Table of Frequency Allocations. So far, the only bands which are identified as such by RR S5.552A are 47.2-47.5 GHz and 47.9-48.2 GHz.

The use of HAPS to provide IMT-2000 is therefore conditioned to the identification of the bands identified for IMT-2000 in RR S5.388 as available for use by HAPS.

However, such identification should be limited at present to be within those bands currently identified in RR S5.388, as has been done in the DNR, since new bands to be identified for IMT-2000 under agenda item 1.6.1 may have to share with co-primary and secondary allocations with various services, and sharing has been investigated only in the existing bands so far.

Agenda item 1.6.2

1.6.2 identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000

Submitted by the following administrations:

Bhutan (Kingdom of), Brunei Darussalam, China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Philippines (Republic of the), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

ASP/20/92

APT proposes that a global radio control channel is not necessary.

Reasons: APT countries support the current CPM text.

Agenda item 1.7

1.7 review the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting the operational, distress and safety communications, taking into account Resolution **346 (WRC-97)**

Submitted by the following administrations:

Bhutan (Kingdom of), Brunei Darussalam, China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Papua New Guinea, Philippines (Republic of the), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

Section 1.2.3.1 of Chapter 1 of the CPM Report recognized that modification of Resolution 207 (Mob-87) would draw attention to the problem of interference to HF communications from unauthorized sources and the need to study possible solutions to mitigate this type of interference. It was also noted by the CPM that expedient action needs to be taken by responsible administrations in response to interference reports.

MOD ASP/20/93

RESOLUTION 207 (~~Mob-87~~Rev.WRC-2000)

Unauthorized use of frequencies in the bands allocated to the maritime mobile service and to the aeronautical mobile (R) service[1]

The World ~~Administrative~~ Radiocommunication Conference ~~for the Mobile Services, Geneva, 1987~~(Istanbul, 2000),

considering

a) that existing provisions of the Radio Regulations prohibit the unauthorized use of certain frequencies for other than safety-related communications;

~~a~~b) that monitoring observations of the use of frequencies in the band 2 170-2 194 kHz and in the bands allocated exclusively to the maritime mobile service between 4 063 kHz and 27 500 kHz and to the aeronautical mobile (R) service between 2 850 kHz and 22 000 kHz show that a number of frequencies in these bands are still being used by stations of other services, some of which are operating in contravention of No. **S23.2**;

~~b~~c) that these stations are causing harmful interference to the maritime mobile and aeronautical mobile (R) services;

~~c~~d) that HF radio is the sole means of communication in certain situations for the maritime mobile service and that certain frequencies in the bands mentioned in *considering ~~a~~b)* are reserved for distress and safety purposes;

~~d~~e) that HF radio is the sole means of communication in certain situations for the aeronautical mobile (R) service and that this is a safety service~~,~~;

f) that enforcing compliance with these regulatory provisions is becoming increasingly difficult with the availability of low-cost HF SSB transcievers;

g) that this Conference has reviewed the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting the operational, distress and safety communications,

considering in particular

~~e~~h) that it is of paramount importance that the distress and safety channels of the maritime mobile service be kept free from harmful interference, since they are essential for the protection of the safety of life and property;

~~f~~i) that it is also of paramount importance that channels directly concerned with the safe and regular conduct of aircraft operations be kept free from harmful interference, since they are essential for the safety of life and property,

[1] WRC-97 made editorial amendments to this Resolution.

resolves

to urge administrations

1 to ensure that stations of services other than the maritime mobile service abstain from using frequencies in distress and safety channels and their guard bands and in the bands allocated exclusively to that service, except under the conditions expressly specified in Nos. **S4.4**, **S5.128**, **S5.129**, **S5.137** and **S4.13** to **S4.15**; and to ensure that stations of services other than the aeronautical mobile (R) service refrain from using frequencies allocated to that service except under the conditions expressly specified in Nos. **S4.4** and **S4.13**;

2 to make every effort to identify and locate the source of any unauthorized emission capable of endangering human life or property and the safe and regular conduct of aircraft operations, and to communicate their findings to the Radiocommunication Bureau;

3 to participate in the monitoring programmes that the Bureau may organize pursuant to this Resolution;

4 to make every effort to ensure that such emissions are made in appropriate bands allocated to services other than the maritime mobile service or the aeronautical mobile (R) service;

5 to request their competent authorities to take, within their respective jurisdiction, such legislative or regulatory measures which they consider necessary or appropriate in order to prevent stations from unauthorized use of distress and safety channels or operating in contravention of No. **S23.2**,

to invite the Bureau

1 to study possible solutions, technical and regulatory, to assist in mitigating HF interference;

~~1~~2 to continue to organize monitoring programmes, at regular intervals, in the maritime distress and safety channels and their guard bands and in the bands allocated exclusively to the maritime mobile service between 4 063 kHz and 27 500 kHz and to the aeronautical mobile (R) service between 2 850 kHz and 22 000 kHz, with a view to ensuring the timely distribution of monitoring data and identifying the stations of other services operating on these channels or in these bands;

~~2~~3 to seek the cooperation of administrations in identifying the sources of those emissions by all available means and in securing the cessation of those emissions;

~~3~~4 when the station of another service transmitting in a band allocated to the maritime mobile service or to the aeronautical mobile (R) service has been identified, to inform the administration concerned,

to invite ITU-R and ITU-D

1 to conduct periodic regional awareness campaigns in an attempt to mitigate the HF interference, especially on distress and emergency channels;

2 to include the problem of interference to distress and emergency channels on the agenda of regional radiocommunication and development seminars,

requests administrations

to take all necessary steps in such cases to ensure the cessation of any transmissions contravening the provisions of the Radio Regulations on the frequencies or in the bands referred to in this Resolution.

Reasons: The proposed modifications are intended to increase awareness to the problem of interference to HF aeronautical and maritime communications and to task ITU-R to undertake mitigation studies.

MOD ASP/20/94

S15.37 § 29 An administration receiving a communication to the effect that one of its stations is causing harmful interference to a safety service shall promptly investigate the matter and take any necessary remedial action and respond in a timely manner.

Reasons: Section 1.2.3.1.1 of the CPM Report states that Article S15 of the Radio Regulations may state that administrations should respond in a timely manner.

Agenda item 1.8

1.8 to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands

Submitted by the following administrations:

Brunei Darussalam, Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Papua New Guinea, Philippines (Republic of the), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

The CPM Report notes that earth stations on board vessels (ESVs) can provide wideband services to cruise liners, passenger ships, naval vessels, seismic research and petroleum exploration vessels and other deep draft vessels. These installations are essentially mobile in nature and as such pose a new interference risk to 6 GHz fixed links.

The CPM Report proposed two options:

– a draft resolution giving regulatory text dealing with the operation of ESVs; and

– an alternative proposal that no change be made to the Radio Regulations, in which ESVs would continue to operate under S4.4.

The following APT proposal is based on the first option above.

MOD ASP/20/95

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
3 400-3 600 FIXED FIXED-SATELLITE (space-to-Earth) Mobile Radiolocation S5.431	**3 400-3 500** FIXED FIXED-SATELLITE (space-to-Earth) Amateur Mobile Radiolocation S5.433 S5.282 S5.432	
3 600-4 200 FIXED FIXED-SATELLITE (space-to-Earth) ADD S5.XXX Mobile	**3 500-3 700** FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation S5.433 S5.435	
	3 700-4 200 FIXED FIXED-SATELLITE (space-to-Earth) ADD S5.XXX MOBILE except aeronautical mobile	

MOD ASP/20/96

5 830-7 550 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 925-6 700	FIXED FIXED-SATELLITE (Earth-to-space) ADD S5.XXX MOBILE S5.149 S5.440 S5.458	

ADD ASP/20/96*bis*

S5.XXX In the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz, transponders on space stations in the fixed-satellite service may be used, additionally, by earth stations on vessels. Such use is subject to the provisions specified in Resolution **ZZZ (WRC-2000)**.

Reasons: It is appropriate to add a footnote to the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz in Article S5. Resolution ZZZ should contain technical and operational requirements in addition to the procedures.

ADD ASP/20/97

DRAFT RESOLUTION ZZZ (WRC-2000)

Provisions to enable earth stations located on board vessels to operate in fixed-satellite service networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that there is a demand for global wideband satellite communication services on vessels;

b) that the technology exists that would permit the use of fixed-satellite services (FSS) networks by earth stations on board vessels (ESVs) operating in the 3 700-4 200 MHz and 5 925-6 425 MHz bands;

c) that ESVs have the potential to cause unacceptable interference to the fixed service (FS) systems in the band 5 925-6 425 MHz;

d) that FS systems have the potential to cause interference to ESVs in the 3 700-4 200 MHz band;

e) that ESVs operating in these bands require considerably less than the full bandwidth in this FSS allocation and only a portion of the visible geostationary arc;

f) that there are a limited number of geostationary FSS systems that have global coverage;

g) that in order to ensure the protection and future growth of the FS, the ESV must operate with certain technical and operational constraints;

h) that administrations may authorize radiocommunication stations on off-shore structures and platforms for which they are responsible;

i) that based on appropriate assumptions a minimum distance can be calculated beyond which the ESV will not have the potential to cause unacceptable interference to the fixed service in this band,

noting

a) that operation within the territorial sea is at the discretion of the administration with territorial authority, in which case the relevant procedures of that administration will apply;

b) that operation of earth stations on vessels from specified fixed points at locations outside the territorial sea but for which an administration has territorial jurisdiction is fully within the FSS,

resolves

1 that the administration that issues the radio licence for the use of ESVs in these bands (licensing administration) shall ensure that such stations do not cause unacceptable interference to stations in the fixed service;

2 that licensing administrations shall ensure that ESVs are capable of operating in compliance with the requirements of this Resolution;

3 that operators of ESVs shall comply with the conditions established by the licensing administration(s);

4 that ESVs shall not claim protection from fixed service station transmissions;

5 that any transmissions from ESVs within a distance of 370 km off the coast shall be based upon the prior agreement of that coastal administration;

6 that the coastal administration, in determining the contour with a distance of 370 km off the coast, should exclude those parts of its territory, such as remote small islands, where FS systems in the band 5 925-6 425 MHz are neither operating nor planned; however, the coastal administration may revise the above contour, if the modification of the future deployment plan for those parts of the territory requires such a revision;

7 that appropriate technical measures for identification of ESVs shall be available for the coastal as well as licensing administrations for such ESVs which continue to operate outside their predetermined geographic (see *resolves* 5) or operational limits. The licensing administration shall also be equipped with automatic mechanisms to terminate transmissions of such ESVs;

8 that ESVs shall be equipped so as to enable the licensing administration under the provisions of Article **S18** to verify earth station performance and to accomplish the switch off of the ESV transmission immediately upon request by an administration whose services may be affected;

9 that ESVs shall comply with additional technical and operational limits given in Annex 1 to this Resolution;

10 that when ESVs operating beyond the territorial sea but within 370 km off the coast of an administration fail to comply with the terms required by that administration pursuant to *resolves* 3 and 5, then that administration may:

– request the ESV to comply with such terms or cease operation immediately; or

– request the licensing administration to require such compliance or immediate cessation of the operation;

11 that any licensing authority that licenses ESVs shall agree to maintain at all times a point of contact, which shall be published in a circular of ITU, that may be contacted by an affected administration seeking assistance pursuant to *resolves* 3 and 5 above;

12 that this Resolution should be considered as provisional and should be placed on the agenda of the next world radiocommunication conference for review,

requests ITU-R

1 to continue studies on various aspects of ESV operation in the bands 3 700-4 200 MHz and 5 925-6 425 MHz;

2 to study the possible extension of the bands for ESV operation from 3 700-4 200 MHz and 5 925-6 425 MHz to 3 400-4 200 MHz and 5 925-6 725 MHz;

3 to develop appropriate technical measures for identification and radiomonitoring by coastal as well as licensing administrations of such ESVs which continue to operate outside their predetermined geographic or operational limits;

4 to study, as a complementary measure, the feasibility of an ESV system which operates in the bands 10.95-12.75 GHz and 13.75-14.5 GHz and/or a dual-band ESV system in which an ESV may operate either in the bands 3 700-4 200 MHz and 5 925-6 425 MHz or in the bands 10.95-12.75 GHz and 13.75-14.5 GHz depending on its location, and to study the sharing criteria and the coordination procedures of such ESV operation with the terrestrial services and the fixed-satellite service operating in these bands;

5 to report the results of the above studies to the next world radiocommunication conference through the conference preparatory meeting.

ANNEX 1 TO RESOLUTION ZZZ (WRC-2000)

Additional technical and operational limits on ESVs in the band 5 925-6 425 MHz

ESVs shall comply with the following additional technical and operational limits in the band 5 925-6 425 MHz:

– minimum diameter of ESV antenna: 2.4 m (NOTE 1);

– minimum elevation angle of ESV antenna: 10°;

– maximum tracking error of ESV antenna regardless of the sea conditions: 0.2°;

– ESV antenna side-lobe gain at the off-axis angle (ϕ) in the range of 10°-20° (including the effects of a radome): 29-25 log ϕ (dBi) or less;

– maximum necessary bandwidth per vessel: 2.5 MHz;

– maximum ESV transmitter power spectral density at the input of the antenna: 17 dB(W/MHz).

NOTE 1 - The ESV antenna half-power bandwidth of 1.5° required to protect adjacent satellites is consistent with the minimum antenna diameter of 2.4 m.

Reasons:

1 The value of X = 370 km was chosen from the CPM Report as an administrative value. Since the value of X must be sufficiently large in order to provide adequate protection of the FS, the candidate values are 370 km and 540 km, according to the CPM Report.

The value of X = 370 km is based on Document CPM99-2/69 submitted to CPM-99. This document adopted the interference assessment methodology as generally agreed to by Working Party 4-9S at its meeting in April 1999, but made a detailed examination on all assumptions and technical parameters adopted in that methodology and made calculations on the basis of revised assumptions and parameters. Therefore, it can be regarded as an improved version of the previous study by Working Party 4-9S. In addition, the assumptions include the following:

– the receiving antenna of an interfered-with FS station is directed towards the sea, perpendicular to the coastline;

– the ESV antenna elevation angle is as low as 10° and the satellite is located in the direction of the interfered-with FS station;

– the ESV is always active at the same frequency.

The above assumptions correspond to the worst case. For example, even if many FS stations are operating near the coast, many of their routes are along the coastline. In such a case, the minimum distance can be well below 100 km, due to the directivity of FS antennas. Only a very few stations will have receiving antennas directed towards the sea, perpendicular to the coastline. Therefore, the value of X = 370 km will adequately protect 6 GHz band FS systems and is appropriate on the basis of the best available information.

2 In some parts (such as remote small islands) of the territory of a coastal administration, 6 GHz FS systems may not operate. It is unnecessary to protect such areas. Therefore, new *resolves* 6 is proposed.

3 It should be noted that § 6.3.3.1 of the CPM Report states that "… agenda item 1.8 can be satisfied by incorporation of the necessary technical and operational constraints …" Therefore, in order to define some basic technical and operational limits of ESVs, it is proposed to add Annex 1 to Resolution ZZZ. The antenna side-lobe pattern is based on the pattern used in the study of Working Party 4-9S (see Document 4-9S/178). The maximum necessary bandwidth of 2.5 MHz is slightly larger than 2.346 MHz in the CPM Report. This takes into account some allowance for ambiguity in necessary bandwidth calculation, but will not increase interference from ESVs.

4 Resolution ZZZ should be a provisional one and should be reviewed at the next world radiocommunication conference. Therefore, new *resolves* 12 is proposed.

5 WRC-2000 should request ITU-R to continue studies on ESVs in the 4/6 GHz bands.

6 In view of a difficult sharing situation in the 4/6 GHz bands within a distance of 370 km off the coast, WRC-2000 should request ITU-R to study the feasibility of a complementary measure such as ESVs in the 11/14 GHz bands. The transponder bandwidths of one international satellite operator are 10.95-11.2 GHz, 11.45-11.7 GHz, 11.7-12.2 GHz (Region 2) and 12.5-12.75 GHz (Region 3) in the 10.95-12.75 GHz range (downlink), and 13.75-14.0 GHz and 14.0-14.5 GHz in the 13.75-14.5 GHz range (uplink), some transponders being on a regional basis.

The band 10.95-11.7 GHz is allocated on a co-primary basis to the FS, FSS and MS (except aeronautical mobile). In Region 2, the band 11.7-12.1 GHz is allocated on a co-primary basis to the FS and FSS, and the band 12.1-12.2 GHz is exclusive to the FSS. In Region 3, the band 12.5-12.75 GHz is allocated on a co-primary basis to the FS, FSS, MS (except aeronautical mobile) and BSS.

As far as the primary allocations are concerned, the band 13.75-14.0 GHz is allocated to the FSS and radiolocation and the band 14.0-14.3 GHz is allocated to the FSS and radionavigation on a worldwide basis. The band 14.3-14.4 GHz is allocated on a co-primary basis to the FS, FSS and MS (except aeronautical mobile), but the allocation in Region 2 is exclusive to the FSS. The band 14.4-14.5 GHz is allocated to the FS, FSS and MS (except aeronautical mobile) on a worldwide basis. Some footnotes make additional allocations of the band 13.75-14.3 GHz to the FS and MS in certain countries.

The coverage areas of the GSO satellites operating in the 11/14 GHz bands are not global, being continental coverages. Therefore, it is not possible to provide 11/14 GHz band operation to ESVs in the middle of oceans. The coverage areas are limited only to those areas close to continents. In addition, the coverages of these areas may not be guaranteed.

Therefore, if ESVs in the 11/14 GHz bands are to be considered, one possible way seems to introduce a dual-band ESV system, in which ESVs employ the 4/6 GHz band operation in the middle of oceans and the 11/14 GHz band operation near the coasts. This system will generally reduce interference to terrestrial services from ESVs. Alternatively, an ESV system which operates in the 11/14 GHz bands only may also offer an opportunity for wideband communication. However, further studies are required on:

– feasibility of the 11/14 GHz band ESV system and/or the dual-band ESV system;

– current and future FSS satellite coverage areas for 11/14 GHz band ESVs;

– interference to FS, radiolocation and radionavigation systems from ESVs in the 14 GHz band.

Finally it should be noted that, according to No. S5.502, the e.i.r.p. of an FSS earth station in the band 13.75-14 GHz shall be at least 68 dBW, and should not exceed 85 dBW, with a minimum antenna diameter of 4.5 m. These limits were established in order to protect the FSS from interference caused by radiolocation systems. ESVs may not be able to meet these requirements, which should be taken into account by the ITU-R study. However, APT proposes that prohibition of emissions less than 68 dBW be relaxed but such earth stations not be protected.

NOTE - The band 14-14.5 GHz is allocated to the mobile-satellite service (except aeronautical mobile-satellite service) on a secondary basis, but there is no such allocation in the band 10.95-12.75 GHz. In order to avoid a complicated discussion, it is suggested that for the 11/14 GHz band, ESV operation be regarded as a part of the fixed-satellite service.

Agenda item 1.9

1.9 to take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service (MSS) in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions **213 (Rev.WRC-95)** and **220 (WRC-97)**

Submitted by the following administrations:

Bhutan (Kingdom of), Brunei Darussalam, China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Philippines (Republic of the), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

Introduction

1 The band 1 559-1 567 MHz

This proposal addresses the issue of a possible allocation for MSS in the 1 559-1 567 MHz band.

APT administrations are strongly of the view that sharing between MSS and RNSS in the band 1 559-1 567 MHz is not feasible as concluded in the CPM Report. Accordingly, APT administrations support NOC for the existing allocations in this band, except to support the addition of the space-to-space direction to the RNSS allocation as per agenda item 1.15.2.

In addition, APT administrations support the suppression of Resolution 220 as studies on this matter by ITU-R have now been completed.

MOD ASP/20/98

(Refer to the frequency table for 1 559-1 610 MHz in relation to agenda item 1.15.2.)

Reasons: Frequency sharing between MSS and RNSS in this band is not feasible.

SUP ASP/20/99

RESOLUTION 220 (WRC-97)

Studies to consider the feasibility of use of a portion of the band 1 559-1 610 MHz by the mobile-satellite service (space-to-Earth)

Reasons: Resolution 220 can be suppressed as ITU-R has completed its studies on this matter.

Agenda item 1.10

1.10 to consider results of ITU-R studies carried out in accordance with Resolution **218 (WRC-97)** and take appropriate action on this subject

Submitted by the following administrations:

Bhutan (Kingdom of), China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Philippines (Republic of the), Democratic People's Republic of Korea, Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

Background

The generic MSS allocation, which was adopted at WRC-97, is intended to alleviate the current spectrum congestion for existing and planned MSS systems. Protection was afforded to the global maritime distress and safety system (GMDSS) and the aeronautical mobile-satellite (route) service by footnotes S5.353A and S5.357A respectively.

APT administrations recognize that additional regulatory procedures and appropriate operational measures are required, as a matter of urgency, to ensure priority access to the spectrum in these bands, during the progress of operations, as well as in the coordination phase by AMS(R)S and GMDSS (operations only), consistent with the protection for these safety of life services.

SUP ASP/20/100

RESOLUTION 218 (WRC-97)

Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service

ADD ASP/20/101

DRAFT NEW RESOLUTION XXX (WRC-2000)

Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that prior to the World Radiocommunication Conference 1997 the bands 1 530-1 544 MHz, 1 545-1 555 MHz (space-to-Earth) and 1 626.5-1 645.5 MHz, 1 646.5-1 656.5 MHz (Earth-to-space) were allocated on an exclusive basis in most administrations to the mobile maritime satellite service and the aeronautical mobile-satellite (route) service (AMS(R)S);

b) that the World Radiocommunication Conference (Geneva, 1997) allocated these bands to the generic mobile-satellite service (MSS);

c) that the World Radiocommunication Conference (Geneva, 1997) adopted footnotes No. **S5.353A** giving priority to accommodating the spectrum requirements for distress, urgency and safety communications, and protection from unacceptable interference, to the global maritime distress and safety service (GMDSS) in the bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz and No. **S5.357A** giving priority to accommodating the spectrum requirements, and protection from unacceptable interference, to the AMS(R)S providing transmission of messages with priority 1 to 6 in Article **S44** in the bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz,

considering further

d) that global and regional mobile-satellite systems are being coordinated in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz and that Section IIA of Article **S9** provides the international framework for coordination agreements;

e) that in these bands GSO satellite system operators presently use a capacity planning approach at multilateral coordination meetings, with the guidance and support of their administrations, to periodically coordinate access to the spectrum needed to accommodate their requirements, however, outside the multilateral process, coordination problems have occurred in some cases;

f) that in the bands to which Nos. **S5.353A** or **S5.357A** applies, the capacity planning approach, and other methods such as intra- and inter-system prioritization, pre-emption and interoperability may assist to accommodate the expanding spectrum requirements of the GMDSS and AMS(R)S;

g) that, as spectrum saturation is reached, MSS systems that do not carry GMDSS or AMS(R)S traffic and MSS systems that do not have the ability to provide prioritization, pre-emption within or between their networks or do not have interoperability with other MSS systems that are carrying GMDSS or AMS(R)S traffic, will be required to vacate these bands to conform with the requirements of Nos. **S5.353A** and **S5.357A**;

h) that the feasibility of prioritization, real-time pre-emptive access and interoperability between different mobile-satellite systems and systems providing GMDSS and AMS(R)S has yet to be adequately determined,

recognizing

a) that the Convention on International Civil Aviation requires that stations of the AMS(R)S shall be in compliance with the internationally agreed Standards and Recommended Practices and procedures for Air Navigation Services and that the ICAO has developed a global air traffic management system which requires interoperability between stations providing AMS(R)S communications with the priority message structure of Article **S44** and that each of these messages are safety related;

b) that the IMO may also place similar requirements of interoperability for those mobile-satellite systems providing GMDSS communications with the priority message structure of Article **S53**;

c) that Appendix **S15** of the Radio Regulations identifies the bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz for distress and safety purposes in the GMDSS as well as for routine non-safety purposes;

d) that priority access and immediate availability of spectrum for maritime distress, urgency and safety communications of the GMDSS and AMS(R)S communications with priority 1 to 6 of Article **S44** is of vital importance for the safety of life,

noting

a) that maritime general communications is defined under the International Convention for the Safety of Life at Sea (SOLAS) as operational and public correspondence, other than distress, urgency and safety, conducted by radio;

b) that maritime distress, urgency and safety communications of the GMDSS in the bands 1 530-1 545 MHz and 1 626.5-1 645.5 MHz include communications with priority 1 to 3 and safety-related communications carried under priority 4 of Article **S53**,

resolves

1 that in frequency coordination procedures and agreements for the mobile-satellite services in the bands 1 530-1 544, 1 545-1 555 MHz and 1 626.5-1 645.5, 1 646.5-1 656.5 MHz, administrations shall ensure prompt and equitable allocation of spectrum between operators in order to meet the spectrum requirements for all distress, urgency and safety communications of the GMDSS as defined in Articles **S32** and **S33** in the bands where No. **S5.353A** applies and the AMS(R)S communications with priority 1 to 6 of Article **S44** in the bands where No. **S5.357A** applies;

2 that techniques such as prioritization and real-time pre-emptive access within a mobile-satellite network and between different mobile-satellite networks and interoperability between different mobile-satellite networks, for GMDSS or AMS(R)S communications over all other communications should be determined and, when necessary and where feasible, implemented in order to achieve the most flexible and practical use of the generic allocations;

3 administrations shall ensure that mobile-satellite service operators carrying non-safety related traffic yield capacity as and when necessary to accommodate the needs of the GMDSS communications as defined in Articles **S32** and **S33** and AMS(R)S communications with priority 1 to 6 of Article **S44**. This could be achieved in advance by the coordination process at *resolves* 1 above or through the implementation of techniques at *resolves* 2 above,

requests ITU-R

1 to complete studies as a matter of urgency, to determine the feasibility of prioritization and real-time pre-emptive access between different networks of mobile-satellite systems and interoperability between different mobile-satellite networks as referred to in *resolves* 2 above;

2 to study and establish the conditions and requirements for prioritization, pre-emption and interoperability within and between mobile-satellite networks operating in bands where Nos. **S5.353A** and **S5.357A** applies,

requests WRC-02/03

to take into account the outcome of ITU-R studies and take appropriate action on this subject,

invites

ICAO, IMO, IATA, administrations and other organizations concerned to participate in the studies identified in *requests ITU-R* 1 and 2 above.

Reasons: The proposed draft Resolution XXX (WRC-2000) redefines the studies requested in Resolution 218 and clarifies and strengthens the provisions of the Radio Regulations S5.353A and S5.357A.

APT proposes that Radio Regulations S5.353A and S5.357A be modified as follows:

MOD ASP/20/102

S5.353A In applying the procedures of ~~No. **S9.11A**~~frequency coordination under Section IIA of Article **S9** to the mobile-satellite service in the bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz, priority shall be given to accommodating the spectrum requirements for distress, urgency and safety communications of the Global Maritime Distress and Safety System (GMDSS) as defined in Articles **S32** and **S33**. Maritime mobile-satellite distress, urgency and safety communications shall have priority access and immediate availability, by pre-emption if necessary, over all other mobile satellite communications operating within ~~a network~~these bands. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, distress, urgency and safety communications of the GMDSS. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (~~See Resolution **218 (WRC-97)**~~The provisions of Resolution **XXX (WRC-2000)** shall apply.)

MOD ASP/20/103

S5.357A In applying the procedures of ~~No. **S9.11A**~~frequency coordination under Section IIA of Article **S9** to the mobile-satellite service in the bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz, priority shall be given to accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service providing transmission of messages with priority 1 to 6 in Article **S44**. Aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **S44** shall have priority access and immediate availability, by pre-emption if necessary, over all other mobile-satellite communications operating within ~~a network~~these bands. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **S44**. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (~~See Resolution **218 (WRC-97)**~~The provisions of Resolution **XXX (WRC-2000)** shall apply.)

Reasons: To refer to Resolution XXX (WRC-2000) vice Resolution 218 (WRC-97) and to clarify and strengthen the footnotes.

Agenda item 1.11

1.11 to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions **214 (Rev.WRC-97)** and **219 (WRC-97)**

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Philippines (Republic of the), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

The APT member countries consider that additional bands should not be allocated to the non-GSO MSS unless compatibility between the non-GSO MSS and services currently allocated to the bands is established and guaranteed.

Most administrations are in favour of new technologies as long as they do not cause harmful interference or other harmful impact to their existing services. Many administrations also submitted written as well as verbal proposals to have further studies for the above allocations - including those who requested NOC (no change) before the studies would be finalized.

NOC ASP/20/104

335.4-410 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
401-402	METEOROLOGICAL AIDS SPACE OPERATION (space-to-Earth) EARTH EXPLORATION-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) Fixed Mobile except aeronautical mobile	
402-403	METEOROLOGICAL AIDS EARTH EXPLORATION-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) Fixed Mobile except aeronautical mobile	
403-406	METEOROLOGICAL AIDS Fixed Mobile except aeronautical mobile	

410-470 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
450-455	FIXED MOBILE S5.209 S5.271 S5.286 S5.286A S5.286B S5.286C S5.286D S5.286E	
455-456 FIXED MOBILE S5.209 S5.271 S5.286A S5.286B S5.286C S5.286E	**455-456** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.286A S5.286B S5.286C S5.209 S5.271	**455-456** FIXED MOBILE S5.209 S5.271 S5.286A S5.286B S5.286C S5.286E
456-459	FIXED MOBILE S5.271 S5.287 S5.288	
459-460 FIXED MOBILE S5.209 S5.271 S5.286A S5.286B S5.286C S5.286E	**459-460** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.286A S5.286B S5.286C S5.209 S5.271	**459-460** FIXED MOBILE S5.209 S5.271 S5.286A S5.286B S5.286C S5.286E
460-470	FIXED MOBILE Meteorological-Satellite (space-to-Earth) S5.287 S5.288 S5.289 S5.290	

Reasons: The frequency bands below 1 GHz are heavily used in many countries for the services such as mobile service, fixed service, broadcasting service, meteorological aids service and meteorological-satellite service to which the bands are allocated for use. In addition, the usage of these services is expected to increase, and sharing feasibility between the non-GSO MSS and services currently allocated to the bands below 1 GHz is to be clarified.

ASP/20/105

APT recognizes that Resolution 219 (WRC-97) needs to be reviewed at WRC-2000.

ASP/20/106

The APT member countries agreed that further studies on sharing between the mobile-satellite services below 1 GHz for narrow-band data applications and the terrestrial services, in particular digital trunked systems are required, to ascertain that it will not cause harmful interference to these terrestrial services, before additional allocations for the uplink of the mobile-satellite service in part of the 450-460 MHz band or other suitable bands could be proposed to WRC-02/03 for consideration.

Agenda item 1.12

1.12 to consider the progress of studies on sharing between feeder links of non-GSO MSS networks and GSO FSS networks in the bands 19.3-19.7 GHz and 29.1-29.5 GHz, taking into account Resolution **121 (Rev.WRC-97)**

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

Introduction

APT supports the conclusions of ITU-R studies in a form of a draft new Recommendation on mitigation techniques which allows for the sharing between feeder links of non-GSO MSS networks and GSO FSS networks in the bands 19.3-19.7 GHz and 29.1-29.5 GHz.

SUP ASP/20/107

RESOLUTION 121 (Rev.WRC-97)

Continued development of interference criteria and methodologies for fixed-satellite service coordination between feeder links of non-geostationary satellite networks in the mobile-satellite service and geostationary-satellite networks in the fixed-satellite service in the bands 19.3-19.7 GHz and 29.1-29.5 GHz

Reasons: The result of ITU-R studies have met the requirements of Resolution 121 (Rev.WRC-97). Therefore, APT proposes that Resolution 121 (Rev.WRC-97) could now be suppressed.

Agenda item 1.13

1.13 on the basis of the results of the studies in accordance with Resolutions **130 (WRC-97)**, **131 (WRC-97)** and **538 (WRC-97)**;

1.13.1 to review and, if appropriate, revise the power limits appearing in Articles **S21** and **S22** in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services;

1.13.2 to consider the inclusion in other frequency bands of similar limits in Article **S21** and **S22**, or other regulatory approaches to be applied in relation to sharing situations

PART 1

Proposed modifications to Article S22

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

Introduction

Resolution 130 (WRC-97) introduced provisional $epfd_{down}$ and aggregate power flux-density, apfd (which is redefined as $epfd_{up}$) limits for non-GSO FSS systems in certain bands intended to protect GSO FSS systems operating co-frequency and requested ITU-R to conduct the appropriate technical, operational and regulatory studies to review the regulatory conditions relating to the coexistence of non-GSO and GSO systems in the FSS.

Resolution 538 (WRC-97) introduced provisional epfd and apfd (which is redefined as $epfd_{up}$) limits for non-GSO FSS systems in certain bands intended to protect GSO BSS systems operating co-frequency, and requested ITU-R to conduct the appropriate technical, operational and regulatory studies to review the regulatory conditions relating to the coexistence of non-GSO FSS and GSO BSS systems.

Considering the ITU-R studies and the CPM Report, APT supports the conclusions of the studies undertaken by ITU-R in response to these two resolutions, as indicated in the CPM Report (Annex 1 to Chapter 3). In order to reflect these conclusions, APT proposes following modifications to Article S22.

ARTICLE S22

Space services[1]

Section II – Control of interference to geostationary-satellite systems

NOC ASP/20/108

S22.2 § 2 1) Non-geostationary-satellite systems shall not cause unacceptable interference to geostationary-satellite systems in the fixed-satellite service and the broadcasting-satellite service operating in accordance with these Regulations.

S22.3 2) Whenever the emissions from geostationary satellites in the inter-satellite service are directed towards space stations at distances from Earth greater than that of the geostationary-satellite orbit, the boresight of the antenna mainbeam of the geostationary satellite shall not be pointed within 15° of any point on the geostationary-satellite orbit.

S22.4 § 3 In the frequency band 29.95-30 GHz space stations in the earth exploration-satellite service on board geostationary satellites and operating with space stations in the same service on board non-geostationary satellites shall have the following restriction:

Whenever the emissions from the geostationary satellites are directed towards the geostationary-satellite orbit and cause unacceptable interference to any geostationary-satellite space system in the fixed-satellite service, these emissions shall be reduced to a level at or less than accepted interference.

S22.5 § 4 In the frequency band 8 025-8 400 MHz, which the Earth exploration-satellite service using non-geostationary satellites shares with the fixed-satellite service (Earth-to-space) or the meteorological-satellite service (Earth-to-space), the maximum power flux-density produced at the geostationary-satellite orbit by any Earth exploration-satellite service space station shall not exceed –174 dB(W/m^2) in any 4 kHz band.

S22.5A § 5 In the frequency band 6 700-7 075 MHz, the maximum aggregate power flux-density produced at the geostationary-satellite orbit and within ±5° of inclination around the geostationary-satellite orbit by a non-geostationary-satellite system in the fixed-satellite service shall not exceed –168 dB(W/m^2) in any 4 kHz band. The maximum aggregate power flux-density shall be calculated in accordance with Recommendation ITU-R S.1256.

SUP ASP/20/109

S22.5B

MOD ASP/20/110

S22.5C § ~~5~~6 1) The equivalent power flux-density[2], epfd$_{down}$ at any point on the Earth's surface visible from the geostationary-satellite orbit, produced by emissions from all the space stations of a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Tables ~~**S22-1**~~**S22-1A** to **S22-1D**, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the limits given in Tables ~~**S22-1**~~ **S22-1A** to **S22-1D** for the given percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions, into a reference antenna and in the reference bandwidth specified in Tables ~~**S22-1**~~**S22-1A** to **S22-1D**, for all pointing directions towards the geostationary-satellite orbit.

MOD ASP/20/110*bis*

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2 **S22.5C.1, D.1, F.1** The equivalent power flux-density is defined as the sum of the power flux-densities produced at a ~~point~~ GSO receive station on the Earth's surface or in the geostationary orbit, as appropriate, by all ~~space~~ the transmit stations within a non-geostationary-satellite system, taking into account the off-axis discrimination of a reference receiving antenna assumed to be pointing ~~towards the geostationary-satellite orbit~~ in its nominal direction. The equivalent power flux-density is calculated using the following formula:

$$\cancel{epfd = 10 \cdot \log_{10} \left[\sum_{i=1}^{N_s} 10^{pfd_i/10} \cdot \frac{G_r(\theta_i)}{G_{max}} \right]}$$

$$epfd = 10 \cdot \log_{10} \left[\sum_{i=1}^{N_a} 10^{\frac{P_i}{10}} . \frac{G_t(\theta_i)}{4.\pi d_i^2} . \frac{G_r(\phi_i)}{G_{r,max}} \right]$$

where:

N_a: is the number of transmit stations in the non-geostationary-satellite system that are visible from the GSO receive station considered on the Earth's surface or in the geostationary orbit, as appropriate;

i: is the index of the transmit station considered in the non-geostationary-satellite system;

P_i: is the RF power at the input of the antenna of the transmit station, considered in the non-geostationary satellite system in dBW in the reference bandwidth;

θ_i: is the off-axis angle between the boresight of the transmit station considered in the non-geostationary satellite system and the direction of the GSO receive station;

$G_t(\theta_i)$: is the transmit antenna gain (as a ratio) of the station considered in the non-geostationary satellite system in the direction of the GSO receive station;

d_i: is the distance in metres between the transmit station considered in the non-geostationary satellite system and the GSO receive station;

ϕ_i: is the off-axis angle between the boresight of the antenna of the GSO receive station and the direction of the ith transmit station considered in the non-geostationary satellite system;

$G_r(\phi_i)$: is the receive antenna gain (as a ratio) of the GSO receive station in the direction of the ith transmit station considered in the non-geostationary satellite system;

$G_{r,max}$: is the maximum gain (as a ratio) of the antenna of the GSO receive station;

$epfd$: is the computed equivalent power flux-density in dB(W/m^2) in the reference bandwidth.

~~N_s: number of non-geostationary space stations visible from the point considered at the Earth's surface, within an elevation angle greater than or equal to 0°;~~

~~i: index of the non-geostationary space station considered;~~

~~pfd_i: power flux-density produced at the point considered on the Earth's surface in dB(W/m^2) in the reference bandwidth;~~

~~θ_i: angle between the direction considered towards the geostationary-satellite orbit and the direction of the interfering space station in the non-geostationary-satellite system;~~

~~$G_r(\theta_i)$: gain (as a ratio) of the receive reference antenna to be considered as part of a geostationary-satellite netwrk;~~

~~G_{max}: maximum gain (as a ratio) of the above receive reference antenna;~~

~~*epfd*: computed equivalent power flux-density in dB(W/m^2) in the reference bandwidth.~~

SUP ASP/20/110*ter*

TABLE **S22-1**

ADD ASP/20/111

TABLE **S22-1A**[3, 5, 6]

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$epfd_{down}$ dB(W/m^2)**	**Percentage of time during which $epfd_{down}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern**[4]
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3	–175.4	0	40	60 cm Recommendation ITU-R S.(4/57)
	–174.0	90		
	–170.8	99		
	–165.3	99.73		
	–160.4	99.991		
	–160.0	99.997		
	–160.0	100		
	–181.9	0	40	1.2 m Recommendation ITU-R S.(4/57)
	–178.4	99.5		
	–173.4	99.74		
	–173.0	99.857		
	–164.0	99.954		
	–161.6	99.984		
	–161.4	99.991		
	–160.8	99.997		
	–160.5	99.997		
	–160.0	99.9993		
	–160.0	100		

	–190.45 –189.45 –187.45 –182.4 –182 –168 –164 –162 –160 –160	0.00 90.00 99.50 99.70 99.855 99.971 99.988 99.995 99.999 100.000	40	3 m Recommendation ITU-R S.(4/57)
	–195.45 –195.45 –190.00 –190 –172.5 –160 –160	0.00 99.00 99.65 99.71 99.99 99.998 100.000	40	10 m Recommendation ITU-R S.(4/57)

[3] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[4] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

[5] In addition to the limits shown in this table, the $\text{epfd}_{\text{down}}$ limits in Table **S22-1A'** apply to all antenna sizes greater than 60 cm in the frequency bands listed in this table.

[6] For each reference antenna the limit consists of the complete curve on a plot which is linear in decibels for the epfd levels and logarithmic for the time percentages, with straight lines joining the data points.

ADD ASP/20/111*bis*

TABLE **S22-1A'**

Limits to the $\text{epfd}_{\text{down}}$ radiated by non-GSO FSS systems at certain latitudes

100% of the time $\text{epfd}_{\text{down}}$ (dB(W/m^2) per 40 kHz)	**Latitude (North or South) (°)**
–160	0 < |Latitude| ≤ 57.5
–160 + 3.4(57.5 – |Latitude|)/4	57.5 < |Latitude| ≤ 63.75
–165.3	63.75 ≤ |Latitude|

ADD ASP/20/112

TABLE **S22-1B**[7, 9]

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$epfd_{down}$ dB(W/m^2)	Percentage of time during which $epfd_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference pattern[8]
17.8-18.6	–164 –164 –167 –172.5 –175.4 –175.4	100 99.971 99.714 99 90 0	40	1 m Recommendation ITU-R S.(4/57)
	–150 –150 –153 –158.5 –161.4 –161.4	100 99.971 99.714 99 90 0	1 000	
17.8-18.6	–164 –164 –166 –170.5 –171.4 –178.4 –178.4	100 99.977 99.971 99.913 99.9 99.4 0	40	2 m Recommendation ITU-R S.(4/57)
	–150 –150 –152 –156.5 –157.4 –164.4 –164.4	100 99.977 99.971 99.913 99.9 99.4 0	1 000	

17.8-18.6	–164 –164 –172 –180 –180 –185.4 –185.4	100 99.998 99.943 99.943 99.8 99.8 0	40	5 m Recommendation ITU-R S.(4/57)
	–150 –150 –158 –166 –166 –171.4 –171.4	100 99.998 99.943 99.943 99.8 99.8 0	1 000	

[7] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[8] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

[9] For each reference antenna the limit consists of the complete curve on a plot which is linear in decibels for the epfd levels and logarithmic for the time percentages, with straight lines joining the data points.

ADD ASP/20/113

TABLE **S22-1C**[10, 12]

Limits to the $\text{epfd}_{\text{down}}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$\text{epfd}_{\text{down}}$ dB(W/m^2)**	**Percentage of time during which $\text{epfd}_{\text{down}}$ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference pattern**[11]
19.7-20.2	–154 –154 –172 –182 –187.4	100 99.983 97.143 71.429 0	40	70 cm Recommendation ITU-R S.(4/57)
	–140 –140 –158 –168 –173.4	100 99.983 97.143 71.429 0	1 000	

19.7-20.2	–154	100	40	90 cm Recommendation ITU-R S.(4/57)
	–154	99.997		
	–160	99.943		
	–165	99.943		
	–168.6	99.8		
	–170.4	99.8		
	–181.4	91		
	–190.4	0		
	–140	100	1 000	
	–140	99.997		
	–146	99.943		
	–151	99.943		
	–154.6	99.8		
	–156.4	99.8		
	–167.4	91		
	–176.4	0		
19.7-20.2	–154	100	40	2.5 m Recommendation ITU-R S.(4/57)
	–154	99.99943		
	–162	99.98		
	–196.4	0		
	–140	100	1 000	
	–140	99.99943		
	–148	99.98		
	–182.4	0		
19.7-20.2	–154	100	40	5 m Recommendation ITU-R S.(4/57)
	–154	99.9992		
	–154.6	99.999		
	–164.2	99.99		
	–175	99.886		
	–184	97.143		
	–187.8	94		
	–189.4	90		
	–200.4	0		
	–140	100	1 000	
	–140	99.9992		
	–140.6	99.999		
	–150.2	99.99		
	–161	99.886		
	–170	97.143		
	–173.8	94		
	–175.4	90		
	–186.4	0		

[10] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[11] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

[12] For each reference antenna the limit consists of the complete curve on a plot which is linear in decibels for the epfd levels and logarithmic for the time percentages, with straight lines joining the data points.

ADD ASP/20/114

TABLE **S22-1D**[13, 15]

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands 30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm and 300 cm BSS antennas

Frequency band (GHz)	**$epfd_{down}$ dB(W/m^2)**	**Percentage of time during which $epfd_{down}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern**[14]
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–165.841	0.000	40	30 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	–165.541	25.000		
	–164.041	96.000		
	–158.600	98.857		
	–158.600	99.429		
	–158.330	99.429		
	–158.330	100.000		
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–175.441	0.000	40	45 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	–172.441	66.000		
	–169.441	97.750		
	–164.000	99.357		
	–160.750	99.809		
	–160.000	99.986		
	–160.000	100.000		
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–176.441	0.000	40	60 cm DNR ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]
	–173.191	97.800		
	–167.750	99.371		
	–162.000	99.886		
	–161.000	99.943		
	–160.200	99.971		
	–160.000	99.997		
	–160.000	100.000		
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–178.94	0.000	40	90 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	–178.44	33.000		
	–176.44	98.000		
	–171.00	99.429		
	–165.50	99.714		
	–163.00	99.857		
	–161.00	99.943		
	–160.00	99.991		
	–160.00	100.000		

11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–182.440 –180.690 –179.190 –178.440 –174.940 –173.750 –173.000 –169.500 –167.800 –164.000 –161.900 –161.000 –160.400 –160.000	0.000 90.000 98.900 98.900 99.500 99.680 99.680 99.850 99.915 99.940 99.970 99.990 99.998 100	40	120 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–184.941 –184.101 –181.691 –176.250 –163.250 –161.500 –160.350 –160.000 –160.000	0.000 33.000 98.500 99.571 99.946 99.974 99.993 99.999 100.000	40	180 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–187.441 –186.341 –183.441 –178.000 –164.400 –161.900 –160.500 –160.000 –160.000	0.000 33.000 99.250 99.786 99.957 99.983 99.994 99.999 100.000	40	240 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–191.941 –189.441 –185.941 –180.500 –173.000 –167.000 –162.000 –160.000 –160.000	0.000 33.000 99.500 99.857 99.914 99.951 99.983 99.991 100.000	40	300 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

13 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO BSS systems.

14 For BSS antenna diameters 180 cm, 240 cm and 300 cm, in addition to the single-entry limits shown in Table **S22-1D**, the following single-entry 100% of the time epfd_{down} limit also applies in the frequency band listed in Table **S22-1D**.

15 For each reference antenna the limit consists of the complete curve on a plot which is linear in decibels for the epfd levels and logarithmic for the time percentages, with straight lines joining the data points.

100% of the time epfd_{down} (dB(W/m^2) per 40 kHz)	**Latitude (North or South) (°)**
–160.0	$0 \leq \|\text{latitude}\| \leq 57.5$
–160.0 + 3.4 * (57.5 – $\|\text{latitude}\|$)/4	$57.5 \leq \|\text{latitude}\| \leq 63.75$
–165.3	$63.75 \leq \|\text{latitude}\|$

For BSS antenna diameter 240 cm, in addition to the above single-entry 100% of the time epfd_{down} limit, a –167(dB(W/m^2) per 40 kHz) single-entry 100% of the time operational epfd_{down} limit also applies to receive antennas located in Region 2, west of 140° W, north of 60° N, pointing toward GSO BSS satellites at 91° W, 101° W, 110° W, 119° W and 148° W with elevation angles greater than 5°. [This limit is implemented during a transition period of [15] years.]*

MOD ASP/20/115

S22.5~~G~~CA The limits given in Tables ~~**S22-1** and **S22-3**~~**S22-1A** to **S22-1D** may be exceeded on the territory of any country whose administration has so agreed.

(SUP) ASP/20/115*bis*

S22.5G

* This transitional regime would be applicable only if the pfd limits in section 5*c*) of Annex 1 to Appendix **S30** are sufficiently relaxed.

MOD ASP/20/116

S22.5D 2) The ~~aggregate~~ equivalent power flux-density~~2~~3, epfd$_{up}$, produced at any point in the geostationary-satellite orbit by emissions from all the earth stations in a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Tables **S22-2**, for all conditions and for all methods of modulation, shall not exceed the limits given in Table **S22-2** for the specified percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions, into a reference antenna and in the reference bandwidth specified in Table **S22-2**, for all pointing directions towards the Earth's surface visible from any given location in the geostationary-satellite orbit.

~~3 **S22.5D.1** The aggregate power flux-density is defined as the sum of the power flux- densities produced at a point in the geostationary-satellite orbit by all the earth stations of a non-geostationary-satellite system. The aggregate power flux-density is computed by means of the following formula:~~

$$\cancel{apfd = 10 \cdot \log_{10}\left[\sum_{i=1}^{N_e} 10^{P_i/10} \cdot \frac{G_t(\theta_i)}{4\pi d_i^2}\right]}$$

~~where:~~

~~N_e: number of earth stations in the non-geostationary-satellite system with an elevation angle greater than or equal to 0°, from which the point considered in the geostationary-satellite orbit is visible;~~

~~i: index of the earth station considered in the non-geostationary-satellite system;~~

~~P_i: RF power at the input of the transmitting antenna of the earth station considered in the non-geostationary-satellite system in dBW in the reference bandwidth;~~

~~θ_i: off-axis angle between the boresight of the earth station considered in the non-geostationary-satellite system and the direction of the point considered in the geostationary-satellite orbit;~~

~~$G_t(\theta_i)$: transmit antenna gain (as a ratio) of the earth station considered in the non-geostationary-satellite system in the direction of the point considered in the geostationary-satellite orbit;~~

~~d_i: distance in metres between the earth station considered in the non-geostationary-satellite system and the point considered in the geostationary-satellite orbit;~~

~~$apfd$: aggregate power flux-density in dB(W/m^2) in the reference bandwidth.~~

~~NOTE – Tables **S22-1** to **S22-4** and Nos. **S22.26** to **S22.29** contain provisional limits corresponding to an interference level caused by one non-geostationary fixed-satellite service system in the frequency bands to be applied in accordance with Resolutions **130 (WRC-97)** and **538 (WRC-97)**. These provisional limits are subject to review by ITU-R and are subject to confirmation by WRC-99.~~

MOD ASP/20/116*bis*

TABLE **S22-2**

~~**Frequency band (GHz)**~~	~~**Aggregate pfd dB(W/m²/4 kHz)**~~	~~**Percentage of time during which aggregate pfd level may not be exceeded**~~
~~17.3-18.1 in Regions 1 and 3 and 17.8-18.1 in Region 2~~	~~–163~~	~~100%~~

Limits to the $epfd_{up}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$epfd_{up}$ dB(W/m^2)**	**Percentage of time $epfd_{up}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna beamwidth and reference radiation pattern**[16]
12.50-12.75 12.75-13.25 13.75-14.5	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20[17]
17.3-18.1[*]	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20[17]
27.5-28.6	–162	100	40	1.55 degrees Rec. ITU-R S.672, Ls = –10[17]
29.5-30.0	–162	100	40	1.55 degrees Rec. ITU-R S.672, Ls = –10[17]

[16] Reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

[17] For the case of Ls = –10, the values a = 1.83 and b = 6.32 should be used in the equations in Annex 1 of Recommendation ITU-R S.672 for single-feed circular beams. In all cases of Ls, the parabolic main beam equation should start at zero.

* This $epfd_{up}$ limit applies to the bands 17.3-18.1 GHz (Regions 1 and 3) and 17.8-18.1 GHz (Region 2). It is proposed that the above-mentioned limit be also applicable to the frequency band 17.3-17.8 GHz (Region 2), in order to protect BSS feeder links in Region 2 from non-GSO FSS uplinks in Regions 1 and 3. See also section 3.2.2.

SUP ASP/20/116*ter*

S22.5E

MOD ASP/20/116*quater*

TABLE **S22-3**

~~PART A~~

~~**Frequency band (GHz)**~~	~~**Equivalent pfd dB(W/m²)**~~	~~**Percentage of time during which equivalent pfd level may not be exceeded**~~	~~**Reference bandwidth (kHz)**~~	~~**Reference antenna diameter, and reference radiation pattern**~~
~~10.7-11.7; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3~~	~~–179~~	~~99.7~~	~~4~~	~~60 cm, Rec. ITU-R S.465-5~~
	~~–192~~	~~99.9~~	~~4~~	~~3 m, Rec. ITU-R S.465-5~~
	~~–186~~	~~99.97~~	~~4~~	~~3 m, Rec. ITU-R S.465-5~~
	~~–195~~	~~99.97~~	~~4~~	~~10 m, Rec. ITU-R S.465-5~~
	~~–170~~	~~99.999~~	~~4~~	~~60 cm, Rec. ITU-R S.465-5~~
	~~–173~~	~~99.999~~	~~4~~	~~3 m, Rec. ITU-R S.465-5~~
	~~–178~~	~~99.999~~	~~4~~	~~10 m, Rec. ITU-R S.465-5~~
	~~–170~~	~~100~~	~~4~~	~~≥ 60 cm, Rec. ITU-R S.465-5~~

~~TABLE **S22-3**~~

~~PART B~~

~~**Frequency band (GHz)**~~	~~**Equivalent pfd dB(W/m²)**~~	~~**Percentage of time during which equivalent pfd level may not be exceeded**~~	~~**Reference bandwidth (kHz)**~~	~~**Reference antenna diameter, and reference radiation pattern**~~
~~17.8-18.6~~	~~–165~~ ~~–151~~	~~99.0~~	~~40~~ ~~1 000~~	~~30 cm, Rec. ITU-R S.465-5~~
	~~–165~~ ~~–151~~	~~99.0~~	~~40~~ ~~1 000~~	~~70 cm, Rec. ITU-R S.465-5~~
	~~–165~~ ~~–151~~	~~99.5~~	~~40~~ ~~1 000~~	~~90 cm, Rec. ITU-R S.465-5~~
	~~–167~~ ~~–153~~	~~99.8~~	~~40~~ ~~1 000~~	~~1.5 m, Rec. ITU-R S.465-5~~
	~~–180~~ ~~–166~~	~~99.9~~	~~40~~ ~~1 000~~	~~5 m, Rec. ITU-R S.465-5~~
	~~–184~~ ~~–170~~	~~99.9~~	~~40~~ ~~1 000~~	~~7.5 m, Rec. ITU-R S.465-5~~
	~~–188~~ ~~–174~~	~~99.9~~	~~40~~ ~~1 000~~	~~12 m, Rec. ITU-R S.465-5~~
	~~–165~~ ~~–151~~	~~100~~	~~40~~ ~~1 000~~	~~30 cm to 12 m, Rec. ITU-R S.465-5~~

~~19.7-20.2~~	~~–154~~ ~~–140~~	~~99.0~~	~~40~~ ~~1 000~~	~~30 cm, Rec. ITU-R S.465-5~~
	~~–164~~ ~~–150~~	~~99.9~~	~~40~~ ~~1 000~~	~~90 cm, Rec. ITU-R S.465-5~~
	~~–167~~ ~~–153~~	~~99.8~~	~~40~~ ~~1 000~~	~~2 m, Rec. ITU-R S.465-5~~
	~~–174~~ ~~–160~~	~~99.9~~	~~40~~ ~~1 000~~	~~5 m, Rec. ITU-R S.465-5~~
	~~–154~~ ~~–140~~	~~100~~	~~40~~ ~~1 000~~	~~30 cm to 12 m,~~ ~~Rec. ITU-R S.465-5~~

Limits to the $epfd_{is}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$epfd_{is}$ dB(W/m^2)**	**Percentage of time $epfd_{is}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna beamwidth and reference radiation pattern[18]**
10.7-11.7 (Region 1) 12.5-12.75 (Region 1) 12.7-12.75 (Region 2)	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20
17.8-18.4	–160	100	40	4 degrees Rec. ITU-R S.672, Ls = –20

[18] Under this section, this reference pattern is to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

MOD ASP/20/117

S22.5F 4) The ~~aggregate~~ equivalent power flux-density[2]~~[5]~~, $epfd_{is}$, produced at any point in the geostationary-satellite orbit by emissions from all the ~~earth~~ space stations in a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Table **S22-3**, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the limits given in Table **S22-~~4~~3** for ~~any~~ the specified percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions into ~~the~~ a reference antenna and in the reference bandwidth specified in Table **S22-~~4~~3**, for all pointing directions towards the Earth's surface visible from any given location in the geostationary-satellite orbit.

~~[5] **S22.5F.1** See No. **S22.5D.1**.~~

SUP ASP/20/117*bis*

TABLE **S22-4**

PART A

SUP ASP/20/117*ter*

TABLE **S22-4**

PART B

ADD ASP/20/118

S22.5H The limits specified in Nos. **S22.5C**, **S22.5D** and **S22.5F** apply to non-GSO FSS systems for which complete coordination or notification information, as appropriate, has been received after 22 November 1997.

ADD ASP/20/119

S22.5I An administration operating a non-GSO FSS system which is in compliance with the limits in Nos. **S22.5C**, **S22.5D** and **S22.5F** (see also Resolution **WWW (WRC-2000)**) shall be considered as having fulfilled its obligations under No. **S22.2** with respect to any GSO network, irrespective of the dates of receipt by the Bureau of the complete coordination or notification information, as appropriate, for the non-GSO system and of the complete coordination information for the GSO network, provided that the $epfd_{down}$ radiated by the non-GSO FSS system into any operating GSO FSS earth station does not exceed the operational limits given in Tables **S22-4A** and **S22-4B**, when the gain of this earth station is equal to or greater than the corresponding value given in Tables **S22-4A** and **S22-4B** for the corresponding orbital inclination of the GSO FSS satellite as given in Tables **S22-4A** and **S22-4B**. Except as otherwise agreed between concerned administrations, an administration operating a non-GSO FSS system that is subject to the limits in Nos. **S22.5C**, **S22.5D** and **S22.5F** and which radiates $epfd_{down}$ into any operating GSO FSS earth station at levels in excess of the operational limits given in Tables **S22-4A** and **S22-4B**, when the gain of this earth station is equal to or greater than the corresponding value given in Tables **S22-4A** and **S22-4B** for the corresponding orbital inclination of the GSO FSS satellite as given in Tables **S22-4A** and **S22-4B**, shall be considered to be in violation of its obligations under No. **S22.2**.

ADD **A**SP/20/120

TABLE **S22-4A**[20, 22]

Operational limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$epfd_{down}$ dB(W/m^2)	Percentage of time during which $epfd_{down}$ may not be exceeded	Reference bandwidth (kHz)	Receive GSO earth station antenna diameter[21] (m)	Orbital inclination of GSO satellite (degrees)
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3 (until 31 December 2005)	–163 –166 –167.5 –169.5	100	40	3 6 9 ≥18	≤2.5
	–160 –163 –164.5 –166.5	100	40	3 6 9 ≥18	≤4.5
10.7-11.7 in all Regions 11.7-12.2 in Region 2 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3 (after 31 December 2005)	–161.25 –164 –165.5 –167.5	100	40	3 6 9 ≥18	≤2.5
	–158.25 –161 –162.5 –164.5	100	40	3 6 9 ≥18	≤4.5

[20] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[21] Linear interpolation of epfd levels in decibels should be performed for other intermediate antenna diameters.

[22] In addition to the operational limits shown in Table **S22-4A**, the additional operational limits in Tables **S22-4A1** and **S22-4A2** apply to certain GSO FSS earth station antenna sizes in the frequency bands listed in Table **S22-4A**.

ADD ASP/20/121

TABLE **S22-4A1**

Additional operational limits to the $epfd_{down}$ radiated by non-GSO FSS systems into 3 m GSO FSS earth station antenna

$epfd_{down}$ ($dB(W/m^2)$ per 40 kHz)	**Percentage of time during which $epfd_{down}$ may not be exceeded**
–182	99.9
–179	99.94
–176	99.97
–171	99.98
–168	99.984
–165	99.993
–163	99.999
–161.25	99.99975
–161.25	100

ADD ASP/20/122

TABLE **S22-4A2**

Additional operational limits to the $epfd_{down}$ radiated by non-GSO FSS systems into 10 m GSO FSS earth station antenna

$epfd_{down}$ ($dB(W/m^2)$ per 40 kHz)	**Percentage of time during which $epfd_{down}$ may not be exceeded**
–185	99.97
–183	99.98
–179	99.99
–175	99.996
–171	99.998
–168	99.999
–166	99.9998
–166	100

ADD ASP/20/123

TABLE **S22-4B**[23]

Operational limits to the epfd$_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	epfd$_{down}$ dB(W/m^2)	Percentage of time during which epfd$_{down}$ may not be exceeded	Reference bandwidth (kHz)	Receive GSO earth station antenna gain (dBi)	Orbital inclination of GSO satellite (degrees)
19.7-20.2	–157 –157 –155	100 100 100	40 40 40	≥49 ≥43[24] ≥49	≤2.5 ≤2.5 >2.5 and ≤4.5
19.7-20.2	–143 –143 –141	100 100 100	1 000 1 000 1 000	≥49 ≥43[24] ≥49	≤2.5 ≤2.5 >2.5 and ≤4.5
17.8-18.6	–164 –162	100 100	40 40	≥49 ≥49	≤2.5 >2.5 and ≤4.5
17.8-18.6	–150 –148	100 100	1 000 1 000	≥49 ≥49	≤2.5 >2.5 and ≤4.5

[23] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[24] The operational limit applies to non-GSO systems operating at altitudes of 7 000 km or above in order to protect GSO FSS systems employing adaptive coding.

ADD ASP/20/124

S22.5J In case of *force majeure*, telecommand and ranging carriers transmitted to non-geostationary satellites in the fixed-satellite service are not subject to the limits given in Table **S22-2**.

Reasons: APT generally supports the conclusion in ITU-R.

PART 2

Proposed Resolution WWW (WRC-2000)

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

Introduction

Resolutions 130 (WRC-97) and 538 (WRC-97) introduced provisional epfd limits for non-GSO FSS systems in certain bands intended to protect GSO FSS and GSO BSS systems operating co-frequency and requested ITU-R to conduct the appropriate technical, operational and regulatory studies to review the regulatory conditions relating to the coexistence of non-GSO and GSO systems. In order to adequately protect GSO networks, an aggregate interference level from all non-GSO FSS systems, which individually meet the Table S22-1 limits and Table S22-4 limits, needs to be defined.

There is a need for assuring the compliance with the aggregate epfd limits and the operational limits given in Table S22-4. Therefore APT proposes to establish the following new resolution, based on the example Resolution WWW in the CPM Report, which includes the efficient and essential remedial measures.

ADD ASP/20/125

RESOLUTION WWW (WRC-2000)

Protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems and/or the operational equivalent power flux-density produced by a non-GSO FSS system in frequency bands where epfd limits have been adopted

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-97 has adopted, in Article **S22**, provisional epfd limits to be met by non-GSO FSS systems in order to protect GSO FSS and GSO BSS networks in parts of the frequency range 10.7-30 GHz;

b) that WRC-2000 has revised these limits to ensure that they provide adequate protection to GSO systems without causing undue constraints to any of the systems and services sharing these frequency bands;

c) that Article **S22** includes single-entry epfd limits which apply to non-GSO FSS systems in these bands;

d) that these single-entry limits have been derived from aggregate equivalent power flux-density (epfd) masks that are intended to protect GSO networks, assuming a maximum effective number of non-GSO FSS systems of 3.5;

e) that the aggregate interference caused by all co-frequency non-GSO FSS systems in these bands into GSO FSS systems should not exceed the maximum interference levels that are necessary to protect these GSO systems;

f) that WRC-97 decided, and WRC-2000 confirmed, that non-GSO FSS systems in these bands are to coordinate the use of these frequencies between themselves under the provisions of No. **S9.12** of the Radio Regulations;

g) that the orbital characteristics of such systems are likely to be inhomogeneous;

h) that as a result of this likely inhomogeneity, the aggregate epfd levels from multiple non-GSO FSS systems are not directly related to the number of actual systems sharing a frequency band, and the number of such systems operating co-frequency is likely to be small;

i) that the possible misapplication of single-entry limits should be avoided,

recognizing

a) that non-GSO FSS systems are likely to need to implement interference mitigation techniques to share frequencies among themselves;

b) that because the use of such interference mitigation techniques will likely keep the number of non-GSO systems small, the aggregate interference caused by non-GSO FSS systems into GSO systems will also likely be small;

c) that notwithstanding *considering d)*, there may be instances where the aggregate interference from non-GSO systems could exceed the interference levels given in Annex 1;

d) that administrations operating GSO systems may wish to ensure that the aggregate epfd produced by all operating co-frequency non-GSO FSS systems in the frequency bands referred to in *considering a)* above into GSO FSS and/or GSO BSS networks does not exceed the aggregate interference levels given in Annex 1,

resolves

1 that administrations operating or planning to operate non-GSO FSS systems, which individually meet the limits contained in Tables **S22-1** and **S22-4**, in the frequency bands referred to in *considering a)* above, individually or in collaboration, take all possible steps, including by means of appropriate modifications to their systems if necessary, to ensure that the actual aggregate interference into GSO FSS and GSO BSS networks caused by such systems operating co-frequency in these frequency bands does not cause the aggregate power levels shown in Annex 1 to be exceeded;

2 that, in the event that the aggregate interference levels in Annex 1 and/or the operational limits in the Tables **S22-4** are exceeded into an operational GSO earth station, administrations operating non-GSO FSS systems, which individually meet the limits contained in Tables **S22-1** and **S22-4**, in these frequency bands shall expeditiously take all necessary measures to reduce the aggregate epfd levels to those compatible with Annex 1 and/or the operational epfd levels or to reduce such interference to higher levels that are acceptable to the affected GSO administrations,

requests ITU-R

1 to develop, as a matter of urgency, and complete, in time for consideration by the next WRC, a methodology for calculating the aggregate epfd produced by all non-GSO FSS systems operating or planning to operate co-frequency in the frequency bands referred to in *considering a)* above into GSO FSS and GSO BSS networks and for comparing the calculated levels with the aggregate power levels shown in Annex 1;

2 to continue its studies on the accurate modelling of interference from non-GSO FSS systems into GSO FSS and GSO BSS networks in the frequency bands referred to in *considering a)* above in order to assist the administrations planning or operating non-GSO FSS systems in their efforts to limit the aggregate epfd levels produced by their systems into GSO networks;

3 to develop technical measures to identify the interference levels from non-GSO systems in excess of the "aggregate" limits given in Annex 1 of this Resolution and/or the "operational limits" given in RR Table **S22-4**, and to confirm compliance with these limits,

requests the Director of the Radiocommunication Bureau

to assist in the development of the methodology referred to in *requests ITU-R* 1 above.

ANNEX 1 TO RESOLUTION WWW (WRC-2000)

This Annex to Resolution **WWW** contains example tables of interference levels concerning aggregate interference from multiple non-GSO FSS systems, which individually meet the limits specified in Table **S22-1** and Table **S22-4,** into GSO FSS and GSO BSS systems. Studies are continuing in order to avoid unnecessary entries in this table and in order to provide maximum protection for the GSO FSS and GSO BSS.

TABLE **WWW-1A**[1, 3]

Limits to the aggregate epfd$_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	epfd$_{down}$ dB(W/m^2)	Percentage of time during which epfd$_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[2]
10.7-11.7 in all Regions 11.7-12.2 in Region 2	–170.0	0	40	60 cm Recommendation ITU-R S.(4/57)
	–168.6	90		
	–165.3	99		
	–160.4	99.97		
	–160.0	99.99		
	–160.0	100		
	–176.5	0	40	1.2 m Recommendation ITU-R S.(4/57)
	–173.0	99.5		
	–164.0	99.84		
	–161.6	99.945		
	–161.4	99.97		
	–160.8	99.99		
	–160.5	99.99		
	–160	99.9975		
	–160	100		
12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3	–185	0	40	3 m Recommendation ITU-R S.(4/57)
	–184	90		
	–182	99.5		
	–168	99.9		
	–164	99.96		
	–162	99.982		
	–160	99.997		
	–160	100.00		
	–190	0	40	10 m Recommendation ITU-R S.(4/57)
	–190	99		
	–166	99.99		
	–160	99.998		
	–160	100		

1 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

2 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

3 In addition to the limits shown in this table, the aggregate epfd$_{down}$ limits in Table **WWW-1A’** apply to all antenna sizes greater than 60 cm in the frequency bands listed in this table.

TABLE **WWW-1A’**

Aggregate $epfd_{down}$ radiated by non-GSO FSS systems at certain latitudes

100% of the time $epfd_{down}$ (dB(W/m^2) per 40 kHz)	Latitude (North or South) (°)
–160	0 < |Latitude| ≤ 57.5
–160 + 3.4(57.5 – |Latitude|)/4	57.5 < |Latitude| ≤ 63.75
–165.3	63.75 ≤ |Latitude|

TABLE **WWW-1B**[1]

Limits to the aggregate $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$epfd_{down}$ dB(W/m^2)	Percentage of time during which $epfd_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference radiation pattern[2]
17.8-18.6	–164 –164 –170 –170	100 99.9 90 0	40	1 m Recommendation ITU-R S.(4/57)
	–150 –150 –156 –156	100 99.9 90 0	1 000	
17.8-18.6	–164 –164 –166 –173 –173	100 99.92 99.9 99.4 0	40	2 m Recommendation ITU-R S.(4/57)
	–150 –150 –152 –159 –159	100 99.92 99.9 99.4 0	1 000	
17.8-18.6	–164 –164 –172 –180 –180	100 99.992 99.8 99.8 0	40	5 m Recommendation ITU-R S.(4/57)
	–150 –150 –158 –166 –166	100 99.992 99.8 99.8 0	1 000	
19.7-20.2	–154 –154 –172 –182	100 99.94 90 0	40	70 cm Recommendation ITU-R S.(4/57)
	–140 –140 –158 –168	100 99.94 90 0	1 000	

19.7-20.2	–154 –154 –160 –165 –176 –185	100 99.99 99.8 99.8 91 0	40	90 cm Recommendation ITU-R S.(4/57)
	–140 –140 –146 –151 –162 –171	100 99.99 99.8 99.8 91 0	1 000	
19.7-20.2	–154 –154 –162 –191	100 99.998 99.933 0	40	2.5 m Recommendation ITU-R S.(4/57)
	–140 –140 –148 –177	100 99.998 99.933 0	1 000	
19.7-20.2	–154 –154 –161 –175 –184 –195	100 99.9992 99.984 99.6 90 0	40	5 m Recommendation ITU-R S.(4/57)
	–140 –140 –147 –161 –170 –181	100 99.9992 99.984 99.6 90 0	1 000	

[1] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[2] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

TABLE **WWW-1C**[2]

Limits to the aggregate $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands 30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm and 300 cm BSS antennas

Frequency band (GHz)	**$epfd_{down}$ dB(W/m^2)**	**Percentage of time during which $epfd_{down}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern**[1]
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–160.400 –160.100 –158.600 –158.600 –158.330 –158.330	0.000 25.000 96.000 98.000 98.000 100.000	40	30 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–170.000 –167.000 –164.000 –160.750 –160.000 –160.000	0.000 66.000 97.750 99.330 99.950 100.000	40	45 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–171.000 –168.750 –167.750 –162.000 –161.000 –160.200 –160.000 –160.000	0.000 90.000 97.800 99.600 99.800 99.900 99.990 100.000	40	60 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–173.750 –173.000 –171.000 –165.500 –163.000 –161.000 –160.000 –160.000	0.000 33.000 98.000 99.100 99.500 99.800 99.970 100.000	40	90 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–177.000 –175.250 –173.750 –173.000 –169.500 –167.800 –164.000 –161.900 –161.000 –160.400 –160.000	0.000 90.000 98.900 98.900 99.500 99.700 99.820 99.900 99.965 99.993 100	40	120 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–179.500 –178.660 –176.250 –163.250 –161.500 –160.350 –160.000 –160.000	0.000 33.000 98.500 99.810 99.910 99.975 99.995 100.000	40	180 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–182.000 –180.900 –178.000 –164.400 –161.900 –160.500 –160.000 –160.000	0.000 33.000 99.250 99.850 99.940 99.980 99.995 100.000	40	240 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 in Region 1 11.7-12.2 and 12.5-12.75 in Region 3 12.2-12.7 in Region 2	–186.500 –184.000 –180.500 –173.000 –167.000 –162.000 –160.000 –160.000	0.000 33.000 99.500 99.700 99.830 99.940 99.970 100.000	40	300 cm DNR ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

[1] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO BSS systems.

[2] For BSS antenna diameters 180 cm, 240 cm and 300 cm, in addition to the aggregate limit shown in Table **WWW-1C**, the following aggregate 100% of the time $epfd_{down}$ limit also applies:

100% of the time $epfd_{down}$ (dB(W/m^2) per 40 kHz)	**Latitude (North or South) (°)**
–160.0	0 < $\lvert$latitude$\rvert$ ≤ 57.5
–160.0 + 3.4 * (57.5 – $\lvert$latitude$\rvert$)/4	57.5 < $\lvert$latitude$\rvert$ ≤ 63.75
–165.3	63.75 ≤ $\lvert$latitude$\rvert$

For BSS antenna diameter 240 cm, in addition to the above aggregate 100% of the time $epfd_{down}$ limit, a –167 dB(W/m^2) per 40 kHz aggregate 100% of the time operational $epfd_{down}$ limit also applies to receive antennas located in Region 2, west of 140° W, north of 60° N, pointing toward GSO BSS satellites at 91° W, 101° W, 110° W, 119° W and 148° W with elevation angles greater than 5°. [This limit is implemented during a transition period of [15] years.]*

Reasons: There is a need for assuring the compliance with the aggregate epfd limits and the operational limits given in Table S22-4.

* This transitional regime would be applicable only if the pfd limits in section 5*c*) of Annex 1 to Appendix **S30** are sufficiently relaxed.

PART 3

Proposed modifications for coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antennas

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

Item e) in § 3.1.2.1.2 of the CPM Report states that some very large earth station antennas may not be adequately protected by the $\text{epfd}_{\text{down}}$ limits in proposed Annex 1 to Chapter 3 of the CPM Report and a coordination procedure may be necessary. Implementation of this coordination procedure may include additions or modifications to Articles S9 and S11 and Appendices S4 and S5. Annex 3 to Chapter 3 of the CPM Report contains the example regulatory and procedural text for coordination between non-GSO FSS transmitting space station and GSO receive earth station with very large antennas.

APT proposes the regulatory and procedural text for coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antennas, including additions and/or modifications to Articles S9 and S11, and Appendices S4 and S5.

ARTICLE S9

Sub-Section IIA – Requirement and request for coordination

ADD ASP/20/126

S9.7A *a1)*[12*bis*, 13*bis*] for a specific earth station within a geostationary-satellite network in the fixed-satellite service in certain frequency bands in respect of a non-geostationary-satellite system in the fixed-satellite service;

ADD ASP/20/127

S9.7B *a2)*[12*bis*, 13*bis*] for a non-geostationary-satellite system in the fixed-satellite service in certain frequency bands in respect of a specific earth station within a geostationary-satellite network in the fixed-satellite service;

ADD ASP/20/128

12*bis* **S9.7A.1** and **S9.7B.1** The coordination of a specific earth station under **S9.7A** or **S9.7B** shall remain within the authority of the administration having this station located on its territory.

ADD ASP/20/129

13*bis* **S9.7A.2** and **S9.7B.2** Coordination information relating to a specific earth station received by the Bureau prior to [date to be established by WRC-2000] is considered as complete **S9.7A** or **S9.7B** information from the date of receipt of complete information of the associated satellite network under **S9.7** provided that the characteristics of the specific earth stations are within the parameters of any typical earth station included in the GSO FSS network coordination request.

NOC ASP/20/130

12 **S9.8.1** and **S9.9.1** Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending a decision of WRC-99 on the revision of these two Appendices.

Reasons: GSO FSS earth stations with very large antennas may not be adequately protected by the $epfd_{down}$ limits contained in Table MOD S22-1 and case-by-case coordination of systems operating co-frequency, co-directional links in the space-to-Earth direction would then be required. The proposed ADD S9.7A and ADD S9.7B would require coordination between non-GSO FSS transmit satellites and GSO FSS receive earth stations with very large antennas. By referring to coordination provisions under S9.7A and S9.7B, the request for coordination would be sent by the requesting administration to the Bureau under S9.30. The Bureau would act under S9.34 to identify administrations with which coordination may need to be effected and publish the information in the Weekly Circular. Since coordination between a non-GSO FSS space station and very large GSO FSS earth stations is a new type of coordination that does not currently exist in Article S9, it is necessary to add two new entry points in Article S9:

- One entry point to enable the non-GSO space station administration to request coordination with administrations having specific very large earth station antennas located on their territory.
- Another entry point to enable the reciprocal coordination to take place, i.e. the possibility for an administration planning to implement a specific very large GSO earth station stations located on their territory to request coordination with administrations having non-GSO FSS transmit space.

ARTICLE S11

Section II – Examination of notices and recording of frequency assignments in the Master Register

MOD ASP/20/131

S11.32A *c)* with respect to the probability of harmful interference that may be caused to or by assignments recorded with a favourable finding under Nos. **S11.36** and **S11.37** or **S11.38**, or recorded in application of No. **S11.41**, or published under Nos. **S9.38** or **S9.58** but not yet notified, as appropriate, for those cases for which the notifying administration states that the procedure for coordination under Nos. **S9.7, S9.7A** or **S9.7B** could not be successfully completed (see also No. **S9.65**);[10] or

MOD ASP/20/132

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[10] **S11.32A.1** The examination of such notices with respect to any other frequency assignment for which a request for coordination under Nos. **S9.7, S9.7A** or **S9.7B** has been published under No. **S9.38** but not yet notified shall be effected by the Bureau in the order of their publication under the same number using the most recent information available.

Reasons: The insertion of a coordination trigger related to $epfd_{down}$ level radiated by the non-GSO FSS system into the earth station employing the very large antenna considered when this earth station is pointed to the wanted GSO satellite provides a mechanism to examine the notice with respect to the probability of harmful interference that may be caused to or by above-listed assignments, and therefore S11.38 and S11.41 are applicable.

ANNEX 2B

Table of characteristics to be submitted for space and radio astronomy services

C – Characteristics to be provided for each group of frequency assignments for a satellite antenna beam or an earth station antenna

(The modifications in either column two or column three need to be incorporated into the full table.)

MOD ASP/20/133

Items in Appendix	Notification or coordination of a geostationary-satellite network (including Appendix S30B)	Notification or coordination of an earth station
C.1		
C.2.a	X	X
C.2.b		
C.3.a	X	X
C.3.b		

C.4	X	X
C.5.a	X	
C.5.b		~~X~~
C.5.c		
C.6	X	X
C.7.a	X[11]	X[11]
C.7.b	C[11]	C[11]
C.7.c	C[11]	C[11]
C.7.d	C	C
C.8.a	X[7]	C[8]
C.8.b	X[7]	X[7]
C.8.c	X[6]	X[6]
C.8.d	X[2]	
C.8.e	X[6]	X[6]
C.8.f		
C.8.g	C[4]	C[4, 5]
C.8.h		
C.8.i		
C.8.j		
C.9.a	C	
C.9.b		
C.9.c		
C.10.a	X[11]	C[11]
C.10.b	X[11]	C[11]
C.10.c.1	X[11]	C[11]
C.10.c.2	X[11]	C[11]
C.10.c.3	X	
C.10.c.4	X	
C.10.c.5	X[11]	C[11]
C.10.c.6		
C.11.a	X	
C.11.b		
C.11.c		
C.11.d		
C.12		
C.13		
C.14		

X Mandatory information

O Optional information

C This information need only be furnished when it has been used as a basis to effect coordination with another administration

[11] Information mandatory for coordination under No. ADD **S9.7A**.

NOTE - Additional characteristics to be provided may include A.4.c, A.1.e.1, A.1.e.2, C.4, B.5 and C.5.b. As a result of decisions that may be made at WRC-2000, these additional characteristics may replace C.10.a, C.10.b, C.10.c.1, C.10.c.2 and C.10.c.5 in the notification or coordination of an earth station column.

Reasons: This is consequential to ADD S9.7A and ADD S9.7B. Administrations will need to submit specific earth station information for earth stations associated with geostationary-satellite networks in the fixed-satellite service meeting the conditions in the proposed addition to Appendix S5.

D – Overall link characteristics

MOD ASP/20/134

(The modifications in either column two or column three need to be incorporated into the full table.)

Items in Appendix	Notification or coordination of a geostationary-satellite network (including Appendix S30B)	Notification or coordination of an earth station
D.1	X	
D.2.a	X[11]	C[11]
D.2.b	X	

X Mandatory information

O Optional information

C This information need only be furnished when it has been used as a basis to effect coordination with another administration

[11] Information mandatory for coordination under No. ADD **S9.7A.**

Reasons: This is consequential to ADD S9.7A and ADD S9.7B and will be required when simple.

ADD ASP/20/135

TABLE S5-1

Technical conditions for coordination
(see Article **S9**)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.7A** GSO earth station/ non-GSO system	A specific earth station in a geostationary-satellite network in the fixed-satellite service in respect of a non-geostationary-satellite system in the fixed-satellite service	The following frequency bands: 10.7-11.7 GHz (space-to-Earth) 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3 12.5-12.75 GHz (space-to-Earth) in Region 1 17.8-18.6 GHz (space-to-Earth) and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) The frequency bands overlap; and ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations and meets all of the following conditions: a) Earth station antenna maximum isotropic gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; b) G/T_1 of 44 dB/K or higher; c) space station emission bandwidth of 250 MHz or higher for the	i) Compare frequency bands; ii) use the maximum antenna gain of the specific receive earth station (Appendix **S4** C.10 *c)* 2)), the lowest equivalent satellite link noise temperature (Appendix **S4** C.10 *c)* 5)), and the space station emission bandwidth (Appendix **S4** C.7 *a)*) in the geostationary-satellite network as given in Appendix **S4** data; and iii) use the $epfd_{down}$ radiated by the non-GSO FSS system into the earth station employing the very large antenna when this antenna is pointed towards the wanted GSO satellite	The threshold/condition for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit.

			frequency bands 10.7-12.75 GHz or 800 MHz or higher for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; iii) the $epfd_{down}$ from the satellite system using the non-geostationary orbit exceeds: a) either –174.5 dB(W/m^2) per 40 kHz for any percentage of time or [x] dB(W/m^2) per 40 kHz for [y]% of the time in the frequency band 10.7-12.75 GHz; b) either –151 dB(W/m^2) per 1 MHz for any percentage of time or [x'] dB(W/m^2) per 1 MHz for [y']% of the time in the frequency bands 17.8-18.6 GHz or 19.7-20.2 GHz		

No. **S9.7B** non-GSO system/GSO earth station	A non-geostationary-satellite system in the fixed-satellite service in respect of a specific earth station in a geostationary-satellite network in the fixed-satellite service	The following frequency bands: 10.7-11.7 GHz (space-to-Earth) 11.7-12.2 GHz (space-to-Earth) in Region 2 12.2-12.75 GHz (space-to-Earth) in Region 3 12.5-12.75 GHz (space-to-Earth) in Region 1 17.8-18.6 GHz (space-to-Earth) and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) The frequency bands overlap; and ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations and meets all of the following conditions: a) Earth station antenna maximum isotropic gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; b) G/T_1 of 44 dB/K or higher; c) space station emission bandwidth of 250 MHz or higher for the frequency bands 10.7-12.75 GHz or 800 MHz or higher for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz;	i) Compare frequency bands; ii) use the maximum antenna gain of the specific receive earth station (Appendix **S4** C.10 *c)* 2)), the lowest equivalent satellite link noise temperature (Appendix **S4** C.10 *c)* 5)), and the space station emission bandwidth (Appendix **S4** C.7 *a)*) in the geostationary-satellite network as given in Appendix **S4** data; and iii) use the $epfd_{down}$ radiated by the non-GSO FSS system into the earth station employing the very large antenna when this antenna is pointed towards the wanted GSO satellite	The threshold/condition for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit

			iii) the epfd$_{down}$ from the satellite system using the non-geostationary orbit exceeds: a) either –174.5 dB(W/m^2) per 40 kHz for any percentage of time or [x] dB(W/m^2) per 40 kHz for [y]% of the time in the frequency band 10.7-12.75 GHz; b) either –151 dB(W/m^2) per 1 MHz for any percentage of time or [x'] dB(W/m^2) per 1 MHz for [y']% of the time in the frequency bands 17.8-18.6 GHz or 19.7-20.2 GHz		

NOTE - Further study is required for determination of the values within [ ].

Reasons: This is consequential to ADD S9.7A and ADD S9.7B.

PART 4

Proposed modifications to Article S21

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

Resolution 131 (WRC-97) invites ITU-R to study the appropriate pfd values to be applied to non-GSO networks in the bands 10.7-12.75 GHz and 17.7-19.3 GHz to ensure protection of the fixed service without unduly constraining the development of either type of networks. Additionally, text is needed to reflect *resolves* 2 of Resolution 131 (WRC-97) in Article S21. APT proposes the following modifications of Article S21, Table S21-4 including consideration of *resolves* 2 of Resolution 131 (WRC-97).

MOD ASP/20/136

TABLE **S21-4** *(continued)*

Frequency band	**Service***	**Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane**			**Reference bandwidth**
		0°-5°	**5°-25°**	**25°-90°**	
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	–150 ~~14~~	–150 + 0.5(δ – 5) ~~14~~	–140 ~~14~~	4 kHz
	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	–126	–126 + 0.5(δ – 5)	–116	1 MHz

11.7-12.5 GHz (Region 1) 12.5-12.75 GHz (Region 1 countries listed in Nos. **S5.494** and **S5.496**) 11.7-12.~~2~~75 GHz (Region 2) 11.7-12.~~2~~7 GHz (Region 3) ~~12.2-12.7 GHz (Region 2)~~	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	~~–148 [15]~~ –124	~~–148 + 0.5(δ – 5) [15]~~ –124 + 0.5(δ – 5)	~~–138 [15]~~–114	~~4 kHz~~ 1 MHz
11.7-12.2 GHz[7] (Region 2)[**] 12.2-12.~~5~~75 GHz[7] (Region 3) 12.5-12.75 GHz[7] (Region 1 ~~and Region 3~~ countries listed in Nos. **S5.494** and **S5.496**)	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	–148 ~~[14]~~	–148 + 0.5(δ – 5) ~~[14]~~	–138 ~~[14]~~	4 kHz
15.43-15.63 GHz	Fixed-satellite (space-to-Earth)	–127	5°-20°: –127 20°-25°: –127 + 0.56(δ – 20)^2	25°-29°: –113 29°-31°: –136.9 + 25 log (δ – 20) 31°-90°: –111	1 MHz
17.7-19.3 GHz[7, 8]	Fixed-satellite (space-to-Earth) Meteorological-satellite (space-to-Earth)	–115 [*12bis*] or ~~–125~~ –115 – X [12]	–115 + 0.5 (δ – 5) [*12bis*] or ~~–125 + (δ – 5)~~ –115 – X((10 + X)/20)(δ – 5) [12]	–105 [*12bis*] or –105 [12]	1 MHz
19.3-19.7 GHz 22.55-23.55 GHz 24.45-24.75 GHz 25.25-27.5 GHz	Fixed-satellite (space-to-Earth) Earth exploration-satellite (space-to-Earth) Inter-satellite	–115	–115 + 0.5(δ – 5)	–105	1 MHz

[**] This modification reflects the Approach 1 of section 7.6 of the CPM Report (see also Annex 6 to Chapter 7 of the Report). In case that the other Approach in section 7.6 of the CPM Report is adopted Annex 4 to Chapter 3 of the CPM Report is retained as it is.

MOD ASP/20/137

[12] **S21.16.6** ~~These values shall apply provisionally only to emissions of space stations on non-geostationary satellites in networks operating with a large number of satellites, that is systems operating with more than 100 satellites (see Resolution **131 (WRC-97)**).~~ The function X is defined as a function of the number, N, of satellites in the non-GSO FSS constellation as follows:

– for $N \leq 50$ $X = 0$ (dB)

– for $50 < N \leq 288$ $X = \frac{5}{119}(N - 50)$ (dB)

– for $N > 288$ $X = \frac{1}{69}(N + 402)$ (dB)

In the band 18.8-19.3 GHz, these limits apply to emissions of any space station in a non-geostationary FSS system for which complete coordination or notification information, as appropriate, has been received by the Radiocommunication Bureau after 17 November 1995, and which was not operational by that date.

Reasons: The above regulatory text maintains the original limits for non-GSO FSS systems in the band 18.8-19.3 GHz that were notified or operational prior to the end of WRC-95 per the decision in Resolution 131 (WRC-97). In the band 17.7-18.8 GHz, the new limits would apply to all non-GSO systems irrespective of the date of receipt of information or date of bringing into operation.

ADD ASP/20/138

[12*bis*] **S21.16.6*bis*** These limits apply to emissions of a space station on a meteorological-satellite and on a geostationary FSS satellite. These limits also apply to emissions of any space station in a non-geostationary FSS system in the band 18.8-19.3 GHz for which complete coordination or notification information has been received by the Radiocommunication Bureau by 17 November 1995, or are in operation by that date.

Reasons: The above regulatory text reflects the date-specific provisions currently in Resolution 131 (WRC-97).

NOC ASP/20/139

[13] **S21.16.7** These power flux-density limits are subject to review by ITU-R and shall apply until they are revised by a competent world radiocommunication conference.

SUP ASP/20/140

[14] **S21.16.8**

SUP ASP/20/141

[15] **S21.16.9**

PART 5

Proposed modifications to Resolutions 130 (WRC-97) and 538 (WRC-97)

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

The existing text in the Radio Regulations (e.g. those Resolutions 130 (WRC-97), 131 (WRC-97) and 538 (WRC-97) (incorporated by reference), and Articles S5, S9, S11, S21 and S22, and Appendices S4 and S5) was reviewed and some possible options were identified for modifications to these provisions in ITU-R.

APT proposes the suppression of the *resolves* 6 of Resolution 130 provided that the suitable text is reflected in the relevant footnotes.

RESOLUTION 130 (WRC-97)

Use of non-geostationary systems in the fixed-satellite service in certain frequency bands

SUP ASP/20/142

resolves

6

Reasons: APT agrees with the suppression of the *resolves* 6 of Resolution 130 provided that suitable text is reflected in the relevant footnotes.

PART 6

Proposed modifications to footnotes in Article S5 (Resolutions 130 (WRC-97) and 538 (WRC-97))

6.1 Proposed modifications to footnotes based on Resolution 130 (WRC-97) and Resolution 538 (WRC-97)

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

Section 3.1.2.4.1 of the CPM Report notes that as a result of the modifications for Resolutions 130 and 538, consequential changes would be required to footnotes in Article S5. APT agrees to modify footnotes in Article S5 based on Option 1A of Annex 6 of the CPM Report.

MOD ASP/20/143

S5.441 The use of the bands 4 500-4 800 MHz (space-to-Earth), 6 725-7 025 MHz (Earth-to-space) by the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by a non-geostationary-satellite system~~s~~ in the fixed-satellite service ~~shall be in accordance with the provisions of Resolution **130 (WRC-97)**~~is subject to the application of the provision of No. **S9.12** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO FSS systems and of the complete coordination information for the GSO networks.

MOD ASP/20/144

S5.484A The use of the bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 13.75-14.5 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), 29.5-30 GHz (Earth-to-space) by a non-geostationary~~- and geostationary-~~satellite system~~s~~ in the fixed-satellite service is subject to application of the provisions of ~~Resolution **130 (WRC-97)**. The use of the band 17.8-18.1 GHz (space-to-Earth) by non-geostationary fixed-satellite service systems is also subject to the provisions of Resolution **538 (WRC-97)**.~~ No. **S9.12** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO FSS systems and of the complete coordination information for the GSO networks.

MOD ASP/20/145

S5.487A *Additional allocation:* in Region 1, the band 11.7-12.5 GHz, in Region 2, the band 12.2-12.7 GHz and, in Region 3, the band 11.7-12.2 GHz, are also allocated to the fixed-satellite service (space-to-Earth) on a primary basis, limited to non-geostationary systems and subject to the provisions of ~~Resolution **538 (WRC-97)**~~No. **S9.12** for coordiniation with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO FSS systems and of the complete coordination information for the GSO networks.

Reasons: They are consequential changes to suppression of the *resolves* 6 of Resolution 130.

6.2 Proposed modifications to footnotes S5.488 and S5.491 to reflect relevant RRB Rule of Procedure

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

It was noted that footnotes S5.488 and S5.491 currently restrict the use by FSS (space-to-Earth) of certain bands in the 12 GHz range to national and subregional systems. In 1998, the Radio Regulations Board adopted a Rule of Procedure on subregional systems, which states that "in the case where a service area covers a territory under the jurisdiction of other administrations, it shall be limited to the territories of the administrations concerned and it shall be notified by one of the participating administrations on behalf of other administrations."

APT considers that these limitations lead to significant burden to the administrations and the Bureau, and unnecessary constraints on the development of GSO and non-GSO FSS systems, without clear advantage since those administrations associated with the subregional system keep the same rights as those which are not associated.

APT also considers that Option 2C would have the advantage of avoiding any unnecessary constraints on the development of both GSO and non-GSO FSS systems in the corresponding bands in both Regions 2 and 3.

APT agrees to support Option 2C of the CPM Report.

MOD ASP/20/146

S5.488 The use of the band~~s 11.7-12.2 GHz by the fixed-satellite service in Region 2 and~~ 12.2-12.7 GHz by the broadcasting-satellite service in Region 2 is limited to national and subregional systems. The use of the band 11.7-12.2 GHz by the fixed-satellite service in Region 2 is subject to ~~previous agreement between the administrations concerned and those having services, operating or planned to operate in accordance with the Table, which may be affected (see Articles **S9** and **S11**)~~the provisions of Article **S21**, Table **S21-4**[**]. For the use of the band 12.2-12.7 GHz by the broadcasting-satellite service in Region 2, see Appendix **S30**.

MOD ASP/20/147

S5.491 *Additional allocation:* in Region 3, the band 12.2-12.5 GHz is also allocated to the fixed-satellite (space-to-Earth) service on a primary basis~~, limited to national and sub-regional systems~~. The power flux-density limits in Article **S21**, Table **S21-4** shall apply to this frequency band. The introduction of the service in relation to the broadcasting-satellite service in Region 1 shall follow the procedures specified in Article 7 of Appendix **S30**, with the applicable frequency band extended to cover 12.2-12.5 GHz.

Reasons: The limitations contained in footnotes S5.488 and S5.491 lead to significant burden to the administrations and the Bureau, and unnecessary constraints on the development of GSO and non-GSO FSS systems without clear advantage.

[**] Concerning the need specified by **S5.488** for previous agreement from administrations which services may be affected, it is to be noted that it might also be waived for GSO FSS systems if pfd limits were to be introduced in Article **S21** (see also section 7.6 of the CPM Report) to ensure the protection of terrestrial services. APT countries proposes the consequential modification based on Approach 1 (introduction of pfd hard limits).

PART 7

Proposed additional data items required in Appendix S4 for the epfd calculations

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

Based on the work in ITU-R, APT proposes the following additions to Appendix S4, Annex 2A.

1 Section A.4 *b)*

ADD ASP/20/148

In addition, if the stations operate in a frequency band subject to the provisions of Resolution **130 (WRC-97)** or Resolution **538 (WRC-97)**:

6) new data elements required to characterize properly the orbital operation of the non-GSO satellite systems:

a) for each range of latitudes provide:

– the maximum number of non-GSO satellites operating their downlinks co-frequency to any location; and

– the associated latitude range;

b) the minimum height of the space station above the surface of the Earth at which any satellite will be used to provide a service;

c) where the space station uses station keeping to maintain a repeating ground track, the time in seconds that it takes for the constellation to return to its starting position, i.e. such that all satellites are in the same location with respect to the Earth and each other;

d) an indicator identifying if the space station should be modelled with a specific precession rate of the ascending node of the orbit instead of the J_2 term;

e) for a space station that is to be modelled with a specific precession rate of the ascending node of the orbit instead of the J_2 term, the precession rate in degrees/day, measured counter-clockwise in the equatorial plane;

f) the longitude of the ascending node for the *j*-th orbital plane, measured counter-clockwise in the equatorial plane from the Greenwich meridian to the point where the satellite makes its south-to-north crossing of the equatorial plane ($0° \leq \Omega_j < 360°$) (NOTE 1);

g) the time at which the satellite is at the location defined by Ω_j (NOTE 1);

h) the longitudinal tolerance of the longitude of the ascending node.

NOTE 1 - Currently non-GSO space stations are referenced by the "right ascension of ascending node" (A.4 *b)* 5) Ω_j) to the first point of Aries. However, for the evaluation of epfd a reference to a point on the Earth is used and hence the "longitude of the ascending node" is required.

2 Section A.4 *b)*

ADD ASP/20/149

7) new data elements required to characterize properly the performance of the non-GSO satellite systems:

a) the maximum number of non-GSO satellites receiving simultaneously co-frequency from the associated earth stations within a given cell;

b) the average number of associated earth stations operating co-frequency per square kilometre within a cell;

c) the average distance between co-frequency cells;

d) for the exclusion zone about the geostationary orbit provide:

– the type of zone;

– the width of the zone in degrees.

3 Section A.14

ADD ASP/20/150

A.14 Spectrum masks

For stations operating in a frequency band subject to the provisions of Resolution **130 (WRC-97)** or Resolution **538 (WRC-97)**:

a) for each e.i.r.p. mask used by the non-GSO space station provide:

– the type of mask;

– the mask identification code;

– the mask pattern defined in terms of the power in the reference bandwidth for a series of off-axis angles with respect to a specified reference point;

– the lowest frequency for which the mask is valid;

– the highest frequency for which the mask is valid;

b) for each associated earth station e.i.r.p. mask provide:

– the type of mask;

– the mask identification code;

– the mask pattern defined in terms of the power in the reference bandwidth for a series of off-axis angles with respect to a specified reference point;

- the lowest frequency for which the mask is valid;
- the highest frequency for which the mask is valid;
- the minimum elevation angle at which any associated earth station can transmit to a non-GSO satellite;
- the minimum separation angle between the GSO arc and the associated earth station beam-axis at which the associated earth station can transmit towards a non-GSO satellite;

c) for each pfd mask used by the non-GSO space station provide:

- the mask identification code;
- the mask pattern of the power flux-density defined in three dimensions;
- the lowest frequency for which the mask is valid;
- the highest frequency for which the mask is valid.

4 Section C.9

ADD ASP/20/151

d) for stations operating in a frequency band subject to the provisions of Resolution **130 (WRC-97)** or Resolution **538 (WRC-97)**, provide:

- the type of mask;
- the mask identification code.

Reasons: APT supports the conclusions in ITU-R.

PART 8

Proposed modification to Article S5

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Japan, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of)

Introduction

The band 13.75-14 GHz is allocated on a co-primary basis to FSS and RLS. It is also allocated, in some countries, to FS and MS (Nos. S5.499 and S5.500) and to RNS (No. S5.501). GSO systems of SRS use this band in accordance with No. S5.503. Additionally, non-GSO SRS and EESS operate with protection from FSS (No. S5.503A) until 1 January 2000. After 2001 the DRS system is the only space research system that will remain in the band on a co-primary basis with FSS.

These technical analyses have led to possible solutions which will maintain the present balance in the sharing conditions between RLS, SRS and FSS, and accommodate non-GSO FSS systems within the 13.75-14 GHz band.

With reference to No. S5.502, reduction or suppression of the minimum e.i.r.p. requirement for FSS earth stations coupled with the introduction of appropriate regulatory measures to address the concerns of RLS, could achieve this objective. Under the current provisions, provided radar observes the restriction put on its maximum e.i.r.p. averaged over 1 second, the FSS cannot claim protection from RLS regardless of the FSS earth station e.i.r.p. used.

APT proposes to suppress the minimum e.i.r.p. restriction prescribed in S5.502 of the Radio Regulations, but to retain the limitation of the minimum antenna diameter in order to maintain the balance between services allocated in this frequency band.

MOD ASP/20/152

S5.502 In the band 13.75-14 GHz, the e.i.r.p. of any emission from an earth station in the fixed-satellite service ~~shall~~should be at least 68 dBW, and should not exceed 85 dBW~~,~~. The earth station shall transmit with a minimum antenna diameter of 4.5 m. In addition the e.i.r.p., averaged over one second, radiated by a station in the radiolocation or radionavigation services towards the geostationary-satellite orbit shall not exceed 59 dBW.

Reasons: As the adjacent frequency spectrum is congested, removal of minimum e.i.r.p. restriction will maintain the present balance could lead to efficiently utilization of frequency spectrum. APT believes that above proposal could satisfy the requirement of all the services allocated to this frequency band. APT also believes that removal of minimum antenna size restriction would be required after further study at relevant ITU-R study groups.

PART 9

Interference from non-GSO FSS systems to GSO FSS and GSO BSS services

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

APT has reviewed Chapter 3 of the CPM Report and developed regulatory text for a new article to ensure operational compliance of non-GSO FSS systems with the operational $\text{epfd}_{\text{down}}$ limits.

ADD ASP/20/153

ARTICLE S15A

ADD ASP/20/154

Interference from non-GSO FSS systems to GSO FSS and GSO BSS services

ADD ASP/20/155

Section I – Procedure for assuring operational compliance with aggregate epfd limits

ADD ASP/20/156

S15A.1 When an administration operating a GSO network in accordance with the Radio Regulations identifies epfd levels from non-GSO systems in excess of the "aggregate" limits[1]:

ADD ASP/20/156*bis*

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[1] **S15A.1.1** See Resolution **WWW (WRC-2000)**.

ADD ASP/20/157

S15A.2 *a)* the affected administration shall immediately send a letter, by fax or other mutually agreed electronic means, to the administrations concerned and request immediate corrective action. It shall provide the necessary evidence identifying the excess interference and the source of such interference. A copy of the request shall be sent to BR;

ADD ASP/20/158

S15A.3 *b)* upon receipt of the request, the interfering administrations shall immediately reduce emissions, equitably, to the required levels pending final determination of solutions to the problem and acknowledge receipt within [X] days. A copy of the acknowledgement and confirmation of the action taken shall be sent to BR;

ADD ASP/20/159

S15A.4 *c)* the non-GSO parties concerned work together thereafter in order to find a permanent solution to the problem, within an additional [30] days;

ADD ASP/20/160

S15A.5 *d)* if after [30] days a solution cannot be found, then any of the parties may request the assistance of BR;

ADD ASP/20/161

S15A.6 *e)* BR will study the matter and report its conclusion to the parties involved, recommending its solution to the problem within an additional [30] days. The affected administration may elect to accept the higher level of interference received;

ADD ASP/20/162

S15A.7 *f)* if an interfering administration fails to respond within the [X]-day period in *c)* above, the affected administration shall send a reminder fax requesting response within an additional [X] days;

ADD ASP/20/163

S15A.8 *g)* if any administration fails to respond within that period, the affected administration may request the assistance of the Bureau, who will promptly send a fax to the concerned administrations;

ADD ASP/20/164

S15A.9 *h)* if the interfering administrations fails to implement BR's recommendations in accordance with *e)* above, BR shall enter a note in the MIFR to the effect that:

- [administration names] have failed to implement the BR recommendation in relation to the use of the frequency assignments of the non-GSO systems causing the interference; and
- the entries do not meet the requirements of Resolution **WWW (WRC-2000)**,

BR shall also add the following statements to the relevant MIFR entries: "The problem of interference caused by this frequency assignment into the services operated by the administration of [name of administration] has not been resolved";

ADD ASP/20/165

S15A.10 *i)* the interfering administrations and the affected administration shall be informed by fax or other agreed electronic means of the action taken by BR. A copy of this advice shall be sent to all ITU Members drawing their attention to the action taken;

ADD ASP/20/166

S15A.11 *j)* when the problem of interference has been resolved, either as in *e)* above or by other means acceptable to all the parties, BR shall modify the entries in the MIFR to reflect the final outcome and inform all ITU Members.

ADD ASP/20/167

Section II – Procedure for assuring compliance with single-entry operational limits

ADD ASP/20/168

S15A.12 When an administration operating a GSO network in accordance with the Radio Regulations identifies epfd levels from non-GSO systems in excess of the "operational limit" given in Tables **S22-4**, as determined by the use of ITU-R agreed measurement techniques or until such ITU-R agreed measurement techniques are available by use of the actual earth station monitoring capability:

ADD ASP/20/169

S15A.13 *a)* that administration first attempts to identify the source of the excess epfd;

ADD ASP/20/170

S15A.14 *b)* if the source of the excess epfd is readily identifiable, the administration may proceed to *g)* below;

ADD ASP/20/171

S15A.15 *c)* in case, after *a)* above, an administration is unable to determine the source of interference, it shall send a request for cooperation to all administrations responsible for non-GSO systems using over-lapping frequency bands, providing all relevant details. A copy of the request shall be sent to BR;

ADD ASP/20/172

S15A.16 *d)* the requested administrations shall acknowledge receipt immediately and dispatch to the requesting administration within [y] days, with a copy to BR, the information which may be used to identify the source of the problem;

ADD ASP/20/173

S15A.17 *e)* if an administration fails to respond within [y] days, the affected administration may request the assistance of BR, in which case BR shall immediately send a fax to the administration responsible for the non-GSO system, requesting action within an additional [z] days;

ADD ASP/20/174

S15A.18 *f)* if the administration fails to respond to BR, BR shall take action as in *i)* to *l)* below, as if the administration had failed to implement recommendations of BR;

ADD ASP/20/175

S15A.19 *g)* once the sources of the excess epfd are identified, the affected administration sends a letter, by fax or other mutually agreed electronic means, to the administrations concerned and requests immediate corrective action. It shall provide the necessary evidence identifying the amount of excess epfd and the source of such interference. A copy of the request shall be sent to BR;

ADD ASP/20/176

S15A.20 *h)* upon receipt of the request, the interfering administration shall immediately reduce emissions to the required levels pending final determination of solutions to the problem and, within [y] days, so advise the administration whose network is affected. A copy of the acknowledgement and confirmation of the action taken shall be sent to BR;

ADD ASP/20/177

S15A.21 *i)* BR will study the matter within an additional [30] days, and report its conclusion to the parties involved, recommending its solution to the problem;

ADD ASP/20/178

S15A.22 *j)* if the interfering administrations fails to implement BR's recommendations in accordance with *e)* above, BR shall enter a note in the MIFR to the effect that:

- [administration names] have failed to implement the BR recommendation in relation to the use of the frequency assignments of the non-GSO systems causing the interference; and
- the entries do not conform with the operational limits in Tables **S22-4** of Article **S22**,

BR shall also add the following statements to the relevant MIFR entries: "The problem of interference caused by this frequency assignment into the services operated by the administration of [name of administration] has not been resolved";

ADD ASP/20/179

S15A.23 *k)* the administration that fails to respond or the interfering administration and the affected administration shall be informed by fax or other agreed electronic means of the action taken by BR. A copy of this advice shall be sent all ITU Members drawing their attention to the action taken;

ADD ASP/20/180

S15A.24 *l)* when the problem of interference has been resolved, either as in *i)* above or by other means acceptable to all the parties, BR shall modify the entries in the MIFR to reflect the final outcome and inform all ITU Members.

Reasons: APT considers that procedures to assure compliance with the epfd limits should be included in the Radio Regulations.

Agenda item 1.14

1.14 to review the results of studies on the feasibility of implementing non-GSO MSS feeder links in the 15.43-15.63 GHz bands in accordance with Resolution **123 (WRC-97)**

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

Introduction

APT supports the conclusions of ITU-R that it should be possible to implement non-GSO mobile-satellite service feeder links in the band 15.43-15.63 GHz taking into account the protection of the radio astronomy service in the band 15.35-15.4 GHz by means of limiting out-of-band emissions. APT therefore proposes the suppression of Resolution 123 (WRC-97).

SUP ASP/20/181

RESOLUTION 123 (WRC-97)

Feasibility of implementing feeder links of non-geostationary satellite networks in the mobile-satellite service in the band 15.43-15.63 GHz (space-to-Earth) while taking into account the protection of the radio astronomy service, the Earth exploration-satellite (passive) service and the space research (passive) service in the band 15.35-15.4 GHz

Reasons: The conducted studies comply with the Resolution 123 (WRC-97) provisions completely and hence cover all issues related to the agenda item concerned. Taking into account that Resolution 123 (WRC-97) has attained the assigned objectives and aims, APT considers it would be appropriate to suppress it at WRC-2000.

Agenda item 1.15.1

1.15.1 to consider new allocation to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Philippines (Republic of the), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

APT administrations recognize the need for appropriate new allocations for RNSS in the bands between 1-6 GHz. The band 960-1 215 MHz (space-to-Earth) and the band 5 000-5 030 MHz (Earth-to-space) are candidate bands for new allocation to RNSS.

However, further consideration is required of the potential interference mechanisms between RNSS and existing services in other candidate bands for new allocations to RNSS. In particular, when considering a new allocation for RNSS in the band 1 300-1 350 MHz, potential interference from existing services to RNSS should be taken into account and no restrictions should be taken into account and no restrictions should be imposed on existing services operating in accordance with the Table of Frequency Allocations. Necessary bandwidth is expected to be studied in the long term.

MOD ASP/20/182

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
960-1 215	AERONAUTICAL RADIONAVIGATION MOD S5.328	

MOD ASP/20/183

S5.328 The band 960-1 215 MHz is reserved on a worldwide basis for the use and development of airborne electronic aids to air navigation and any directly associated ground-based and satellite-borne facilities. A portion of this band is also allocated to the radionavigation-satellite service (space-to-Earth) on a primary basis. In this band, the radionavigation-satellite service shall not cause harmful interference to, nor claim protection from, stations of the aeronautical radionavigation and aeronautical radionavigation-satellite services.

Reasons: Parts of the band of 960-1 215 MHz are investigated for the worldwide new need of RNSS (space-to-Earth) allocations. The operation of the ARNS in the band 960-1 215 MHz should be preserved in all with sufficient bandwidth for accommodating necessary frequency transition of the ARNS operating in the band which would be allocated to the new RNSS. The ITU-R study has also concluded that the priority should be given to the ARNS over the RNSS in order to satisfy current and future requirement of the ARNS.

MOD ASP/20/184

4 800-5 830 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 000-~~5 150~~5 030	AERONAUTICAL RADIONAVIGATION S5.367 S5.444 S5.444A ADD S5.444B	

ADD ASP/20/184*bis*

S5.444B The band 5 000-5 030 MHz is also allocated to the radionavigation-satellite service (Earth-to-space) on a primary basis.

Reasons: According to the new needs of RNSS (Earth-to-space) allocations, the band 5 000-5 030 MHz can be considered as a candidate due to the study results that the band is lightly used and is not planned for use by the international standard MLS. The nearby RAS band can be protected by a separation distance between the beacons and the RAS sites.

Agenda item 1.15.2

1.15.2 to consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the bands 1 215-1 260 MHz and 1 559 -1 610 MHz

Submitted by the following administrations:

Bhutan (Kingdom of), China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Philippines (Republic of the), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

APT administrations support the addition of the space-to-space direction to the RNSS in the 1 215-1 260 MHz and 1 559-1 610 MHz bands, subject to the provision that space-borne radionavigation receivers shall not seek protection from other existing radionavigation-satellite systems or existing terrestrial radiolocation systems operating in accordance with the Table of Frequency Allocations.

MOD ASP/20/185

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 215-1 240	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) S5.329 <u>RADIONAVIGATION-SATELLITE (space-to-space) ADD S5.3XX</u> SPACE RESEARCH (active) S5.330 S5.331 S5.332	
1 240-1 260	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION RADIONAVIGATION-SATELLITE (space-to-Earth) S5.329 <u>RADIONAVIGATION-SATELLITE (space-to-space) ADD S5.3XX</u> SPACE RESEARCH (active) Amateur S5.330 S5.331 S5.332 S5.334 S5.335	

ADD ASP/20/186

S5.3XX The radionavigation-satellite service (space-to-space) oprating in the band 1 215-1 260 MHz shall not claim protection from, or impose constraints on operation or development of existing radiolocation services operating in this band.

Reasons: The new allocation for the RNSS in this band would be appropriate in the condition that the stations of the RNSS shall not claim protection from, impose constraints on operation or development of the existing radiolocation services.

MOD ASP/20/187

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 559-1 610	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) S5.341 S5.355 S5.359 S5.363	

Reasons: To provide frequencies for space-to-space applications such as spacecraft positioning, velocity determination, leading to give better precision of timing and positioning for users according to the results of ITU-R studies.

Agenda item 1.16

1.16 to consider allocation of frequency bands above 71 GHz to the earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution **723 (WRC-97)**

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

Introduction

In accordance with Resolution 723 (WRC-97), modification of the allocation tables above 71 GHz is proposed to accommodate the present and future requirements for the Earth exploration-satellite (passive), space research (passive) and radio astronomy services. It will ensure an outcome supportive of the operations of these services consistent with the needs of other services. The modifications are based on a plan developed by an international group of science service and other experts who regularly attend ITU-R Working Party meetings. They are consistent with the guidelines discussed in Chapter 4 of the CPM Report to WRC-2000. The major aim was to maintain the aggregate amount of spectrum allocated to the displaced services and provide wideband blocks to accommodate future multimedia systems, while taking into account differences in atmospheric attenuation and appropriate separation between services.

MOD ASP/20/188

66-86 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
71-74	FIXED FIXED-SATELLITE (~~Earth-to-space~~space-to-Earth) MOBILE MOBILE-SATELLITE (~~Earth-to-space~~space-to-Earth) ~~S5.149 S5.556~~	

Reasons: MSS and FSS uplinks and downlinks in the 71-74 GHz and 81-84 GHz bands are interchanged to avoid satellite downlinks in bands needed by RAS. The atmospheric absorption is only slightly higher in the 71-74 GHz band than in the 81-84 GHz band. The RAS footnotes S5.149 and S5.556 are deleted and references to the 72.77-72.91 GHz band in the footnotes are deleted.

MOD ASP/20/189

74-75.5	BROADCASTING SATELLITE FIXED FIXED-SATELLITE (~~Earth-to-space~~space-to-Earth) MOBILE Space research (space-to-Earth) MOD S5.561

MOD ASP/20/190

75.5-76	~~AMATEUR~~ ~~AMATEUR-SATELLITE~~ BROADCASTING-SATELLITE FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Space research (space-to-Earth) MOD S5.561 ADD S5.EEE

Reasons: The BSS currently allocated to the 84-86 GHz band is relocated in this band to protect proposed RAS allocations in the 84-86 GHz band. The atmospheric absorption is only slightly higher in the 74-76 GHz band than in the 84-86 GHz band. The AS and ASS allocations are shifted to 77.5-78 GHz. A new footnote S5.EEE protects existing AS and ASS operations in the 75.5-76 GHz band until the year 2010. The FSS (Earth-to-space) allocation is moved to the 84-86 GHz band. The proposed allocations in the 74-84 GHz range preserve a contiguous 10 GHz SRS downlink (secondary) allocation that is required for space VLBI purposes. Footnote S5.561 is modified to recognize the change in the BSS allocations.

MOD ASP/20/191

76-~~81~~77.5	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth) MOD S5.149 ~~S5.560~~

MOD ASP/20/192

~~76-81~~77.5-78	AMATEUR AMATEUR SATELLITE ~~RADIOLOCATION~~ ~~Amateur~~ ~~Amateur-satellite~~ Radio astronomy Space research (space-to-Earth) ~~S5.560~~

MOD ASP/20/193

~~76~~78-81	RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite Space research (space-to-Earth) MOD S5.149 ~~S5.560~~

Reasons: The RAS allocations in the 76-77.5 GHz and 78-81 GHz bands satisfy the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. The RAS is added as a secondary allocation in the 77.5-78 GHz band. The frequencies of the AS and ASS primary bands are increased by 2 GHz to enable the BS, FSS and MSS downlinks to be relocated at lower frequencies, and to avoid sharing with the vehicular radars which some administrations have authorized to operate in the 76-77 GHz band. The RAS bands are added to those listed in S5.149. S5.560 does not apply to the 76-77.5 and 77.5-78 GHz bands and is deleted.

MOD ASP/20/194

81-84	FIXED FIXED-SATELLITE (~~space-to-Earth~~Earth-to-space) MOBILE MOBILE-SATELLITE (~~space-to-Earth~~Earth-to-space) RADIO ASTRONOMY Space research (space-to-Earth) MOD S5.149 ADD S5.DDD

Reasons: The directions of MSS and FSS downlinks are reversed to allow radio astronomy observations and have downlink pairs in the 71-74 GHz band. The RAS allocation satisfies the radio astronomy requirements for spectral line and wide band continuum observations from remote locations worldwide. S5.DDD has been added to maintain the current amount of secondary allocated AS and ASS spectrum. This band has been added to S5.149.

MOD ASP/20/195

84-86	FIXED FIXED-SATELLITE (Earth-to-space) ADD S5.PPP MOBILE BROADCASTING ~~BROADCASTING-SATELLITE~~ RADIO ASTRONOMY MOD S5.149 ~~S5.561~~

Reasons: The BSS allocation is relocated in the 74-76 GHz band. The direction of the satellite downlinks has been reversed to allow radio astronomy observations. The new uplink is paired with downlinks in the 74-76 GHz band. The addition of the RAS allocation satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. This band has been added to S5.149. S5.561 is no longer relevant to this band and is deleted. A new country footnote, S5.PPP, is added to constrain the FSS use in Japan.

MOD ASP/20/196

86-119.98 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
86-92	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340	

Reasons: This band is of importance to the SRS (passive) and EESS (passive) as a comparison band for observations of atmospheric oxygen at 118.75 GHz. No active services are acceptable in this band.

MOD ASP/20/197

92-94	FIXED ~~FIXED-SATELLITE (Earth-to-space)~~ MOBILE RADIO ASTRONOMY RADIOLOCATION MOD S5.149 ~~S5.556~~

Reasons: The addition of the RAS allocation satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. S5.556 identified previous RAS interest, and is no longer needed; it is deleted from the band and modified appropriately. The FSS (Earth-to-space) allocation is relocated in the 81-86 GHz band. This band has been added to those listed in S5.149.

MOD ASP/20/198

94-94.1	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) Radio astronomy S5.562

Reasons: The RAS allocation is secondary. Except for its introduction, no change in sharing between services is proposed.

MOD ASP/20/199

94.1-95	FIXED ~~FIXED-SATELLITE (Earth-to-space)~~ MOBILE RADIO ASTRONOMY RADIOLOCATION MOD S5.149

Reasons: The addition of the RAS allocation satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. The FSS (Earth-to-space) allocation is relocated in the 81-86 GHz band. S5.556 is no longer relevant and is deleted. This band has been added to those listed in S5.149.

MOD ASP/20/200

95-100	FIXED MOBILE ~~S5.553~~ ~~MOBILE-SATELLITE~~ RADIO ASTRONOMY RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE ~~Radiolocation~~ MOD S5.149 MOD S5.553 MOD S5.554 ~~S5.555~~

Reasons: The addition of the RAS allocation satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations. The RLS is upgraded to primary. The MSS is deleted because it cannot share with the RLS. S5.555, which allocates the 97.88-98.08 GHz band to the RAS, is not needed and is deleted; the footnote is modified appropriately. S5.553 is modified to include stations in the FS. This band is added to those listed in S5.149.

MOD ASP/20/201

100-102	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341

Reasons: The addition of the RAS allocation satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. The band is used by the EESS (passive) for microwave limb sounding of atmospheric constituents. This band is added to those listed in S5.340.

MOD ASP/20/202

102-105	FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY MOD S5.149 S5.341

Reasons: The FSS allocation is relocated in the 71-76 GHz band, to enable radio astronomy observations in the 102-105 GHz band. The atmospheric absorption in these two windows is similar. The addition of the RAS allocation satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. This band is added to those listed in S5.149.

MOD ASP/20/203

105-~~116~~109.5	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ~~S5.340~~ S5.341

Reasons: The EESS (passive) has no specific use for the band 105-109.5 GHz and the allocation is deleted. The FS and MS are added, relocated from the 116-122.5 GHz band where removal of these services is needed to protect essential passive sensor operations. Since the band is no longer passive in nature, S5.340 is deleted. S5.CCC is added to limit the SRS (passive) allocation to space-based radio astronomy. This band is added to those in S5.149, to reflect the need to protect the RAS in a band that is no longer passive.

MOD ASP/20/204

109.5-111.8	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341

Reasons: It is essential to maintain this band passive, and no change is proposed to the allocations (the MOD merely reflects a change in band limits). This band is of particular importance to the EESS because it contains an ozone line at 110.8 GHz, used for microwave limb sounding, and also to the RAS because it contains carbon monoxide lines at 109.8 and 110.2 GHz.

MOD ASP/20/205

111.8-114.25	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ~~S5.340~~ S5.341

Reasons: The EESS (passive) does not need the band 111.8-114.25 GHz and is deleted. FS and MS are added, relocated from the 116-122.5 GHz band where deletion of these services is needed to protect essential passive sensor operations. The addition of S5.CCC limits the SRS (passive) allocation to space-based radio astronomy. S5.340 is no longer relevant and is deleted; its list of bands is modified appropriately. This band is added to those in S5.149 to reflect the need to protect the RAS in a band that is no longer passive.

MOD ASP/20/206

~~105~~114.25-116	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341

Reasons: It is essential to maintain this band passive, and no change is proposed to the allocations (the MOD merely reflects a change in band limits). The band is of vital importance to the RAS for observations of the 115.27 GHz line of carbon monoxide. It is the first portion of the 114.25-122.25 GHz oxygen absorption band (with peak absorption at 118.75 GHz) which is required for remote sensing.

MOD ASP/20/207

116-119.98	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.XXX ~~MOBILE S5.558~~ SPACE RESEARCH (passive) S5.341

MOD ASP/20/208

119.98-158 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
119.98-120.02	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.XXX ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~Amateur~~ S5.341	

MOD ASP/20/209

120.02-~~126~~122.25	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.XXX ~~MOBILE S5.558~~ SPACE RESEARCH (passive) MOD S5.138

Reasons: These bands are of vital importance to the EESS (passive), as they are the major part of the 114.25-122.25 GHz oxygen absorption band, with peak absorption at 118.75 GHz. The FS and MS are relocated in the 105-109.5 GHz and 111.8-114.25 GHz bands, because sharing with passive sensors would severely restrict the services. The ISS needs to be limited by footnote S5.XXX to links between GSO satellites only, with pfd limits as specified in sharing studies involving passive sensors. The secondary allocation to the AS in the 119.98-120.02 GHz band is also moved to the 122.25-123 GHz band. S5.138 is modified so as to expand the designated bands for industrial, scientific and medical applications.

MOD ASP/20/210

122.25-123	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED INTER-SATELLITE MOBILE MOD S5.558 ~~SPACE RESEARCH (passive)~~ Amateur MOD S5.138

Reasons: The passive sensor allocations are not required in this band and are deleted. A secondary AS allocation has been added to compensate for the deletion in the 119.98-120.02 GHz band. S5.138 is modified so as to expand the designated bands for industrial, scientific and medical applications.

MOD ASP/20/211

~~120.02~~123-126	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE ~~SPACE RESEARCH (passive)~~ Radio astronomy ~~S5.138~~

Reasons: An allocation for passive sensor operations is not needed and is deleted. Satellite downlinks in the frequency range 141-153 GHz are moved to 123-130 GHz to avoid interference to proposed RAS operations at the higher frequencies. The RAS is added on a secondary basis for possible use in wideband continuum observations. Sharing conditions between the ISS and the FSS, MSS, RNS and RNSS services need to be developed, but no imminent use of the band by these services is contemplated. The MSS directional indicator is left undefined. Footnote S5.138 does not apply to this band and are deleted.

MOD ASP/20/212

126-~~134~~130	~~FIXED~~ FIXED SATELLITE (space-to-Earth) ~~INTER-SATELLITE~~ ~~MOBILE S5.558~~ MOBILE SATELLITE ~~RADIOLOCATION S5.559~~ RADIONAVIGATION RADIONAVIGATION-SATELLITE Radio astronomy ADD S5.QQQ MOD S5.149 MOD S5.554

Reasons: Satellite downlinks in the frequency range 141-153 GHz are moved to 123-130 GHz to avoid interference to proposed RAS operations at the higher frequencies. The RAS is added on a secondary basis for possible spectral line and wideband continuum observations. S5.149 is added to highlight RAS observations of silicon monoxide lines in the 128.33-128.59 GHz and 129.23-129.49 GHz bands; the bands are added to this footnote. The FS, MS, ISS and RLS allocations are relocated to improve sharing conditions. Sharing conditions between the FSS, MSS, RNS and RNSS services need to be developed, although no imminent use of the band by these services is contemplated. The MSS directional indicator remains undefined. This band is included in S5.554. A new country footnote, S5.QQQ, is added.

MOD ASP/20/213

~~126~~130-134	FIXED INTER-SATELLITE MOBILE MOD S5.558 RADIO ASTRONOMY ADD S5.QQQ ~~RADIOLOCATION S5.559~~ MOD S5.149

Reasons: The addition of the RAS allocation satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. Sharing conditions between the RAS and the ISS need to be developed. S5.558 is modified to reflect the new MS band limit. The RLS is relocated to improve sharing conditions. S5.149 is added appropriately modified. A new country footnote, S5.QQQ, is added.

MOD ASP/20/214

134-~~142~~136	AMATEUR AMATEUR-SATELLITE ~~MOBILE S5.553~~ ~~MOBILE-SATELLITE~~ ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ Radio astronomy ~~Radiolocation~~ ~~S5.149 S5.340 S5.554 S5.555~~

Reasons: The AS and ASS are relocated from the 142-144 GHz band to avoid interference to proposed RAS operations in the band. The RAS has a secondary allocation. All footnotes are deleted from the band because they are not relevant; they are modified in accordance with the changes.

MOD ASP/20/215

136-141	~~MOBILE S5.553~~ ~~MOBILE-SATELLITE~~ RADIO ASTRONOMY RADIOLOCATION ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ Amateur Amateur-satellite ~~Radiolocation~~ MOD S5.149 ~~S5.340 S5.554 S5.555~~

Reasons: The AS and ASS are relocated from 144-149 GHz. The secondary allocation to the RLS is upgraded to primary to partially compensate for its loss in other bands. The addition of the RAS allocation satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. Since the band is no longer passive, it is removed from S5.340. S5.340, S5.554 and S5.555 are no longer relevant and are deleted. This band is added to S5.149.

MOD ASP/20/216

~~134~~141-142	FIXED MOBILE~~ S5.553~~ ~~MOBILE-SATELLITE~~ RADIO ASTRONOMY RADIOLOCATION ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ ~~Radiolocation~~ MOD S5.149~~ S5.340 S5.554 S5.555~~

MOD ASP/20/217

142-144	~~AMATEUR~~ ~~AMATEUR-SATELLITE~~ FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION MOD S5.149

MOD ASP/20/218

144-~~149~~148.5	FIXED MOBILE RADIO ASTRONOMY RADIOLOCATION ~~Amateur~~ ~~Amateur-satellite~~ MOD S5.149~~ S5.555~~

Reasons: FS, MS and RLS allocations are relocated from the 126-134 GHz band. The addition of the RAS allocations satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. Since the 141-142 GHz sub-band is no longer passive, S5.340 is deleted and modified accordingly. S5.554 and S5.555 no longer apply to the bands and are deleted from them and modified accordingly. All bands are included in S5.149.

MOD ASP/20/219

~~144~~148.5-149	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY ~~RADIOLOCATION~~ SPACE RESEARCH (passive) ~~Amateur~~ ~~Amateur-satellite~~ ~~S5.149~~ MOD S5.340~~ S5.555~~

MOD ASP/20/220

149-150	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340

MOD ASP/20/221

150-151	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) ~~S5.149~~ MOD S5.340 ~~S5.385~~

MOD ASP/20/222

151-15~~6~~1.5	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340

Reasons: A 3 GHz passive band centred on 150 GHz is provided for use in conjunction with remote sensing observations of the 183.31 GHz water vapour line. The bands include the 150.74 GHz nitrous oxide line observed in limb-sounding applications. The active services are relocated in other bands. The 3 GHz band is added to S5.340. Reference to S5.149 is deleted, and the footnote is modified accordingly. S5.385 and S5.555 are not needed and are deleted.

MOD ASP/20/223

151.5-15~~6~~5.5	FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY RADIOLOCATION MOD S5.149

Reasons: The FSS downlink allocation is incompatible with the proposed RAS allocation and is relocated elsewhere. The addition of the RAS allocation satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. The additional RLS allocation partially compensates for its removal from the 126-134 GHz band. This band is added to S5.149.

MOD ASP/20/224

~~151~~155.5-156	EARTH EXPLORATION-SATELLITE (passive) ADD S5.AAA FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ADD S5.BBB

MOD ASP/20/225

156-158	EARTH EXPLORATION-SATELLITE (passive) ADD S5.AAA FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ADD S5.BBB

MOD ASP/20/226

158-202 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
158-16~~4~~58.5	EARTH EXPLORATION-SATELLITE (passive) ADD S5.AAA FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ADD S5.BBB	

Reasons: To satisfy current and imminent EESS (passive) operations a 3 GHz band centered at 157 GHz is allocated for use in conjunction with 183.31 GHz water vapour observations. This allocation is required only until 2018, by which time all operations will have transferred to the 148.5-151.5 GHz band and EESS operations will no longer require protection in these bands. The FSS (space-to-Earth) allocation is incompatible with RAS requirements and is relocated. The addition of the RAS allocations satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. The SRS (passive) allocation is limited to space-based radio astronomy. The 3 GHz band is added to S5.149.

MOD ASP/20/227

158.5-164	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth)

Reasons: The MSS allocation is added to partially compensate for the loss of the 134-142 GHz band.

MOD ASP/20/228

164-16~~8~~7	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340

Reasons: This 3 GHz band together with the 148.5-151.5 GHz band is intended as a reference band for passive sensor observations of the 183.31 GHz water vapour line. It is also used for limb sounding observations of the 164.38 GHz ClO line. It is essential to maintain the band passive. The MOD proposal status refers only to a band-limit change and the associated modification of S5.340, because no change is proposed to the allocations.

MOD ASP/20/229

1647-168	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558 ~~RADIO ASTRONOMY~~ ~~SPACE RESEARCH (passive)~~

MOD ASP/20/230

168-170	FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558 MOD S5.149

MOD ASP/20/231

170-174.5	FIXED FIXED-SATELLITE (space-to-Earth) INTER-SATELLITE MOBILE MOD S5.558 MOD S5.149 ADD S5.QQQ ~~S5.385~~

MOD ASP/20/232

174.5-17~~6.5~~4.8	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED INTER-SATELLITE MOBILE MOD S5.558 ~~SPACE RESEARCH (passive)~~ ~~S5.149 S5.385~~

Reasons: The FS, FSS (space-to-Earth), MS, MSS (space-to-Earth) and ISS are added to these bands to compensate for deletions in other bands. Modified footnote S5.558, providing ISS protection from the aeronautical MS, is added with the MS allocations. The passive services are deleted because they are incompatible with the active services. However, S5.149 is added to draw attention to important RAS spectral lines of hydrogen sulphide in the frequency range 168.59-168.93 GHz, and of silicon monoxide in the frequency ranges 171.11-171.45 GHz, 172.31-172.65 GHz and 173.52-173.85 GHz. S5.149 is modified to include these bands, and exclude the 174.5-174.8 GHz band. A new country footnote, S5.QQQ, is added.

MOD ASP/20/233

174.~~5~~8-176.5	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.YYY ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~S5.149 S5.385~~

MOD ASP/20/234

176.5-182	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.YYY ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~S5.149 S5.385~~

MOD ASP/20/235

182-185	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.563

MOD ASP/20/236

185-190	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ INTER-SATELLITE ADD S5.YYY ~~MOBILE S5.558~~ SPACE RESEARCH (passive) ~~S5.149 S5.385~~

MOD ASP/20/237

190-~~200~~191.8	EARTH EXPLORATION-SATELLITE (passive) ~~MOBILE S5.553~~ ~~MOBILE-SATELLITE~~ ~~RADIONAVIGATION~~ ~~RADIONAVIGATION-SATELLITE~~ SPACE RESEARCH (passive) ~~S5.341 S5.554~~ MOD S5.340

Reasons: The entire 174.8-191.8 GHz band is of vital importance for passive sensing of the water vapour absorption line centred at 183.31 GHz. Sharing with FS and MS is not practical and these services are relocated. The ISS needs to be limited to links between GSO satellites and to a pfd limit as specified in sharing studies. Footnote S5.YYY is added to reflect this requirement. S5.149, S5.341 and S5.385 are deleted. Active services and associated footnote S5.554 are moved from the 190-191.8 GHz band to facilitate the addition of passive sensor allocations, and MOD S5.340 is added to the proposed passive bands. All footnotes are appropriately modified to reflect the changes in the bands.

MOD ASP/20/238

19~~0~~1.8-200	FIXED INTER-SATELLITE MOBILE ~~S5.553~~ MOD S5.558 MOBILE-SATELLITE RADIONAVIGATION RADIONAVIGATION-SATELLITE MOD S5.149 S5.341 MOD S5.553 MOD S5.554

Reasons: The FS and ISS are added to compensate for deletions from other bands. S5.553 and S5.554 are modified to reflect the proposed changes. MOD S5.149 draws attention to an important spectral-line transition of carbon monosulphide in the frequency range 195.75-196.15 GHz; the band has been added to the footnote.

MOD ASP/20/239

200-202	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341 ADD S5.RRR

MOD ASP/20/240

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
202-2~~17~~09	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (Earth-to-space)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 S5.341 ADD S5.RRR	

Reasons: The bands are optimum for microwave limb sounding of water vapour and other atmospheric constituents in the low troposphere. To provide passive bands, the FS, FSS (Earth-to-space) and MS are relocated elsewhere. Consequentially, S5.340 is modified to include the bands. RAS allocations are added to satisfy the requirement for spectral-line and wideband continuum observations. S5.RRR is added to note the use by ground-based passive sensors.

MOD ASP/20/241

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
~~202~~209-217	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY MOD S5.149 S5.341	

Reasons: The addition of the RAS allocation satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. This band has been added to those listed in S5.149.

MOD ASP/20/242

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
217-~~231~~226	~~EARTH EXPLORATION-SATELLITE (passive)~~ FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY SPACE RESEARCH (passive) ADD S5.CCC MOD S5.149 ~~S5.340~~ S5.341	

Reasons: The EESS (passive) allocation is deleted. The FS, FSS (Earth-to-space) and MS are moved to this band from other locations. The band is of particular importance to the RAS because it contains carbon monoxide lines at 219.56 GHz and 220.40 GHz. No longer passive, the band is removed from S5.340 and added to MOD S5.149, which replaces the other footnote in the band.

MOD ASP/20/243

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
~~217~~226-231	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) MOD S5.340 ~~S5.341~~	

MOD ASP/20/244

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
231-~~235~~231.5	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ ~~FIXED-SATELLITE (space-to-Earth)~~ ~~MOBILE~~ RADIO ASTRONOMY SPACE RESEARCH (passive) ~~Radiolocation~~ MOD S5.340	

MOD ASP/20/245

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
231.5-232	FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE Radiolocation	

Reasons: It is essential to maintain the entire 226-231.5 GHz band passive, and the FS, FSS (space-to-Earth) and MS are deleted from the 231-231.5 GHz band. The FSS (space-to-Earth) in the band 231.5-232 GHz is relocated to free up the band from satellite downlinks, avoiding interference problems with the adjacent lower band, which is quite important for radio astronomy. Passive sensors require the bands for microwave limb sounding of atmospheric constituents. In addition, the bands provide a 5.5 GHz reference band for water vapour measurements near 345 GHz. The 226-231.5 GHz band is of vital importance to the RAS for observations of the 230.54 GHz carbon monoxide line. MOD S5.340 is modified to reflect the changes in the passive band limits and added to the second band. S5.341 is not relevant to the bands and is deleted.

MOD ASP/20/246

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
~~231~~232-235	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Radiolocation	

Reasons: Although this is not near the edge of the 1 mm window, the FSS (space-to-Earth) is located in the band to enable RAS allocations for continuum and important spectral-line observations at higher frequencies.

MOD ASP/20/247

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
235-238	EARTH EXPLORATION-SATELLITE (passive) ~~FIXED~~ FIXED-SATELLITE (space-to-Earth) ~~MOBILE~~ SPACE RESEARCH (passive) ADD S5.RRR	

Reasons: The EESS (passive) requires this band for microwave limb sounding of atmospheric constituents. Although the band is not near the edge of the 1 mm window, the FSS (space-to-Earth) is located here to free up bands at higher frequencies for RAS continuum and important spectral-line observations. Studies are required to establish that, at these frequencies, this service can share with EESS (passive) and SRS (passive); Resolution XXX has been added, calling for appropriate ITU-R studies. S5.RRR is added to note the use by ground-based passive sensors.

MOD ASP/20/248

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
238-~~241~~240	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE RADIOLOCATION RADIONAVIGATION RADIONAVIGATION-SATELLITE ~~Radiolocation~~	

MOD ASP/20/249

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
~~238~~240-241	FIXED ~~FIXED-SATELLITE (space-to-Earth)~~ MOBILE RADIOLOCATION ~~Radiolocation~~	

Reasons: The RLS, RNS and RNSS are added to compensate for deleted allocations elsewhere.

MOD ASP/20/250

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
241-248	MOBILE RADIO ASTRONOMY RADIOLOCATION Amateur Amateur-satellite MOD S5.138 MOD S5.149	

Reasons: The addition of the RAS allocation satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. MS is added to partially compensate its loss in other frequency bands. This band is added to those listed in S5.149. S5.138 is modified so as to expand the designated bands for industrial, scientific and medical applications.

MOD ASP/20/251

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
248-250	AMATEUR AMATEUR-SATELLITE Radio astronomy	

Reasons: An RAS allocation is added on a secondary basis.

MOD ASP/20/252

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
250-252	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) ~~S5.149 S5.555~~ MOD S5.340 ADD S5.RRR	

Reasons: The EESS (passive) requires this band for limb sounding of nitrous oxide near 251 GHz. The RAS is added to other passive services and its addition does not alter the sharing scenario. The references to S5.149 and S5.555 are consequentially deleted and the band lists in these footnotes are appropriately modified. S5.340 is added to highlight the passive nature of the band. S5.RRR is added to note the use by ground-based passive sensors.

MOD ASP/20/253

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
252-265	FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY RADIONAVIGATION RADIONAVIGATION-SATELLITE MOD S5.149 ~~S5.385~~ MOD S5.553 S5.554 ~~S5.555 S5.564~~	

Reasons: The FS is relocated to this band as a consequence of allocation actions in other bands. The addition of the RAS allocation satisfies the radio astronomy requirements for spectral-line and wideband continuum observations from remote locations worldwide. The directional indicator is added to the MSS allocation, which is paired with a downlink allocation in the 190-200 GHz band. The atmospheric absorption in the 252-265 GHz band is somewhat higher than in the paired band. This band is added to S5.149, and deleted from S5.385 and S5.555 (which are no longer relevant to the band). Consequent to the worldwide RAS primary allocation, S5.564 is no longer needed.

MOD ASP/20/254

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
265-275	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE RADIO ASTRONOMY MOD S5.149 ADD S5.RRR	

Reasons: No changes are proposed (apart from the text of S5.149 of course). S5.RRR is added to note the use by ground-based passive sensors.

MOD ASP/20/255

202-~~400~~1 000 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
275-~~400~~1 000	(Not allocated) MOD S5.565	

Reasons: The change of the upper limit for applicability of footnote S5.565 is to account for passive service needs above 275 GHz that have been identified by administrations; many spectral-line and wide continuum bands are required for radio astronomy observations and passive remote sensing of the Earth.

MOD ASP/20/256

S5.138 The following bands:

6 765-6 795 kHz	(centre frequency 6 780 kHz),
433.05-434.79 MHz	(centre frequency 433.92 MHz) in Region 1 except in the countries mentioned in No. **S5.280**,
61-61.5 GHz	(centre frequency 61.25 GHz),
~~122~~120.02-123 GHz	(centre frequency ~~122.5~~121.5 GHz), and
~~244~~241-~~246~~248 GHz	(centre frequency ~~245~~244.5 GHz)

are designated for industrial, scientific and medical (ISM) applications. The use of these frequency bands for ISM applications shall be subject to special authorization by the administration concerned, in agreement with other administrations whose radiocommunication services might be affected. In applying this provision, administrations shall have due regard to the latest relevant ITU-R Recommendations.

MOD ASP/20/257

S5.149 In making assignments to stations of other services to which the bands:

13 360-13 410 kHz,	23.07-23.12 GHz*,	~~146.82-147.12 GHz*,~~
25 550-25 670 kHz,	31.2-31.3 GHz,	~~150-151 GHz*,~~
37.5-38.25 MHz,	31.5-31.8 GHz in Regions 1 and 3,	151.5-158.5 GHz,
73-74.6 MHz in Regions 1 and 3,	36.43-36.5 GHz*,	168.59-168.93 GHz*,
150.05-153 MHz in Region 1,	42.5-43.5 GHz,	171.11-171.45 GHz*,
322-328.6 MHz*,	42.77-42.87 GHz*,	172.31-172.65 GHz*,
406.1-410 MHz,	43.07-43.17 GHz*,	173.52-173.85 GHz*,
608-614 MHz in Regions 1 and 3,	43.37-43.47 GHz*,	~~174.42-175.02 GHz*,~~
1 330-1 400 MHz*,	48.94-49.04 GHz*,	~~177-177.4 GHz*,~~
1 610.6-1 613.8 MHz*,	~~72.77-72.91 GHz*,~~	~~178.2-178.6 GHz*,~~
1 660-1 670 MHz,	76-77.5 GHz,	~~181-181.46 GHz*,~~
1 718.8-1 722.2 MHz*,	78-86 GHz,	~~186.2-186.6 GHz*,~~
2 655-2 690 MHz,	~~93.07-93.27 GHz*,~~	195.75-196.15 GHz*,
3 260-3 267 MHz*,	92-94 GHz,	209-226 GHz,
3 332-3 339 MHz*,	94.1-100 GHz,	241-248 GHz,
3 345.8-3 352.5 MHz*,	~~97.88-98.08 GHz*,~~	~~250-251 GHz*,~~
4 825-4 835 MHz*,	102-109.5 GHz,	252-275 GHz
4 950-4 990 MHz,	111.8-114.25 GHz,	~~257.5-258 GHz*,~~
4 990-5 000 MHz,	128.33-128.59 GHz*,	~~261-265 GHz,~~
6 650-6 675.2 MHz*,	129.23-129.49 GHz*,	~~262.24-262.76 GHz*,~~
10.6-10.68 GHz,	130-134 GHz,	~~265-275 GHz,~~
14.47-14.5 GHz*,	136-148.5 GHz,	~~265.64-266.16 GHz*,~~
22.01-22.21 GHz*,	~~140.69-140.98 GHz*,~~	~~267.34-267.86 GHz*,~~
22.21-22.5 GHz,	~~144.68-144.98 GHz*,~~	~~271.74-272.26 GHz*~~
22.81-22.86 GHz*,	~~145.45-145.75 GHz*,~~	

are allocated (* indicates radio astronomy use for spectral line observations), administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference.

Emissions from spaceborne or airborne stations can be particularly serious sources of interference to the radio astronomy service (see Nos. **S4.5** and **S4.6** and Article **S29**).

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD ASP/20/258

S5.340 All emissions are prohibited in the following bands:

1 400-1 427 MHz,	
2 690-2 700 MHz,	except those provided for by Nos. **S5.421** and **S5.422**,
10.68-10.7 GHz,	except those provided for by No. **S5.483**,
15.35-15.4 GHz,	except those provided for by No. **S5.511**,
23.6-24 GHz,	
31.3-31.5 GHz,	
31.5-31.8 GHz,	in Region 2,
48.94-49.04 GHz,	from airborne stations,
50.2-50.4 GHz[2],	except those provided for by No. **S5.555A**,
52.6-54.25 GHz,	
86-92 GHz,	
100-102 GHz,	
~~105-116 GHz,~~	
109.5-111.8 GHz,	
114.25-116 GHz	
~~140.69-140.98 GHz,~~	~~from airborne stations and from space stations in the space-to-Earth direction,~~
148.5-151.5 GHz,	
164-167 GHz,	
182-185 GHz,	except those provided for by No. **S5.563**,
190-191.8 GHz,	
200-209 GHz,	
~~217-231 GHz.~~	
226-231.5 GHz,	
250-252 GHz.	

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

NOC ASP/20/259

S5.341 In the bands 1 400-1 727 MHz, 101-120 GHz and 197-220 GHz, passive research is being conducted by some countries in a programme for the search for intentional emissions of extraterrestrial origin.

Reasons: This informational footnote is still accurate.

MOD ASP/20/260

S5.385 *Additional allocation:* the band~~s~~ 1 718.8-1 722.2 MHz~~, 150-151 GHz, 174.42-175.02 GHz, 177-177.4 GHz, 178.2-178.6 GHz, 181-181.46 GHz, 186.2-186.6 GHz and 257.5-258 GHz are~~ is also allocated to the radio astronomy service on a secondary basis for spectral line observations.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD ASP/20/261

S5.553 In the bands 43.5-47 GHz, 66-71 GHz, 95-100 GHz,~~ 134-142 GHz,~~ ~~190~~191.8-200 GHz and 252-265 GHz, stations in the fixed and land mobile service may be operated subject to not causing harmful interference to the space radiocommunication services to which these bands are allocated (see No. **S5.43**).

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD ASP/20/262

S5.554 In the bands 43.5-47 GHz, 66-71 GHz, 95-100 GHz, 126-130 GHz, ~~134-142 GHz, 190~~191.8-200 GHz and 252-265 GHz, satellite links connecting land stations at specified fixed points are also authorized when used in conjunction with the mobile-satellite service or the radionavigation-satellite service.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD ASP/20/263

S5.555 *Additional allocation:* the band~~s~~ 48.94-49.04 GHz~~, 97.88-98.08 GHz, 140.69-140.98 GHz, 144.68-144.98 GHz, 145.45-145.75 GHz, 146.82-147.12 GHz, 250-251 GHz and 262.24-262.76 GHz are~~ is also allocated to the radio astronomy service on a primary basis.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD ASP/20/264

S5.556 In the bands 51.4-54.25 GHz, 58.2-59 GHz~~,~~ and 64-65 GHz~~, 72.77-72.91 GHz and 93.07-93.27 GHz,~~ radio astronomy observations may be carried out under national arrangements.

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD ASP/20/265

S5.558 In the bands 55.78-58.2 GHz, 59-64 GHz, 66-71 GHz, ~~116-134 GHz,~~ 122.25-126 GHz, 130-134 GHz, ~~170-182 GHz and~~ 167-174.8 GHz ~~185-190 GHz,~~and 191.8-200 GHz stations in the aeronautical mobile service may be operated subject to not causing harmful interference to the inter-satellite service (see No. **S5.43**).

Reasons: The changes to this footnote are consequential to the changes made to the related allocations.

MOD ASP/20/266

S5.559 In the band~~s~~ 59-64 GHz ~~and 126-134 GHz~~, airborne radars in the radiolocation service may be operated subject to not causing harmful interference to the inter-satellite service (see No. **S5.43**).

Reasons: The changes to this footnote are consequential to the changes made to the related allocation. The radiolocation and inter-satellite services are no longer co-allocated in this spectral region.

NOC ASP/20/267

S5.560 In the band 78-79 GHz radars located on space stations may be operated on a primary basis in the Earth exploration-satellite service and in the space research service.

Reasons: No change is required to this footnote.

MOD ASP/20/268

S5.561 In the band ~~84-86~~ 74-76 GHz, stations in the fixed~~,~~ and mobile ~~and broadcasting~~ services shall not cause harmful interference to broadcasting-satellite stations operating in accordance with the decisions of the appropriate frequency assignment planning conference for the broadcasting-satellite service.

Reasons: The broadcasting-satellite allocations have been transferred to the 74-76 GHz band.

NOC ASP/20/269

S5.562 The use of the band 94-94.1 GHz by the Earth exploration-satellite (active) and space research (active) services is limited to spaceborne cloud radars.

Reasons: This footnote was the result of allocation decisions made at WRC-97 and no change is needed.

SUP ASP/20/270

S5.564

Reasons: The radio astronomy allocation is now worldwide in the 261-265 GHz band, therefore a country footnote is no longer needed.

MOD ASP/20/271

S5.565 The frequency band 275-~~400~~1 000 GHz may be used by administrations for experimentation with, and development of, various active and passive services. In this band a need has been identified for the following spectral line measurements for passive services:

– radio astronomy service: ~~278-280 GHz and 343-348 GHz~~275-323 GHz, 327-371 GHz, 388-424 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz and 795-909 GHz;

– Earth exploration-satellite service (passive) and space research service (passive): 275-277 GHz, ~~300-302 GHz, 324-326 GHz, 345-347 GHz, 363-365 GHz and 379-381 GHz~~ 294-306 GHz, 316-334 GHz, 342-349 GHz, 363-365 GHz, 371-389 GHz, 416-434 GHz, 442-444 GHz, 496-506 GHz, 546-568 GHz, 624-629 GHz, 634-654 GHz, 659-661 GHz, 684-692 GHz, 730-732 GHz, 851-853 GHz and 951-956 GHz.

Future research in this largely unexplored spectral region may yield additional spectral lines and continuum bands of interest to the passive services. Administrations are urged to take all practicable steps to protect these passive services from harmful interference until the next competent world radiocommunication conference.

Reasons: These additional bands have been identified by various administrations as bands that are, or will be, used for radio astronomy observations and spaceborne passive remote sensing.

ADD ASP/20/272

S5.AAA In the band 155.5-158.5 GHz, the allocation to the Earth exploration-satellite (passive) and space research (passive) services shall terminate on 1 January 2018.

Reasons: This allocation will not be needed by passive sensors after the termination date. By the termination date, all passive sensors will have transferred to the 148.5-151.5 GHz band.

ADD ASP/20/273

S5.BBB The date of entry for the allocation to the fixed and mobile services in the band 155.5-158.5 GHz shall be 1 January 2018.

Reasons: Passive sensors require the use of this band until 1 January 2018.

ADD ASP/20/274

S5.CCC Use of this allocation is limited to space-based radio astronomy only.

Reasons: This band is a likely candidate for a future space-based radio astronomy mission. No other space research use is contemplated.

ADD ASP/20/275

S5.DDD The 81-81.5 GHz band is also allocated to the amateur and amateur-satellite services on a secondary basis.

Reasons: Required amateur allocation.

ADD ASP/20/276

S5.EEE The band 75.5-76 GHz is also allocated to the amateur and amateur-satellite services on a primary basis until the year 2010.

Reasons: To protect existing use in an amateur allocation proposed for relocation.

ADD ASP/20/277

S5.YYY Use of the bands 174.8-182 GHz and 185-190 GHz by the inter-satellite service is limited to satellites in the geostationary-satellite orbit. The single-entry power flux-density, at all altitudes from 0 km to 1 000 km above the Earth's surface and in the vicinity of all geostationary orbital positions occupied by passive sensors, produced by a station in the inter-satellite service, for all conditions and for all methods of modulation, shall not exceed –144 dBW/m^2/MHz for all angles of arrival.

Reasons: This footnote is required to protect passive sensors operating in this band.

ADD ASP/20/278

S5.XXX Use of the bands 116-122.25 GHz by the inter-satellite service is limited to satellites in the geostationary-satellite orbit. The single-entry power flux-density, at all altitudes from 0 km to 1 000 km above the Earth's surface and in the vicinity of all geostationary orbital positions occupied by passive sensors, produced by a station in the inter-satellite service, for all conditions and for all methods of modulation, shall not exceed –148 dBW/m^2/MHz for all angles of arrival.

Reasons: This footnote is required to protect passive sensors operating in this band.

ADD ASP/20/279

S5.PPP In Japan, use of the band 84-86 GHz, as the fixed-satellite service (Earth-to-space) is limited to the feeder link by the broadcasting-satellite service in the geostationary-satellite.

Reasons: This footnote is required to compensate the deletion of the broadcasting-satellite service in the band 84-86 GHz in Japan.

ADD ASP/20/280

S5.QQQ *Additional allocation*: In Korea (Republic of), the bands 128-131 GHz, 171-171.6 GHz, 172.2-172.8 GHz and 173.3-174 GHz are allocated to the radio astronomy service in a primary basis until 2015.

Reasons: This footnote is required to protect the radio astronomy service operating in the Republic of Korea, since current operational instruments are already in these bands and these bands are of vital importance to the radio astronomy service for simultaneous observations of the silicon monoxide (SiO) molecule and its isotopic variants. The impact of co-primary allocations to the terrestrial/satellite services and the RAS in these bands is expected to be very limited, since current observations in the Republic of Korea may be finished until 2015 and these primary allocations will not be needed by the RAS after 2015. By 2015, all of these applications will have transitioned to the secondary service.

ADD ASP/20/281

S5.RRR In the bands 200-209 GHz, 235-238 GHz, 250-252 GHz and 265-275 GHz, ground-based passive atmospheric sensing is carried out to monitor atmospheric constituents.

Reasons: The bands are suitable to monitor atmospheric constituents related with ozone depletion by ground-based passive sensors.

ADD ASP/20/282

RESOLUTION XXX (WRC-2000)

Consideration by a future competent world radiocommunication conference of issues dealing with sharing and adjacent band compatibility above 71 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-2000 has made changes to the Table of Frequency Allocations above 71 GHz; following consideration of science service issues;

b) that several bands above 71 GHz are already used by the Earth exploration-satellite (passive) and space research (passive) services because they are unique bands for deriving specific atmospheric parameters;

c) that radio astronomy observations are already carried out in many bands above 71 GHz;

d) that in order to ensure the protection of passive services above 71 GHz, WRC-2000 avoided co-allocations of certain active and passive services to prevent potential sharing problems;

e) that there are several co-primary active services in some bands above 71 GHz in the Table of Frequency Allocations as revised by WRC-2000;

f) that several satellite downlink allocations have been made within bands adjacent to those allocated to the radio astronomy service;

g) that sharing between multiple co-primary active services may hinder the development of each active service in bands above 71 GHz,

noting

a) that preliminary sharing studies between active and passive services performed by ITU-R have not yet reached final conclusions because the technical characteristics of the active services above 71 GHz are not yet known;

b) that sharing studies between active services have not yet been performed;

c) that interference criteria for passive sensors have been developed and are given in Recommendation ITU-R SA.1029;

d) that interference criteria for radio astronomy have been developed and are given in Recommendation ITU-R RA.769-1,

resolves

1 that spectrum requirements and sharing criteria for active services be developed in bands above 71 GHz;

2 that further studies be conducted:

2.1 to determine if and under what condition sharing is possible between terrestrial active services and passive services (EESS and SR) in the bands 116-122.25 GHz, 174.8-182 GHz, 185-190 GHz, 200-209 GHz and 235-238 GHz;

2.2 to determine if and under what condition sharing is possible between active services in bands above 71 GHz;

2.3 on adjacent-band interference from space services (downlinks) into radio astronomy in bands above 71 GHz;

3 that the necessary studies be completed as soon as the technical characteristics of the active services in these bands are known;

4 that a future conference should review, if necessary, the allocations above 71 GHz in the light of the studies performed under *resolves* 1, 2 and 3,

invites ITU-R

to develop recommendations specifying sharing criteria for those bands where sharing is feasible,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

Agenda item 1.17

1.17 to consider possible worldwide allocation for the earth exploration-satellite (passive) and space research (passive) services in the band 18.6 - 18.8 GHz, taking into account the results of the ITU-R studies

Submitted by the following administrations:

Bhutan (Kingdom of), China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Sri Lanka (Democratic Socialist Republic of)

Introduction

This agenda item requires WRC-2000 to consider possible worldwide allocation for the Earth exploration-satellite (passive) service in the band 18.6-18.8 GHz. This was unresolved at WRC-97 because of concerns by fixed service and fixed-satellite operators, however the final CPM for WRC-2000 developed a technical compromise based on power flux-density limitations.

This compromise involves WRC-2000 considering establishing common worldwide primary allocations for the Earth exploration-satellite (passive) and space research (passive) services. Constraints on the characteristics of GSO FSS and FS systems as well as on the operation of the passive sensors would be required.

Co-primary allocation should be made worldwide to EESS passive in the band 18.6-18.8 GHz and footnotes shall be inserted into the Radio Regulations as follows:

These limits should not apply retroactively.

MOD ASP/20/283

18.6-22.21 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
18.6-18.8 EARTH EXPLORATION-SATELLITE (passive) FIXED S5.YYY FIXED-SATELLITE (space-to-Earth) ~~S5.523~~ S5.XXX MOBILE except aeronautical mobile ~~Earth exploration-satellite (passive)~~ ~~Space research (passive)~~ SPACE RESEARCH (passive) S5.522	**18.6-18.8** EARTH EXPLORATION-SATELLITE (passive) FIXED S5.YYY FIXED-SATELLITE (space-to-Earth) ~~S5.523~~ S5.XXX MOBILE except aeronautical mobile SPACE RESEARCH (passive) S5.522	**18.6-18.8** EARTH EXPLORATION-SATELLITE (passive) FIXED S5.YYY FIXED-SATELLITE (space-to-Earth) ~~S5.523~~ S5.XXX MOBILE except aeronautical mobile ~~Earth exploration-satellite (passive)~~ ~~Space research (passive)~~ SPACE RESEARCH (passive) S5.522

Note that this modification will align the allocations across all three Regions. Therefore the table can be included in Article S5 as:

18.6-22.21 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
18.6-18.8	EARTH EXPLORATION-SATELLITE (passive) FIXED S5.YYY FIXED-SATELLITE (space-to-Earth) S5.XXX MOBILE except aeronautical mobile SPACE RESEARCH (passive)	
	S5.522	

SUP ASP/20/284

S5.523

Reasons: Replaced by S5.XXX.

ADD ASP/20/285

S5.XXX In the band 18.6-18.8 GHz the power flux-density produced by a fixed-satellite system at the Earth's surface shall be limited to a value of –95 dB(W/m^2) across the 18.6-18.8 GHz band, allowing a 3 dB exceedance for 5% of the time everywhere.

ADD ASP/20/286

S5.YYY In the band 18.6-18.8 GHz the total input power delivered to the antenna of a fixed-service station shall be limited to 0 dBW across the 200 MHz band. Additionally fixed service stations should use transmitting antennas with good radiation patterns taking into account Recommendation ITU-R F.699.

Agenda item 1.19

1.19 to consider the report of the Inter-conference Representative Group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system

A Principles for consideration of BSS replanning

Submitted by the following administrations:

Bhutan (Kingdom of), Brunei Darussalam, China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

Introduction

The above-mentioned administrations have the following observations related to consideration of BSS replanning at WRC-2000:

- The replanning studies presented to the final meeting of the Inter-conference Representative Group (IRG-5) provide a good indication that BSS-BSS compatibility can be satisfactorily addressed for Region 3 countries. Some further refinement of these studies to take account of the orbit position preferences indicated in Circular Letter CR/132 can be expected before WRC-2000.
- The IRG-5 studies have however indicated a number of, as yet, unresolved compatibility issues in relation to other services and other Region compatibility.

  To allow administrations to evaluate the impact of any potential incompatibility identifications, reports on other service and other Region compatibility studies shall be provided before WRC-2000. In the case of FSS networks, this identification should be provided down to FSS network level.

  ASP/20/287

It is proposed that WRC-2000 should decide that it can undertake BSS replanning for Regions 1 and 3.

If the Conference decides to perform BSS replanning:

1 For Region 3 countries (for which the downlink band 11.7-12.2 GHz is allocated for BSS) replanning should provide 12 channels.

2 The Asia-Pacific Telecommunity (APT) supports the use of the channel raster b) in general for BSS replanning for Region 3 countries [p. 54 of Document IRG99-5/24(Rev.4)]. In some cases the use of channel raster d) might be necessary.

3 The APT supports the use of channel bandwidths larger than the reference bandwidth of 27 MHz, while retaining the existing channel spacing (i.e. 38.36 MHz) provided that there is no adverse impact on adjacent channel protection and the protection of space operation in the guardband.

4 Planning should be based on digital operation (except for “existing” analogue assignments).

5 Under principle 3 of Annex 1 to Resolution 532 (WRC-97) existing systems should be protected during any replanning.

6 The APT propose the adoption of orbital offsets of ±0.2 degrees from the initial orbital position in order to achieve a substantial reduction in the feeder-link incompatibilities. The offset orbital position should be deemed as the assigned nominal orbital position.

7 In the BSS-77 and BSS-97 (WRC-97) Plans, many large countries have multiple beams. APT supports the use of composite beams for the purpose of BSS replanning on the basis of specific advice from the concerned administrations.

8 The APT supports protection of the existing BSS systems prior to WRC-97 at the same levels as adopted at WARC SAT-77, that after WRC-97 prior to WRC-2000 at the level as adopted at WRC-97, and the reduced protection ratios for digital BSS systems as shown in Table 1.

TABLE 1

Protection ratios for replanning

Category	**Type of wanted emission**	**Applicable protection ratios (overall/down/up in dB)**			
		Interfering analogue		**Interfering digital**	
		Co-channel	**Adjacent channel**	**Co-channel**	**Adjacent channel**
“Existing” systems prior to WRC-97	**Analogue**	30/31/40	14/15/21	30/31/40	14/15/21
(Prior to 27/10/97)	**Digital**	30/31/40	14/15/21	30/31/40	
“Existing” systems after WRC-97	**Analogue**	23/24/30	15/16/22	23/24/30	15/16/22
Prior to WRC-2000	**Digital**	23/24/30	15/16/22	23/24/30	-
Plan assignments at WRC-2000	**Digital**	23/24/30	15/16/22	20/21/27	-

9 The APT supports the conclusion in IRG regarding the allowable EPM degradation, as under:

a) in the case of “existing” assignments/systems, no positive reference EPM is degraded below –0.45 dB and no negative reference EPM is degraded by more than 0.45 dB. The reference EPM values are those of the WRC-97 reference situation as evolved since;

b) in case of “planned” assignments, no negative reference EPM below –0.45 dB.

Test points with very low EPM (less than about –10 dB) can be ignored for the purpose of the replanning.

10 The APT supports the idea that the interference levels into the plateau of the antenna radiation patterns, which is for example below –35 dB, is negligible and they should not be taken into account in the BSS-BSS interference calculation.

Reasons: The APT is in agreement with the methodology developed by IRG for replanning of the BSS-97 Plan. This is reflected in the above proposal.

11 The APT supports the methodology in selecting the orbital position, channel arrangement and polarization that IRG has developed [Document IRG99-5/24(Rev.4)]. The draft Plan developed according to the IRG methodology starting from the orbital positions described in Circular Letter CR/132 (5 January 2000) should be the baseline Plan at the Conference. It should be noted that the orbital positions for feeder link and downlink have to be aligned.

12 In addition to “existing systems” (as defined in Principle 3 of Annex 1 to Resolution 532), systems which have completed Part B of Appendices S30/S30A and which have provided Due Diligence information in accordance with Resolution 49 (WRC-97) prior to a cut-off date (to be defined during WRC-2000) should be taken into account in replanning.

It may also be possible to take into account a limited number of Part A published, but still under coordination, Appendices S30/S30A Article 4 networks which are already in operation (or in final stages of implementation) for which Due Diligence information in accordance with Resolution 49 (WRC-97) has been received by the Bureau. Such networks may only enter the Plans after completing coordination. The consideration of such networks needs to take into account the impact on the possibility of achieving a successful outcome to the replanning.

13 Planning should ensure compatibility between the BSS in Regions 1 and 3 and services having allocations in the planned bands in all three Regions. In particular Region 3 administrations are of the opinion that the compatibility issue between Region 1 BSS to Region 3 FSS in the band 12.2-12.5 GHz should be adequately addressed.

14 Should WRC-2000 decide to adopt any revisions to the BSS Plans, consideration should be given to the need to develop an acceptable mechanism to deal with any “unresolved cases” of incompatibility identified during this replanning. Draft Resolution [ASP/XXX] is in the attachment.

15 Should WRC-2000 decide to adopt any revisions to the BSS Plans, networks filed under Article 4 of Appendices S30/S30A which were not included in the replanning shall continue to be processed after WRC-2000 in the same date order of receipt which they had prior to the replanning.

16 It may be acceptable to consider a mechanism to permit the adjustment of these filings as a result of changes brought about by the replanning.

17 In considering proposals WRC-2000 should consider both the technical and regulatory aspects of the proposals.

ATTACHMENT 1

ADD ASP/20/288

DRAFT RESOLUTION [ASP/XXX] (WRC-2000)

Consequential action related to Regions 1 and 3 BSS replanning following WRC-2000

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-97 has adopted a revision of the broadcasting-satellite service (BSS) Plans for Regions 1 and 3 providing capacity for all new countries in accordance with Resolutions **524 (WARC-92)** and **531 (WRC-95)**;

b) that several countries requested that a replanning be undertaken in order to increase the Plan capacity so as to provide a channel capacity large enough to permit the economical development of a broadcasting-satellite system;

c) the large number of applications which have been submitted under Article 4 of Appendices **S30/S30A** for modifications involving additions to the Plans;

d) the rights of all Member States to equitable access to the spectrum allocated to satellite broadcasting, and that Article 44 of the Constitution provides, *inter alia*, that “Members shall bear in mind that radio frequencies and the geostationary-satellite orbit are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to both”,

noting

that WRC-2000 has undertaken replanning of BSS assignments in the Appendices **S30/S30A** Plan of Regions 1 and 3 in accordance with decisions taken at WRC-2000,

resolves

1 that consideration should be given to the need to develop an acceptable mechanism to deal with any “unresolved cases” of incompatibility identified during this replanning;

2 that guidelines to govern this mechanism are contained in Annex 1 (to be developed by WRC-2000 based on contributions by administrations);

3 that networks filed under Article 4 of Appendices **S30/S30A** which were not included in the replanning shall continue to be processed after WRC-2000 in the same date order of receipt which they had prior to the replanning.

B Other issues related to agenda item 1.19

Submitted by the following administrations:

Bhutan (Kingdom of), China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

ASP/20/289

1 Capacity for future requirements

A significant proportion of the BSS orbital and frequency resource should be kept free from planning. This resource, to be earmarked for future additional requirements, should be distributed all over the orbital arc to the extent possible, so as to be easily accessible by all countries.

2 Maintenance of Section A 2) *c)* of Annex 7 of Appendix S30

The use of the 12.2-12.7 GHz band is allocated to different service applications in Regions 2 and 3, some of which would have sharing difficulties. The APT feels that subsection A 2) *c)* of Annex 7 of Appendix S30 serves a useful purpose and should not be suppressed.

3 Subregional systems

The APT view is that planning in Region 3 should be based on Resolution 532 (WRC-97). Many APT member countries support subregional systems, however, a definition for such systems could not be agreed. The APT noted the difficulties encountered by WRC-97 in defining such systems and agreed that a specific definition was not a prerequisite for the implementation of these systems.

C Regions 1 and 3 compatibility issues

Submitted by the following administrations:

Bhutan (Kingdom of), China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Compatibility between Region 1 BSS and Region 3 FSS

ASP/20/290

No additional BSS assignments of Region 1 in the band 12.2-12.5 GHz (after WRC-97) shall be located at orbital positions in the range from 34° E to 200° E.

Some limited exceptions might need to be made for additional assignments to a strictly limited number of Region 1 administrations viz. TKM, KAZ and KGZ (all at 44° E), MNG (74° E) and RUS (110° E)[1] which already have WRC-97 Plan assignments in this frequency range and which may receive additional assignments under Resolution 532 (WRC-97).

Reasons: Increasing BSS channel assignments in Region 1 could increase usage of the 12.2-12.5 GHz band. If this occurs it will translate into more constraints on the use of FSS in this band in Region 3

Compatibility issues were intensively discussed in WRC-97. Resolution 73 (WRC-97) asks BR to identify incompatibility issues between Region 1 BSS and Region 3 FSS. However it does not guarantee compatibility between Region 1 BSS and Region 3 FSS. In view of this, the participants from Region 3 at IRG-2 meeting raised this issue. The IRG-2 (Document IRG98-2/10) decision on the issue is reproduced in the following:

*5.4.3 In selecting orbital positions/channels, considerations to be given to the sharing issues between BSS and FSS in Region 3, in particular, to attempt not to put any further constraints to the present use and to attempt not to impose undue constraints on future development of FSS in that Regions. (See also Resolution **73 (WRC-97)**.)*

It is noted that application of this limitation would assist in reducing the number of potential Region 1 BSS-Region 3 FSS incompatibility cases identified in the Resolution 532 (WRC-97) replanning studies.

[1] A limited additional number of Region 1 BSS assignments (i.e. SEY, POL, and UAE as proposed by IRG99-5) may be accepted for the purpose of the replanning provided that these assignments are fully compatible with the existing Region 3 FSS assignments.

ASP/20/291

“Super primary” status given in S5.487 of the Radio Regulations to Region 1 BSS assignments eastward than 34° E (after WRC-97) against Region 3 FSS in the band 12.2-12.5 GHz should be removed.

Some limited exceptions should be made for existing assignments and additional assignments made in the replanning process to a strictly limited number of Region 1 administrations viz. TKM, KAZ, KGZ (all at 44° E), MNG (74° E) and RUS (110° E)[2] which already have WRC-97 Plan assignments in this frequency range.

Reasons: S5.487 states that:

“In the band 11.7-12.5 GHz in Regions 1 and 3, the fixed, fixed-satellite, mobile, except aeronautical mobile, and broadcasting services, in accordance with their respective allocations, shall not cause harmful interference to broadcasting-satellite stations operating in accordance with the provisions of Appendix ***S30****.”*

This footnote for Regions 1 and 3, appear to provide a “super-primary” status to the broadcasting-satellite service over the other primary services sharing the same band (FSS, BS, FS), in that they require the latter services not to cause harmful interference on the broadcasting-satellite stations operating in accordance with the provisions of Appendix S30. This footnote is also the subject of a Rule of Procedure, which concludes that, if, despite the application of the procedures of Appendix S30, harmful interference is actually caused on a broadcasting-satellite station, the station in the other service shall cease this interference (see also S5.43).

On the other hand the provision No. 4.3.17 of Article 4 of Appendix S30 states:

“The Bureau shall publish in a special section of its weekly circular the information received under § 4.3.14 together with the names of any administrations with which the provisions of this Article have been successfully applied. The frequency assignment concerned shall enjoy the same status as those appearing in the appropriate Regional Plan and will be considered as a frequency assignment in conformity with the Plan.”

It is understood that footnote S5.487 is applicable to the modifications/additions to the BSS Plans which are in conformity with Appendix S30 and also provides super primary status for Region 1 BSS systems against Region 3 unplanned services (including FSS). This means that Region 1 Article 4 systems may cause more constraints for future Region 3 FSS. (See also S5.43.)

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2 A limited additional number of Region 1 BSS assignments (i.e. SEY, POL, and UAE as proposed by IRG99-5) may be accepted for the purpose of the replanning provided that these assignments are fully compatible with the existing Region 3 FSS assignments.

D Regions 1 and 3 BSS-BSS compatibility/Region 3 BSS arc concept

Submitted by the following administrations:

Bhutan (Kingdom of), China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

ASP/20/292

No additional BSS assignments of Region 1 in the band 11.7-12.2 GHz (after WRC-97) should be located in the orbital location from 34° E to 200° E (160° W) during the replanning process.

Some limited exceptions might need to be made for additional BSS assignments under Resolution 532 (WRC-97) to a limited number of Region 1 administrations viz. BLR (38° E), UKR (38° E), MDA (44° E), TJK (38.2° E), UZB (44° E), KGZ (44° E), TKM (44° E), KAZ (44° E), RUS (110° E) and MNG (74° E)[3] which already have WRC-97 Plan assignments in this frequency range in the orbital location from 34° E to 200° E.

Reasons: Increasing channel assignments for BSS replanning exercise in Region 1 might mean that the 11.7-12.2 GHz band is heavily used. Eastward expansion of Region 1 BSS would place additional constraints on Region 3 BSS. This might translate into more constraints for BSS in this band in Region 3.

[3] A limited additional number of Region 1 BSS assignments (i.e. FIN, LVA, LTU and TUR as proposed by IRG99-5) may be accepted for the purpose of the replanning, provided that these assignments are fully compatible with the Region 3 BSS assignments.

E Concept of Region 3 arc for BSS Plan

Submitted by the following administrations:

Bhutan (Kingdom of), China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

ASP/20/293

Although there is no definition of the Region 3 orbital arc in ITU texts, it is proposed to define the Region 3 arc in the orbital position from 34° E to 200° E (160° W), noting that some orbital locations within this arc have been assigned to some Region 1 and 2 countries.

In establishing a buffer between Regions 1 and 3, the following procedures should be established:

- No new Article 4 systems of Region 1 and using a frequency in the band 11.7-12.5 GHz should occupy a nominal orbital position further east than 34° E.
- If an Article 4 system of a Region 1 country is to be located within the orbital arc from 34° E to 200° E (160° W) on an orbital position not coincident with any nominal orbital position in the WRC-BSS-97 Plan, it shall not include any Region 3 country in the service area and shall involve a reduction in the e.i.r.p. compared to that appearing in the Plan for the assignment before the modification similar to that which was applied in deriving Table 3 of the Rules of Procedure related to Annex 7 of Appendix S30.

Agenda item 1.20

1.20 to consider the issues related to the application of Nos. **S9.8, S9.9** and **S9.17** and the corresponding parts of Appendix **S5** with respect to Appendices **S30** and **S30A**, with a view to possible deletion of Articles 6 and 7 of Appendices **S30** and **S30A**, also taking into consideration Recommendation **35 (WRC-95)**

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Viet Nam (Socialist Republic of)

Introduction

The above APT Members support Approach A and the example given in Annex 1 of Chapter 5 of the CPM Report, with the exception of the modifications to the Report as shown in the following proposals:

MOD ASP/20/294

S9.17 *f)*~~[13]~~ for any specific earth station or typical mobile earth station in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services, in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15** and Article 4 of Appendix S**30A** and the coordination of earth stations in the broadcasting-satellite service which are subject to Appendix **S30** Plans;

Reasons: Clarification as to the actual coordination requirements.

MOD ASP/20/295

TABLE S5-1 *(continued)*

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.17** GSO, non-GSO/ terrestrial	A specific earth station or a typical mobile earth station in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15** and Article 4 of Appendix **S30A** and the coordination of earth stations in the broadcasting-satellite service which are subject to Appendix **S30** Plans	Any frequency band allocated to a space service, except those mentioned in the Plans in Appendix **S30A**	The coordination area of the earth station covers the territory of another administration	Appendix **S7** (for earth stations in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz, 2 483.5-2 500 MHz and 2 500-2 516.5 MHz, see Remarks column) 1) The coordination area of aircraft earth stations is determined by increasing the service area by 1 000 km with respect to the aeronautical mobile service (terrestrial) or 500 km with respect to terrestrial services other than the aeronautical mobile service	NOTE – For RDSS earth stations, a uniform coordination distance of 400 km corresponding to an airborne earth station shall be used. In cases where the earth stations are all ground-based, a coordination distance of 100 km shall be used

Reasons: Clarification as to the actual coordination requirements.

MOD ASP/20/296

S9.18 *h)* for any ~~transmitting~~ station of a terrestrial service in the bands referred to in No. **S9.17** within the coordination area of an earth station, in respect of this earth station, with the exception of the coordination under Nos. **S9.16** and **S9.19**;

Reasons: In order to include receiving terrestrial station in the procedure of coordination with respect to the transmitting earth station.

MOD ASP/20/297

6.1.1 Before notifying to the Bureau a frequency assignment to a terrestrial transmitting station or to a transmitting earth station in the fixed-satellite service, an administration shall initiate coordination with any other administration having a frequency assignment to a broadcasting-satellite station in conformity with the appropriate Regional Plan or for which corresponding Plan modification procedure has been initiated if:

– the necessary bandwidths of the two transmissions overlap; *and*

Reasons: Article 4 modifications should be included in the procedure. See Resolution 73 (WRC-97).

MOD ASP/20/298

7.1.4 If, after studying the information published under § 7.1.3, any administration is of the opinion that interference which may be unacceptable may be caused to its frequency assignments in conformity with the appropriate Regional Plan or for which corresponding Plan modification procedure has been initiated, it shall, within ~~three~~ four months after the date of the Weekly Circular publishing the information listed in Appendix **S4**, Annexes 2A and 2B, send its comments to the administration concerned. A copy of these comments shall also be sent to the Bureau. If no such comments are received from an administration within the period mentioned above, it may be assumed that that administration has no basic objections to the planned fixed-satellite or broadcasting-satellite network(s) of that system of which details have been published.

Reasons: Article 4 modifications should be included in the procedure. See Resolution 73 (WRC-97).

MOD ASP/20/299

7.2.1 Before an administration notifies to the Bureau or brings into use any frequency assignment to a space station in the fixed-satellite service (space-to-Earth), or in the broadcasting-satellite service not subject to a Plan, it shall seek the agreement of any other administration having a frequency assignment in conformity with the appropriate Regional Plan or for which corresponding Plan modification procedure has been initiated, if:

a) any portion of the necessary bandwidth proposed for the space station in the fixed-satellite or broadcasting-satellite service falls within the necessary bandwidth associated with the frequency assignment to the broadcasting-satellite station; *and*

b) the power flux-density which would be produced by the proposed fixed-satellite or broadcasting-satellite assignment exceeds the value specified in Annex 4.

For this purpose, the administration seeking agreement shall send to any other such administration the information listed in Appendix **S4**, Annexes 2A and 2B.

Reasons: Article 4 modifications should be included in the procedure. See Resolution 73 (WRC-97).

MOD ASP/20/300

7.2.3 An administration seeking coordination under § 7.2.1 shall at the same time send to the Bureau a copy of the request for coordination together with the information listed in Appendix **S4**, Annexes 2A and 2B and the name(s) of the administration(s) whose agreement is sought. The Bureau shall determine on the basis of Annex 4 which frequency assignments in conformity with the appropriate Regional Plan or for which corresponding Plan modification procedure has been initiated are considered to be affected. The Bureau shall include the names of those administrations with the information received from the administration seeking coordination and shall publish this information in a special section of its Weekly Circular, together with a reference to the Weekly Circular in which details of the satellite system were published in accordance with Section I of this Article. When the Weekly Circular contains such information, the Bureau shall so inform all administrations by circular telegram.

Reasons: Article 4 modifications should be included in the procedure. See Resolution 73 (WRC-97).

MOD ASP/20/301

7.3.1 Any frequency assignment to a space station in the fixed-satellite or in the broadcasting-satellite service not subject to a Plan shall be notified to the Bureau:

a) if the use of the frequency concerned is capable of causing harmful interference to a frequency assignment of another administration which is in conformity with the appropriate Regional Plan or for which corresponding Plan modification procedure has been initiated[10]; *or*

b) if it is desired to obtain international recognition of the use of the frequency.

Reasons: Article 4 modifications should be included in the procedure. See Resolution 73 (WRC-97).

MOD ASP/20/302

7.4.5.2 where appropriate, with respect to its conformity with the provisions of § 7.2.1, relating to the coordination of the use of the frequency assignment with the other administrations concerned having a frequency assignment in conformity with the appropriate Regional Plan or for which corresponding Plan modification procedure has been initiated;

Reasons: Article 4 modifications should be included in the procedure. See Resolution 73 (WRC-97).

MOD ASP/20/303

7.4.9.1 Where the Bureau finds that the coordination procedures mentioned in § 7.4.5.2 have been successfully completed with all administrations whose frequency assignments in conformity with the appropriate Regional Plan or for which corresponding Plan modification procedure has been initiated may be affected, the frequency assignment shall be recorded in the Master Register. The date of receipt by the Bureau of the notice shall be entered in Column 2d.

Reasons: Article 4 modifications should be included in the procedure. See Resolution 73 (WRC-97).

[10] The attention of administrations is specifically drawn to the application of § 7.2.1 above.

MOD ASP/20/304

7.4.9.4 Where the notifying administration resubmits the notice and the Bureau finds that the coordination procedure mentioned in § 7.4.5.2 has been successfully completed with all administrations whose frequency assignments in conformity with the appropriate Regional Plan or for which corresponding Plan modification procedure has been initiated may be affected, the frequency assignment shall be recorded in the Master Register. The date of receipt of the original notice by the Bureau shall be entered in Column 2d. The date of receipt by the Bureau of the resubmitted notice shall be entered in the Remarks Column.

Reasons: Article 4 modifications should be included in the procedure. See Resolution 73 (WRC-97).

Agenda item 1.21

1.21 to consider the Report from the Radiocommunication Bureau on results of the analysis in accordance with Resolution **53 (WRC-97)** and take appropriate actions

Submitted by the following administrations:

Bhutan (Kingdom of), China (People's Republic of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Philippines (Republic of the), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

ASP/20/305

The APT supports achievement of compatibility in all three Regions. The APT supports the Bureau analysing fully the effect of all assignments which were received before 27 October 1997 but which had not been processed at the time of WRC-97.

The APT will determine its position after analysing the Report of the Radiocommunication Bureau under Resolution 53 (WRC-97).

Agenda item 4

4 in accordance with Resolution **95 (WRC-97)**, to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Pakistan (Islamic Republic of), Papua New Guinea, Philippines (Republic of the), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

Introduction

The APT has reviewed resolutions and recommendations of past conferences and offers the following proposals to suppress resolutions and recommendations.

SUP ASP/20/306

RESOLUTION 5

Relating to technical cooperation with the developing countries in the study of propagation in tropical areas[1]

Reasons: This is a very old Resolution of 1979, and should be abrogated in view of BDT activities.

SUP ASP/20/307

RESOLUTION 8 (Rev.Mob-87)

Implementation of the changes in allocations in the bands between 4 000 kHz and 27 500 kHz[1]

Reasons: Obsolete. All actions completed on 31 December 1998.

SUP ASP/20/308

RESOLUTION 14

Relating to the transfer of technology[1]

Reasons: Obsolete in view of the current BDT activities.

SUP ASP/20/309

RESOLUTION 23 (WRC-95)

Provisions applicable to the frequency assignments in the non-planned bands below 28 000 kHz

Reasons: Obsolete as from 1 January 1999 (date of entry of the simplified RR).

SUP ASP/20/310

RESOLUTION 24 (WRC-95)

Review of the provisions of the Constitution relating to revisions of the Radio Regulations

Reasons: Obsolete in view of the action taken by PP-98.

SUP ASP/20/311

RESOLUTION 46 (Rev.WRC-97)

Interim procedures for the coordination and notification of frequency assignments of satellite networks in certain space services and the other services to which certain bands are allocated[1]

Reasons: Obsolete as from 1 January 1999 (matter covered by Article S9 and Appendix S5), provided that appropriate revision may be necessary on the following texts, which contain references to Resolution 46: Appendix S5, Resolutions 27, 49, 70, 121, 127, 130, 132, 215, 219, 538, 716, 728, Recommendation 104 and other relevant resolutions/recommendations.

SUP ASP/20/312

RESOLUTION 50 (WRC-97)

Interval between world radiocommunication conferences

Reasons: Obsolete in view of PP-98 action.

SUP ASP/20/313

RESOLUTION 52 (WRC-97)

Provisional application of Nos. S11.24 and S11.26 of the Radio Regulations adopted by WRC-97 with regard to high altitude platform stations

Reasons: Obsolete as from 1 January 1999.

SUP ASP/20/314

RESOLUTION 54 (WRC-97)

Implementation of Resolution 46 (Rev.WRC-97)

Reasons: Obsolete as from 1 January 1999.

SUP ASP/20/315

RESOLUTION 63

Relating to the protection of radiocommunication services against interference caused by radiation from industrial, scientific and medical (ISM) equipment[1]

Reasons: Obsolete, action completed (see Recommendation ITU-R SM.1056).

SUP ASP/20/316

RESOLUTION 70 (WARC-92)

Establishment of standards for the operation of low-orbit satellite systems

Reasons: Obsolete in view of current situation.

NOC ASP/20/317

RESOLUTION 132 (WRC-97)

Use of the bands 18.8-19.3 GHz and 28.6-29.1 GHz by networks operating in the fixed-satellite service

Reasons: Transitional measure as this is still current.

SUP ASP/20/318

RESOLUTION 411 (WARC-92)

Implementation of the new provisions applicable in the frequency bands allocated exclusively to the aeronautical mobile (OR) service between 3 025 kHz and 18 030 kHz[1]

Reasons: Obsolete from 15 December 1997.

SUP ASP/20/319

RESOLUTION 518 (Orb-88)

Country/geographical area symbols used in Appendices S30/30 and S30A/30A

Reasons: Obsolete (in current practices).

SUP ASP/20/320

RESOLUTION 524 (WARC-92)

Future consideration of the Plans for the broadcasting-satellite service in the band 11.7-12.5 GHz (Region 1) and the band 11.7-12.2 GHz (Region 3) in Appendix S30/30 and the associated feeder-link Plans in Appendix S30A/30A

Reasons: SUP seems to have been satisfied by the WRC-97 Plan revision.

SUP ASP/20/321

RESOLUTION 534 (WRC-97)

Implementation of Annex 5 to Appendix S30 and Annex 3 to Appendix S30A of the Radio Regulations

Reasons: All activities completed.

SUP ASP/20/322

RECOMMENDATION 32 (Orb-88)

International monitoring of emissions originating from space stations[1]

Reasons: This is an old text adopted in 1988. Recommendation 36 (WRC-97) covers the same subject. ITU-R studies are well under way (see Recommendation ITU-R SM.1054). Recommendation 32 can be abrogated.

SUP ASP/20/323

RECOMMENDATION 61

Relating to technical standards for the assessment of harmful interference in the frequency bands above 28 MHz[1]

Reasons: Only Recommendation ITU-R S.1150 established, but no other since 1979. Recommendation 61 should be abrogated.

SUP ASP/20/324

RECOMMENDATION 316 (Rev.Mob-87)

Use of ship earth stations within harbours and other waters under national jurisdiction[1]

Reasons: Obsolete (INMARSAT MoU).

SUP ASP/20/325

RECOMMENDATION 503 (Rev.WRC-97)

High-frequency broadcasting

Reasons: Obsolete (implemented, observed by administrations).

SUP ASP/20/326

RECOMMENDATION 518 (HFBC-87)

HF broadcast receivers

Reasons: Obsolete in view of current practices.

SUP ASP/20/327

RECOMMENDATION 521 (WRC-95)

Technical parameters for use in the revision of Appendices S30/30 and S30A/30A in response to Resolution 524 (WARC-92)

Reasons: Agree WRC-97 revision used these values and appropriate modification to Annex 5 of Appendix 30 and Annex 3 of Appendix 30A were performed.

SUP ASP/20/328

RECOMMENDATION 606 (Mob-87)

The possibility of reducing the band 4200-4400 MHz used by radio altimeters in the aeronautical radionavigation service[1]

Reasons: Studies complete.

SUP ASP/20/329

RECOMMENDATION 720 (WRC-95)

The flexible and efficient use of the radio spectrum by fixed and some mobile services in the MF and HF bands using block allocations for adaptive systems

Reasons: Obsolete, Recommendations ITU-R SM.1266 and F.1337 approved.

Agenda item 7.2

7.2 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent Conference and on possible agenda items for future conferences

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Iran (Islamic Republic of), Japan, Malaysia, Maldives (Republic of), Mongolia, Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Philippines (Republic of the), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of)

Introduction

APT proposes the agenda for WRC-02/03 and the preliminary agenda for the WRC-04/05 as follows:

SUP ASP/20/330

RESOLUTION 721 (WRC-97)

Agenda for the 1999 World Radiocommunication Conference

SUP ASP/20/331

RESOLUTION 722 (WRC-97)

Preliminary agenda for the 2001 World Radiocommunication Conference

ADD ASP/20/332

RESOLUTION [XXX] (WRC-2000)

Agenda for the 2002/03 World Radiocommunication Conference

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that, in accordance with Nos. 118 and 126 of the Convention (Geneva, 1992), the general scope of the agenda for a world radiocommunication conference should be established four years in advance and a final agenda shall be established two years before the conference;

b) Article 13 of the Constitution (Geneva, 1992) regarding the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention (Geneva, 1992) regarding their agendas;

c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

recognizing

a) that this Conference has identified a number of urgent issues requiring further examination by WRC-02/03;

b) that in preparing this agenda, many proposals from administrations could not be included and have had to be deferred to future conference agendas,

resolves

to recommend to the Council that a world radiocommunication conference be held in 2002/03 for a period of four weeks, with the following agenda:

1 to take appropriate action in respect of those urgent issues that were specifically requested by WRC-2000;

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, taking account of the results of WRC-2000, and with due regard to the requirements of existing and future services in the bands under consideration, to consider and take appropriate action in respect of the following topics:

2.1 requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution **26 (Rev.WRC-97)**;

2.2 consideration of Article **S25** concerning the amateur and amateur-satellite services;

Reasons: The member societies have after lengthy consultation reached agreement on a draft text for a new Article S25.

2.3 issues related to Appendix **S3**:

2.3.1 to consider the results of studies regarding the boundary between spurious and out-of-band emissions;

2.3.2 to consider the inclusion of general limits for out-of-band emissions in the Radio Regulations, in particular with regard to whether it is appropriate to do so, taking into account the results of ITU-R studies;

2.4 review of the frequency and channel arrangements in the MF and HF bands allocated on a primary basis to the maritime mobile service, taking into account the use of new digital technology, in accordance with Resolution **347 (WRC-97)**;

2.5 review of allocations to the space research service (deep space) (space-to-Earth) and the inter-satellite service in the frequency range 32-32.3 GHz with a view to improving the sharing conditions between these services;

2.6 to consider Appendix **S13** and Resolution **331 (Rev.WRC-97)** with a view to their deletion and, if appropriate, consider related changes to Chapter **SVII** and other provisions of the Radio Regulations as necessary, taking into account the continued transition to the Global Maritime Distress and Safety System (GMDSS) and the review of the operational procedures after the introduction of the GMDSS;

Reasons: The GMDSS was fully implemented on 1 February 1999. However, false distress alerts and unnecessary relays frequently take place with regard to satellite EPIRB, DSC, etc. Especially false distress alert and unnecessary relays from ship stations by HF band's DSC are frequently reported.

2.7 to consider the results of studies, and take necessary actions relating to:

2.7.1 the exhaustion of the maritime mobile service identity numbering resource (Resolution **344 (WRC-97)**);

2.7.2 shore-to-ship distress communication priorities (Resolution **348 (WRC-97)**);

2.8 consideration of the need to realign the allocations to the amateur, amateur-satellite and broadcasting services around 7 MHz on a worldwide basis, taking into account Recommendation **718 (WARC-92)**;

Reasons: This matter has been deferred since WARC-92.

2.9 examination of the adequacy of the frequency allocations for HF broadcasting from about 4 MHz to 10 MHz, taking into account the seasonal planning procedures adopted by WRC-97, and to consider bringing forward the date of availability of the HF bands allocated by WARC-92 to the broadcasting service in response to Resolution **29 (WRC-97)** and Resolution **537 (WRC-97)**;

2.10 to consider the regulatory and technical provisions for the quasi-geostationary-satellite networks;

2.11 to examine the spectrum requirements for telemetry, tracking, and telecommand of FSS networks operating with service links in the frequency bands above 17 GHz;

2.12 to consider the provision of up to 3 MHz of frequency spectrum for the implementation of telecommand links in the space research and space operation services in the frequency range between 100 MHz and 1 GHz, taking into account Resolution **723 (WRC-97)**;

2.13 to consider provision of up to 6 MHz of frequency spectrum to the Earth exploration-satellite service (active) in the frequency band 420-470 MHz, in accordance with Resolution **727 (WRC-97)**;

2.14 to consider the possible allocations in the frequency bands above 275 GHz, taking into account Resolution **[AAA] (WRC-2000)**;

Reasons: This item has already been considered by Working Party 7D and studies will be completed by the year 2002.

2.15 to consider the preferred frequency bands and allocation for future mobile communication systems beyond IMT-2000, e.g. the fourth generation system;

Reasons: The studies of the fourth generation system have already been started by ITU-R Working Party 8F. Similar to the study activities at Task Group 8/1, the studies will be conducted intensively and promptly. Therefore, the early completion of the studies on the preferred frequency bands and the bandwidth for the fourth generation systems is expected before WRC-02/03.

2.16 to consider the allocations on a worldwide basis for feeder links in bands around 1.4 GHz to the non-GSO MSS with service links operating below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolution **127 (WRC-97)**;

Reasons: ITU-R studies under Resolution 127 (1.4 GHz), showed that sharing in the 1 390-1 393 MHz and 1 429-1 432 MHz bands was theoretically feasible, but the study group requested hardware testing be performed to validate the theory. These tests will be completed prior to WRC-02/03 at which time allocations should be considered.

2.17 to consider the additional allocations on a worldwide basis for downlinks in the 401-406 MHz to the non-GSO MSS, taking into account the results of ITU-R studies conducted in response to Resolution **219 (WRC-97)**;

Reasons: It is timely to consider the studies and allocations at WRC-02/03. The band sharing study is expected to be complete prior to WRC-02/03 and it will be ready to review at that WRC.

2.18 to consider regulatory provisions and possible frequency allocations for various services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution **122 (Rev.WRC-2000)** and Resolution **[XXX] (WRC-2000)** relating to frequency bands above 3 GHz allocated exclusively for terrestrial radiocommunications;

Reasons: ITU-R has concluded the urgency of additional allocation for HAPS in Region 3 and regulatory considerations regarding the operating procedure of HAPS and further studies for allocations can be considered. The studies according to the Resolution 122 and Resolution [XXX] are expected to be complete prior to WRC-02/03.

2.19 to review footnote **S5.332** in the frequency band 1 215-1 300 MHz concerning the Earth exploration-satellite (active) service and other services, taking into account Resolution **[BBB] (WRC-2000)**;

Reasons: ITU-R studies shows that sharing between spaceborne SAR and the radionavigation satellite-service is feasible and that sharing between spaceborne SAR and radiolocation service (ground radar not including wind profiler radar (WPR)) is feasible. Recent ITU-R studies show that there is a possibility that mitigation techniques could be applied to WPR. This study will have been completed by 2002.

2.20 to review all EESS and SRS allocations between 35-38 GHz in accordance with Resolutions **[CCC] (WRC-2000)**, **[DDD] (WRC-2000)** and **[EEE] (WRC-2000)**;

Reasons:

– ITU-R studies have shown the feasibility of sharing between spaceborne radio altimeter and scatterometer and radiolocation systems. Currently, sharing between spaceborne precipitation radar and radiolocation systems is being studied, and it is prospected that this study will have been completed by 2002. It is necessary to review exclusion of footnote S5.551A from the spectrum that is used for spaceborne precipitation radar among 35.5-35.6 GHz which had not any restriction before WRC-97.

– ITU-R studies shows that protection criteria for spaceborne passive sensor in 36-37 GHz is established. However, the sharing condition is not defined and spaceborne sensor is not properly protected. This study for sharing conditions will have been completed by 2002.

– ITU-R studies show that pfd limits in 37.5-38 GHz defined by FSS and FS sides have much impact on some SRS earth stations. Sharing studies have been conducted in ITU-R and they will have been completed by 2002.

2.21 to consider results of ITU-R studies in accordance with Resolution **[ZZZ] (WRC-2000)** and take appropriate action on this subject;

Reasons: It is necessary to take appropriate actions by WRC-2000 in accordance with Resolution [ZZZ] to ensure spectrum availability and protection for AMS(R)S in the bands where No. S5.357A applies and GMDSS in the bands where No. S5.353A applies.

2.22 to consider the additional allocations to MSS in the 1-3 GHz band;

Reasons: ITU-R studies under Resolution 220, showing that the frequency band 1 559-1 567 MHz can not be shared co-frequency between MSS (space-to-Earth) and RNSS. In order to respond to Resolution 213, which requires matching downlink allocation, consideration should be given for an alternative downlink allocation to the MSS at WRC-02/03.

3 to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations which have been communicated by the 2002/03 Radiocommunication Assembly, in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in the Annex to Resolution **27 (Rev.WRC-97)**;

4 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the Conference;

5 in accordance with Resolution **95 (WRC-97)**, to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

6 to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the Convention (Geneva, 1992);

7 to identify those items requiring urgent action by the radiocommunication study groups in preparation for WRC-04/05;

8 in accordance with Article 7 of the Convention (Geneva, 1992):

8.1 to consider and approve the Report of the Director of the Radiocommunication Bureau on the activities of the Radiocommunication Sector since WRC-2000;

8.2 to recommend to Council items for inclusion in the agenda for WRC-04/05, and to give its views on the preliminary agenda for the 2006/07 World Radiocommunication Conference and on possible agenda items for future conferences,

invites Council

to finalize the agenda and arrange for the convening of WRC-02/03 and to initiate as soon as possible the necessary consultation with Member States,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a Report to WRC-02/03,

instructs the Secretary-General

to communicate this Resolution to concerned international and regional organizations.

ADD ASP/20/333

RESOLUTION [YYY] (WRC-2000)

Preliminary agenda for the 2004/05 World Radiocommunication Conference

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that, in accordance with Nos. 118 and 126 of the Convention (Geneva, 1992), the general scope of the agenda for the WRC-2004/05 should be established four years in advance;

b) Article 13 of the Constitution (Geneva, 1992) regarding the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention (Geneva, 1992) regarding their agendas;

c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

resolves to give the view

that the following items should be included in the preliminary agenda of WRC-04/05, to be held in late 2004/05:

1 to take appropriate action in respect of those urgent issues that were specifically requested by WRC-02/03;

2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-02/03, to consider and take appropriate action in respect of the following topics:

2.1 Resolution **528 (WARC-92)**;

2.2 potential for sharing around 4 300 MHz between radio altimeters and space-based passive earth sensors;

2.3 additional allocations on a worldwide basis for the non-GSO MSS with service links operating below 1 GHz in accordance with Resolution **728 (WRC-97)**;

2.4 use of frequency adaptive systems in the MF/HF bands in accordance with Resolution **729 (WRC-97)**;

2.5 allocation of the frequency band 14.5-14.8 GHz to the FSS (Earth-to-space) in Region 3 (expansion of FSS to include other than feeder links of the broadcasting-satellite service);

3 to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations which have been communicated by the 2004/05 Radiocommunication Assembly, in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in the Annex to Resolution **27 (Rev.WRC-97)**;

4 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the Conference;

5 in accordance with Resolution **95 (WRC-97)**, to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

6 to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the Convention (Geneva, 1992);

7 to identify those items requiring urgent action by the radiocommunication study groups;

8 in accordance with Article 7 of the Convention (Geneva, 1992):

8.1 to consider and approve the Report of the Director of the Radiocommunication Bureau on the activities of the Radiocommunication Sector since WRC-02/03;

8.2 to recommend to Council items for inclusion in the agenda for the 2006/07 World Radiocommunication Conference,

invites Council

to consider the views given in this Resolution,

instructs the Director of the Radiocommunication Bureau

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a Report to WRC-04/05,

instructs the Secretary-General

to communicate this Resolution to concerned international and regional organizations.

ADD ASP/20/334

RESOLUTION [AAA] (WRC-2000)

Possible frequency allocations above 275 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that there is no Table of Frequency Allocations in the region above 275 GHz;

b) that the radio astronomy service and services to use spaceborne and terrestrial sensing systems for Earth observation needs to receive signals in the frequency region above 275 GHz to satisfy scientific demands;

c) that the radio astronomy service and services to use spaceborne and terrestrial sensing systems for Earth observation have already developed techniques to receive radio signals above 275 GHz;

d) that the frequency range above 275 GHz may be useful for active services in the future;

e) that, although active services have no actual demands to use the frequency range above 275 GHz at present, when active services have actual demands frequency allocations should be made to those services so as to satisfy their purpose in a similar way below 275 GHz;

f) that the frequency allocations needed above 275 GHz has already been considered by ITU-R, and the CPM Report for WRC-2000 describes that the studies will be completed by the year 2002,

resolves

that, on the basis of proposals from administrations and taking into account the results in ITU-R study groups and the Conference Preparatory Meeting (CPM-02/03), the 2002/03 World Radiocommunication Conference should consider the allocation of frequency bands above 275 GHz,

invites ITU-R study groups

to complete the necessary studies, as a matter of urgency, taking into account the present and future frequency needs, with a view to presenting, at the appropriate time, the technical information likely to be required as a basis for the work of the Conference,

instructs the Secretary-General

to bring this Resolution to the attention of the international and regional organizations concerned.

ADD ASP/20/335

RESOLUTION [BBB] (WRC-2000)

Use of the frequency band 1 215-1 300 MHz by spaceborne synthetic aperture radar

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the frequency band 1 215-1 300 MHz is allocated to the primary service of radiolocation service;

b) that the frequency band 1 215-1 260 MHz is allocated to the primary service of the radionavigation satellite (space-to-Earth);

c) that the frequency band 1 215-1 300 MHz is allocated to primary services of the Earth exploration-satellite (active) and the space research (active) services with footnote **S5.332**;

d) that performance criteria and interference criteria for spaceborne synthetic aperture radar (SAR) within 1 215-1 300 MHz is included in Recommendation ITU-R SA.1166-2;

e) that the sharing between spaceborne SAR and radionavigation satellite is feasible based upon Recommendation ITU-R SA.1347;

f) that the sharing between spaceborne SAR and terrestrial radar is feasible based upon Recommendation ITU-R SA.516-1;

g) that co-frequency sharing with wind profiler radar (WPR) is not feasible and frequency modulated pulsed WPR should be outside 1 215-1300 MHz based upon Recommendation ITU-R SA.1282;

h) that guidelines for the appropriate selection of design parameters for active spaceborne sensors are contained in Recommendation ITU-R SA.1280;

i) that the Report of the CPM to WRC-97 concluded that sharing between spaceborne SAR and terrestrial radar not including WPR is feasible;

j) that recent ITU-R studies show the possibility that filtering techniques can be applied not only to terrestrial radar but also to WPR;

k) that spaceborne SAR is a very useful tool to monitor Earth environment and disaster with day-and-night and all-weather observation capability;

l) that the application of spaceborne SAR is to monitor Earth environment and disaster such as forest including tropical rain forest, land use, earth resources, disaster areas such as flood, sea ice extent, oil contamination, deformation of land surface due to earthquakes and volcano eruptions, observation under dry surfaces and others,

resolves

1 to invite ITU-R to study sharing between spaceborne SAR and other services including mitigation techniques so that spaceborne SAR can be operated with good quality data processing, worldwide observation and continuity of observation and so that other services can be operated satisfactorily;

2 that WRC-02 would review the results of these studies and consider revision of footnote **S5.332**.

ADD ASP/20/336

RESOLUTION [CCC] (WRC-2000)

Use of the frequency band 35.5-35.6 GHz by spaceborne precipitation radar

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the frequency band 35.5-36.0 GHz is expanded from 35.5-35.6 GHz with footnote **S5.551** and allocated to the Earth exploration-satellite (active) service as a primary service with footnote **S5.551A** and allocated to meteorological aids and radiolocation services on a primary basis;

b) that the frequency band 35.5-35.6 GHz is allocated to radars located on spacecraft on a primary basis with no restriction based upon **S5.551** before WRC-97;

c) that performance criteria and interference criteria for spaceborne precipitation radar within 35.5-36.0 GHz is included in Recommendation ITU-R SA.1166-2;

d) that spaceborne precipitation radar is very important to measure rain rate globally and study global water circulation;

e) that minimum observable rain rate around 35 GHz is less than 0.2 mm/h;

f) that combination between part of 35.5-35.6 GHz and 13.4-13.75 GHz is very useful to measure rain rate precisely;

g) that studies have shown that sharing between spaceborne active sensors and radiolocation systems in 35.5-36 GHz is feasible as shown in section 5.7.2.1 of Chapter 5 of the CPM-97 Report,

resolves

1 to invite ITU-R to study sharing between the spaceborne precipitation radar and other services in 35.5-35.6 GHz;

2 that WRC-02 would review the results of these studies and consider exclusion of footnote **S5.551A** in 35.5-35.6 GHz used for spaceborne precipitation radar.

ADD ASP/20/337

RESOLUTION [DDD] (WRC-2000)

Sharing between spaceborne passive sensors and other services in 36-37 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that 36-37 GHz is allocated to the Earth exploration-satellite service (passive) as a primary service;

b) that 36-37 GHz is also allocated to fixed and mobile services as a primary service;

c) that 36-37 GHz is very important to study global water circulation;

d) that performance and the interference criteria for satellite passive sensing near 37 GHz are contained in Recommendations ITU-R SA.1028-1 and ITU-R SA.1029-1,

requests ITU-R

1 to develop the technical and operational characteristics of the passive spaceborne sensor systems in this band;

2 to develop the criteria by which passive spaceborne sensor systems can share with other services in 36-37 GHz,

resolves

1 that the results of the studies be included in one or more recommendation(s);

2 that the results of above studies would be reflected at WRC-02/03.

ADD ASP/20/338

RESOLUTION [EEE] (WRC-2000)

Sharing criteria and mitigation technique between the space research service and the fixed-satellite service in the 37.5-38 GHz bands

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the 37-38 GHz and 40-40.5 GHz bands are allocated to the space research service on a primary basis;

b) that 37.5-40.5 GHz is allocated to the fixed-satellite service (FSS) (space-to-Earth) on a primary basis;

c) that frequency sharing between the space research services and other services in the 37-38 GHz and 40-40.5 GHz bands is shown in Question ITU-R 211/7 (1993);

d) that studies on sharing between the fixed service and other services in the band 37-40 GHz are requested to determine whether the power flux-density limits included in Article **S21** of the Radio Regulations adequately protect terrestrial services from FSS networks in Resolution **133 (WRC-97)**;

e) that space research systems will be implemented in the 37-38 GHz and 40-40.5 GHz bands;

f) that protection criteria for the space research service in the 37-38 GHz and 40-40.5 GHz bands is shown in Recommendation ITU-R SA.1396;

g) that more than 500 MHz is needed for high data rate transmission systems between the moon and the Earth;

h) that the CPM-99 Report indicates that there may be interference from FSS to some space research service earth stations which can receive data more than 500 Mbps from the moon and, if required, studies on mitigation techniques shall be brought to the attention of a competent conference,

resolves

1 to invite ITU-R to study, as a matter of urgency, appropriate sharing criteria and mitigation techniques in the case of the moon-to-Earth data transmission system which send more than 500 Mbps;

2 that the results of above studies should be reflected at WRC-02/03.

RESOLUTION 86

Coordination and notification procedures for satellite networks

Introduction

Resolution 86 (PP-98) resolves to request WRC-2000 and subsequent WRCs to continually review and update the advance publication, coordination and notification procedures, including the associated technical characteristics, and the related Appendices of the Radio Regulations, so as to ensure that they reflect the latest technologies, as well as to achieve additional simplification and cost savings for the Radiocommunication Bureau and administrations.

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Indonesia (Republic of), Japan, Maldives (Republic of), Mongolia, Myanmar (Union of), New Zealand, Papua New Guinea, Philippines (Republic of the), Democratic People's Republic of Korea, Singapore (Republic of), Sri Lanka (Democratic Socialist Republic of), Thailand, Tonga (Kingdom of), Viet Nam (Socialist Republic of)

ADD ASP/20/339

Appendix S30, Article 11, Section 11.3 - Below the table showing correspondence between channel numbers and assigned frequencies, **add**:

NOTE - Assigned frequency = 11 708.3 + 19.18*n (MHz) where n is channel number.

ADD ASP/20/340

Appendix S30, Article 10, Table 4 - Below the table showing correspondence between channel numbers and assigned frequencies, **add**:

NOTE - Assigned frequency = 12 209.42 + 14.58*n (MHz) where n is channel number.

Submitted by the following administrations:

Bhutan (Kingdom of), Korea (Republic of), Japan, Maldives (Republic of), Myanmar (Union of), Pakistan (Islamic Republic of), Papua New Guinea, Democratic People's Republic of Korea, Sri Lanka (Democratic Socialist Republic of), Thailand, Viet Nam (Socialist Republic of)

ADD ASP/20/341

RESOLUTION EEE (WRC-2000)

Use of the broadcasting-satellite service (sound) in the 2 535-2 655 MHz band in Region 3 by non-GSO satellite systems

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the band 2 535-2 655 MHz is allocated to the broadcasting-satellite service (sound) in certain Region 3 countries (WARC-92);

b) that satellite technology has now advanced to the stage where systems are technically and economically feasible using highly elliptical orbits where the operational arc is restricted to small windows of the sky by operational means, thereby ensuring that service is provided to countries in medium to high latitudes using elevation angles that are higher than would be provided from the geostationary orbit;

c) that for medium to high latitude countries, satellite systems in the broadcasting-satellite service in highly elliptical orbits can be used for the delivery of high quality, spectrally efficient broadcasting-satellite (sound) service to portable and mobile terminals;

d) that systems in the broadcasting-satellite service (sound) in the 2 535-2 655 MHz band in Region 3 using the orbit type described in *considering b)* have been communicated to ITU and are expected to be brought into use in the near future;

e) that, in general, interference between non-GSO satellites using the type of orbit described in *considering b)* and terrestrial services is reduced as the elevation angle from the service area to the satellite is increased;

f) that there are other co-primary allocations in this frequency band for which no coordination criteria and methodology has been established,

resolves

1 that any broadcasting-satellite service (sound) using non-GSO orbits brought into operation in the 2 535-2 655 MHz band in Region 3 shall be limited to those employing highly elliptical orbits, as described in *considering b)*;

2 that the use of the band 2 535-2 655 MHz by the broadcasting-satellite service (sound) for which advance publication information has been received after the end of WRC-2000 is subject to the application of the provisions of Nos. **S9.12** and **S9.13**, and **S22.2** does not apply except in the cases identified in *resolves* 3;

3 that in the band 2 535-2 655 MHz, the provisions of **S22.2** shall continue to apply between non-geostationary systems and geostationary networks for which complete Appendix **S4** coordination information, or notification information, is considered as having been received by the Bureau by the end of WRC-2000. Administrations having geostationary-satellite networks under coordination prior to the end of WRC-2000 shall cooperate to the maximum extent possible to coordinate pursuant to No. **S9.13** with non-geostationary satellite networks for which notification information has been received by the Bureau prior to that date, with a view to reaching results acceptable to all the parties concerned;

4 that systems in the broadcasting-satellite service (sound) using non-GSO satellites shall be limited to national services unless prior approval has been received to extend the service area to include the territories of other administrations;

5 that the calculation methodology and interference criteria to be employed in evaluating the interference shall be based upon relevant ITU-R Recommendations or as agreed to by concerned administrations,

invites ITU-R

to conduct the necessary studies in *resolves* 5 and report the results to the next conference.

MOD ASP/20/342

APPENDIX S5

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article S9

TABLE S5-1

Technical conditions for coordination
(see Article **S9**)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.11** GSO~~,~~ non-GSO /terrestrial	~~A~~ For a space station in the ~~BSS~~ broadcasting-satellite service in any band shared on an equal primary basis with terrestrial services and where the ~~BSS~~ broadcasting-satellite service is not subject to a Plan, in respect of terrestrial services	620-790 MHz 1 452-1 492 MHz 2 310-2 360 MHz 2 520-2 655 MHz 2 655-2 670 MHz 12.5-12.75 GHz (Region 3) 17.7-17.8 GHz (Region 2) 21.4-22 GHz (Region 1 and 3) 40.5-42.5 GHz 84-86 GHz	Condition: bandwidths overlap	Check by using the assigned frequencies and bandwidths	
No. **S9.19** Terrestrial/ GSO~~,~~ non-GSO	A transmitting station in a terrestrial service in a frequency band shared on an equal primary basis with the BSS, except where the service is subject to the Plans in Appendix **S30**	Bands listed in No. **S9.11**	i) Necessary bandwidths overlap; and ii) the pfd of the terrestrial station at the edge of the BSS service area exceeds the permissible level	Check by using the assigned frequencies and bandwidths	

Reasons: As discussed in the CPM Report the provisions of Nos. S9.11 and S9.19 specify the coordination procedure between “a space station” and the terrestrial services, however Table S5-1 in Appendix S5 indicates the procedures only between “GSO/terrestrial”. This proposal is consistent with the solution provided in the CPM Report to resolve this inconsistency by modifying the reference to “GSO/terrestrial” in the first column of Table S5-1 of Appendix S5 for Nos. S9.11 and S9.19 to “GSO, non-GSO/terrestrial”. These modified provisions could be applied to satellite networks for which the API or the request for coordination has been received after a specific date.

MOD ASP/20/343

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.12** 1) Non-GSO/ non-GSO	A station in a satellite network using a non-geostationary-satellite orbit in the frequency bands for which a footnote refers to **S9.11A** or **S9.12** in respect of any other satellite network using a non-geostationary-satellite orbit, with the exception of coordination between earth stations operating in the opposite direction of transmission	2 535-2 655 MHz See also Table S5-2	Condition: bandwidths overlap	Check by using the assigned frequencies and bandwidths	
No. **S9.12** 2) Non-GSO/ GSO	A station in a satellite network using a non-geostationary-satellite orbit in the frequency bands for which a footnote refers to **S9.11A** or **S9.12** in respect of any other satellite network using the geostationary-satellite orbit, with the exception of coordination between earth stations operating in the opposite direction of transmission	2 535-2 655 MHz See also Table S5-2	Condition: bandwidths overlap	Check by using the assigned frequencies and bandwidths	
No. **S9.13** GSO/non-GSO	A station in a satellite network using the GSO in the frequency bands for which a footnote refers to No. **S9.11A** or **S9.13** in respect of any other satellite network using a non-GSO, with the exception of coordination between earth stations operating in the opposite direction of transmission	2 535-2 655 MHz See also Table S5-2	Condition: bandwidths overlap	Check by using the assigned frequencies and bandwidths	

Reasons: Consequential changes…

MOD ASP/20/344

2 520-2 700 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr>
<td rowspan="2">2 520-2 655
FIXED S5.409 S5.410 S5.411
MOBILE except aeronautical mobile
BROADCASTING-SATELLITE S5.413 S5.416

S5.339 S5.403 S5.405 S5.408 S5.412 S5.417 S5.418 ADD S5.[XXX1]</td>
<td rowspan="2">2 520-2 655
FIXED S5.409 S5.411
FIXED-SATELLITE (space-to-Earth) S5.415
MOBILE except aeronautical mobile
BROADCASTING-SATELLITE S5.413 S5.416

S5.339 S5.403 ADD S5.[XXX1]</td>
<td>2 520-2 535
FIXED S5.409 S5.411
FIXED-SATELLITE (space-to-Earth) S5.415
MOBILE except aeronautical mobile
BROADCASTING-SATELLITE S5.413 S5.416
S5.403 S5.415A</td>
</tr>
<tr>
<td>2 535-2 655
FIXED S5.409 S5.411
MOBILE except aeronautical mobile
BROADCASTING-SATELLITE S5.413 S5.416

S5.339 S5.418 ADD S5.[XXX1]</td>
</tr>
</table>

ADD ASP/20/345

S5.[XXX1] Use of the band 2 535-2 655 MHz by non-geostationary-satellite systems in the broadcasting-satellite service (sound) shall be in accordance with the provisions of Resolution **EEE (WRC-2000)**.

Reasons: This proposal (combined with the addition of Resolution EEE) is consistent with a solution provided in the CPM Report which includes the coordination procedures of non-GSO BSS (sound) systems with respect to GSO networks and other non-GSO BSS (sound) systems within the scope of the provisions of Nos. S9.12 and S9.13. The proposal also includes a transitional measure to take into account the GSO BSS (sound) networks filed prior to WRC-2000 as discussed in the CPM Report.

ARTICLE S9

MOD ASP/20/346

S9.12 i) in a satellite network using a non-geostationary-satellite orbit, in respect of any other satellite network using a non-geostationary-satellite orbit, and in respect of any other satellite network using the geostationary-satellite orbit, with the exception of coordination between earth stations operating in the opposite direction of transmission;[12*bis*]

MOD ASP/20/347

S9.13 ii) in a satellite network using the geostationary-satellite orbit, in respect of any other satellite network using a non-geostationary-satellite orbit, with the exception of coordination between earth stations operating in the opposite direction of transmission;[12*ter*]

ADD ASP/20/348

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12*bis* **S9.12.1** This provision also applies for the coordination between non-geostationary satellite systems as well as for the coordination of non-geostationary-satellite systems with geostationary-satellite systems when the requirement for such coordination is included in a footnote to the Table for Frequency Allocations or in a resolution referring to this provision.

ADD ASP/20/349

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12*ter* **S9.13.1** This provision also applies for the coordination of geostationary-satellite systems with non-geostationary-satellite systems when the requirement for such coordination is included in a footnote to the Table of Frequency Allocations or in a resolution referring to this provision.

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WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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United Arab Emirates

PROPOSALS FOR THE WORK OF THE CONFERENCE

ALLOCATIONS OF THE BANDS 1.5/1.6 GHz TO THE MOBILE-SATELLITE SERVICE (AGENDA ITEM 1.10)

1 Introduction

At WRC-2000, in agenda item 1.10, the delegations will be invited to consider the results of ITU-R studies carried out in accordance with Resolution 218 (WRC-97), "Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service" and to take appropriate action on this subject.

Resolution 218 was adopted at WRC-97 in order to achieve the most flexible and practical use of the generic MSS allocations in the 1.5/1.6 GHz bands, while satisfying the spectrum requirements for distress, urgency and safety communications. Resolution 218 requested ITU-R to study the future spectrum requirements of the GMDSS and the AMS(R)S and the feasibility of prioritization, real time pre-emptive access and, if necessary, interoperability between different mobile-satellite systems providing or with the potential to provide the GMDSS and the AMS(R)S.

No conclusion was reached in ITU-R Working Party 8D on the future spectrum needed for AMS(R)S communications with priority 1 to 6 of Article S44, two different figures are given in the CPM-99 text taken from the results of two studies. No studies were carried out on the future spectrum requirements for distress, urgency and safety communications of the GMDSS. Furthermore, no studies have been carried out regarding the feasibility of implementing prioritization and pre-emption between different MSS networks. However, it has been concluded and recorded in the CPM-99 text that the capacity planning approach, adopted in the multilateral coordination process, satisfactorily provides the spectrum requirements of the GMDSS and the AMS(R)S.

2 Proposal

In order to ensure that future spectrum requirements of AMS(R)S communications with priority 1 to 6 of Article S44 and for distress, urgency and safety GMDSS communications will be made available, the UAE Administration proposes to replace Resolution 218 with a new Resolution (Resolution XXX) to be incorporated by a new reference in the present footnotes S5.353A and

S5.357A. The UAE Administration also proposes no further modifications to the relevant provisions S5.353A and S5.357A and to keep the existing priority for safety services unchanged in the bands where provisions S5.353A and S5.357A apply. These existing provisions ensure ample spectrum for the GMDSS and the AMS(R)S.

MOD UAE/21/1

S5.353A In applying the procedures of No. **S9.11A** to the mobile-satellite service in the bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz, priority shall be given to accommodating the spectrum requirements for distress, urgency and safety communications of the Global Maritime Distress and Safety System (GMDSS). Maritime mobile-satellite distress, urgency and safety communications shall have priority access and immediate availability over all other mobile satellite communications operating within a network. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, distress, urgency and safety communications of the GMDSS. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (~~See Resolution **218 (WRC-97)**.)~~The provisions of Resolution **XXX (WRC-2000)** shall apply.)

MOD UAE/21/2

S5.357A In applying the procedures of No. **S9.11A** to the mobile-satellite service in the bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz, priority shall be given to accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service providing transmission of messages with priority 1 to 6 in Article **S44**. Aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **S44** shall have priority access and immediate availability, by pre-emption if necessary, over all other mobile-satellite communications operating within a network. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, aeronautical mobile satellite (R) service communications with priority 1 to 6 in Article **S44**. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (~~See Resolution **218 (WRC-97)**.)~~The provisions of Resolution **XXX (WRC-2000)** shall apply.)

Reasons: The coordination process is satisfactorily providing spectrum for the GMDSS and AMS(R)S currently and is expected to do so in the future. The strengthening of current provisions through a new resolution will provide for the required priority for safety services in the bands where provisions S5.353A and S5.357A apply.

ADD UAE/21/3

RESOLUTION XXX (WRC-2000)

Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the World Radiocommunication Conference (Geneva, 1997) allocated the bands 1 525-1 559 MHz (space-to-Earth) and 1 626.5-1 660.5 MHz (Earth-to-space) to the mobile-satellite service (MSS) to facilitate the assignment of spectrum to multiple mobile-satellite systems in a flexible and efficient manner;

b) that the World Radiocommunication Conference (Geneva, 1997) adopted footnotes Nos. **S5.353A** and **S5.357A** giving priority to accommodating the spectrum requirements for distress, urgency and safety communications of the Global Maritime Distress and Safety System (GMDSS) and the aeronautical mobile-satellite (R) service communications AMS(R)S with priority 1 to 6 of Article **S44**;

c) that the results of the studies conducted by ITU-R pursuant to Resolution **218 (WRC-97)** were inconclusive with regard to the spectrum needed for future AMS(R)S traffic;

d) that the technical considerations for sharing satellite network resources between the MSS (other than the AMS(R)S) and the AMS(R)S service have been developed by ITU-R (see Recommendation ITU-R M.1233),

further considering

e) that global and regional mobile-satellite systems are being multilaterally coordinated in the bands 1 525-1 559 MHz (space-to-Earth) and 1 626.5-1 660.5 MHz (Earth-to-space) and that the ITU Radio Regulations provide the framework for such multilateral agreements;

f) that such coordination agreements are currently based on the capacity planning approach, under which administrations periodically coordinate access to the amount of spectrum needed to accommodate their validated requirements;

g) that the capacity planning approach is currently satisfying the spectrum requirements of the GMDSS and the AMS(R)S and will continue to do so in the future;

h) that in the long term, to ensure that the actual validated spectrum requirements of the GMDSS and the AMS(R)S are met, it might be necessary to enforce the coordination priority provided to accommodate the spectrum requirements for distress, urgency and safety communications of GMDSS and AMS(R)S communications with priority 1 to 6 of Article **S44**, under footnotes **S5.353A** and **S5.357A** by the provisions of a resolution,

recognizing

a) that Appendix **S15.2** identifies the use of the bands 1 530-1 544 MHz (space-to-Earth) and 1 626.5-1 645.5 MHz (Earth-to-space) for distress and safety purposes in the maritime mobile-satellite service as well as for routine non-safety purposes;

b) that priority access and immediate availability of spectrum for distress, urgency and safety communications of the GMDSS and AMS(R)S communications with priority 1 to 6 of Article **S44** is important for the safety of life;

c) that setting aside dedicated spectrum segments for distress, urgency and safety communications will lead to the inefficient usage of spectrum, since the allocated spectrum would only be used on rare occasions;

d) that the coordination process currently allows for the orderly development of MSS systems and applications while meeting the requirements for distress, urgency and safety communications of GMDSS and for the transmission of messages with priority 1 to 6 of Article **S44** of AMS(R)S;

e) that administrations are urged during the coordination to limit the spectrum used to the minimum needed to provide in a satisfactory manner the necessary services and that Members shall endeavour to apply the latest technical advances as soon as possible, as stated in No. 195 of the Constitution of the International Telecommunication Union (Geneva, 1992),

resolves

1 that in the frequency coordination of the mobile-satellite services in the bands 1 525-1 559 and 1 626.5-1 660.5 MHz, administrations will ensure accommodation of the verified spectrum needed for distress, urgency and safety communications of the Global Maritime Distress and Safety System (GMDSS) of Article **S32** and **S33** in the bands where **S5.353A** applies and the aeronautical-mobile-satellite (R) service AMS(R)S communications with priority 1 to 6 of Article **S44** in the bands where **S5.357A** applies;

2 that administrations will ensure the use of the latest technical advances in order to reduce the total spectrum required and thus maximize the spectral efficiency of the MSS.

SUP UAE/21/4

RESOLUTION 218 (WRC-97)

Use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service

Reasons: One option identified by CPM-99 to ensure that future spectrum requirements for the AMS(R)S and the GMDSS will be available is by adding or modifying the relevant regulatory provisions. Strengthening the provisions (S5.353A and S5.357A) through the incorporation by reference of the new resolution (Resolution XXX) would achieve the most efficient use of the generic allocations in 1.5/1.6 GHz.

Considering the effect of strengthening of current provisions by the proposed Resolution XXX and the workable procedure of capacity planning, the need to determine the spectrum requirements of GMDSS and AMS(R)S or to further study the feasibility of inter-system prioritization and pre-emption becomes no longer required. Therefore, Resolution 218 is suppressed.

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PROPOSALS FOR THE WORK OF THE CONFERENCE

ADDITIONAL ALLOCATION FOR MSS IN 1-3 GHz RANGE
(AGENDA ITEM 1.9)

1 Introduction

The need for additional spectrum for the MSS in the 1-3 GHz range has been one of the main issues at the last two conferences. Studies have been submitted to the ITU-R that provide estimates for the MSS spectrum requirements in the 1-3 GHz range.

A study, based on conservative assumptions for MSS traffic growth and for realistic MSS spectral efficiency, includes a forecast for the minimum demand for MSS spectrum of between 2 x 125 MHz and 2 x 145 MHz by year 2010, depending on the geographic region selected. These forecasts are consistent with the estimates of spectrum demand presented in Report ITU-R [IMT.SPEC]. Report ITU-R [IMT.SPEC] deals with the satellite component of IMT-2000.

All studies indicate that there is a requirement for additional MSS spectrum in the 1-3 GHz frequency range to meet the demand for the future MSS, including the satellite component of IMT-2000, and, therefore, all existing worldwide MSS allocations should be retained for MSS use.

The current allocations for the MSS in the 1-3 GHz band are about 2 x 115 MHz, with some variations among the ITU regions. It should, however, be noted that most of these allocations are used by other services in most countries, significantly reducing the actual availability of those allocations for the MSS, and, in many countries, these allocations are not available for the MSS.

This issue was addressed at WARC-92 by the adoption of Resolution 213. The ITU-R is requested in Resolution 213 to study the feasibility of allocating parts of the bands 1 675-1 710 MHz (space-to-Earth) and 1 492-1 525 MHz (Earth-to-space) to the MSS. In Region 2, these bands are already allocated to the MSS.

2 Provisions of Resolution 213 (Rev.WRC-95)

The study proposed in Resolution 213 is divided into two parts consisting of:

1) Technical and operational studies of the feasibility of sharing between the MSS (Earth-to-space) and the meteorological satellite (space-to-Earth) (MetSat), meteorological aids (MetAids), fixed and mobile services (FS and MS) in the band 1 675-1 710 MHz.

2) Identification and investigation of a potentially suitable MSS downlink band that may assist in meeting the spectrum requirements of the MSS.

2.1 Sharing feasibility in the band 1 675-1 710 MHz

It has been concluded in the ITU-R studies that sharing is feasible between MSS (Earth-to-space) and the MetSat (space-to-Earth), MetAids, FS and MS services in the band 1 675-1 690 MHz. The results of the ITU-R studies were reported to WRC-95 and the ITU-R concluded that it was feasible to make limited worldwide allocations to the MSS in this band. However, the resolution was revised at WRC-95 to increase the range of frequency band options for the complementary downlink allocations. The ITU-R studies to date have reconfirmed the above results and the ITU-R concluded that MSS uplink allocations can be made specifically in the band 1 683-1 690 MHz where no MetAids operations take place. However, appropriate separation distances will be required between MetSat and MSS earth stations in the band 1 683-1 690 MHz, as determined by coordination under No. S9.11A.

2.2 Suitable matching MSS downlink allocation

As a result of Resolution 213, two potential bands (1 517-1 525 MHz) and (1 559-1 567 MHz) were identified at WRC-97 for consideration as complementary MSS downlink allocations.

2.2.1 Use of the band 1 559-1 567 MHz as an associated downlink band for MSS operations within the band 1 675-1 710 MHz

Due to the lack of formal ITU-R studies at the conference, Resolution 220 was approved at WRC-97 and the ITU-R directed to study the feasibility of using portions of the band 1 559-1 610 MHz as a possible MSS downlink allocation complementing the uplink allocation 1 675-1 710 MHz.

The frequency range under consideration, 1 559-1 567 MHz, is currently allocated on a co-primary basis to the RNSS (space-to-Earth) and the ARNS. Additionally, the band is allocated to the FS in some countries.

It has been concluded, in up-to-date studies conducted in response to Resolution 220 (WRC-97), that a finding of sharing feasibility between the MSS (space-to-Earth) and the ARNS/RNSS cannot be made without imposing conditions on the MSS. A complete and acceptable demonstration is needed:

- of how the MSS signals would be monitored;
- of how aircraft would be notified of the ensuing anomalies arising from MSS interference;
- and of the manner in which the MSS signal parameters would be recorded and archived.

The ITU-R studies also examined the matter of burden sharing between the ARNS/RNSS and the MSS (space-to-Earth) and concluded that the burden sharing concept is not applicable in the 1 559-1 610 MHz band, particularly due to the fact that the ARNS/RNSS are safety services.

2.2.2 Use of the band 1 517-1 525 MHz as an associated downlink band for MSS operations within the band 1 675-1 710 MHz

One of the methods used to identify potential downlink bands is to examine the existing regional MSS allocations and to assess the feasibility of extending these bands to other regions. Therefore, this allocation of 1 517-1 525 MHz was considered since it is part of a Region 2 MSS allocation in the band 1 492-1 525 MHz.

Currently, the band 1 492-1 525 MHz is allocated to the FIXED and MOBILE services on a primary basis worldwide; however, the aeronautical mobile service is excluded from mobile services in Region 1 only. In Region 2, the use of the band by the aeronautical mobile service for telemetry has been given priority over other uses by the MS, as recorded in footnote S5.343.

In order to consider the band 1 517-1 525 MHz as a suitable downlink MSS allocation, the sharing feasibility with other co-primary services can be determined by reviewing the results of relevant ITU-R sharing studies.

1) Sharing with fixed services

The sharing scenario between the MSS (space-to-Earth) and the terrestrial fixed services (FS) would involve only two methods of interference:

1) MSS transmitters interfering into FSS receiver;

2) FS transmitters interfering into MSS receiver.

Recommendations ITU-R M.1141-1 and ITU-R M.1142-1 are applicable for the first mode of interference and summarize the resultant coordination thresholds and coordination procedures to be followed in the event that the thresholds are exceeded. Also Recommendation ITU-R M.1319 gives detailed methodology for frequency coordination between MSS (space-to-Earth) and FS receivers. In the case of the MS, RR No. S5.348 specifies, for Japan, the coordination threshold as a power flux spectral density of –150 dBW/m^2/4 kHz (for all angles of arrival) in order to protect the use of the MS in Japanese territory.

The second mode of interference can be minimized to an acceptable level by maintaining a certain separation distance between FS transmitters and MES. In any case, there will be interference to the MES but this should not be a cause for objections by the FS operators.

2) Sharing with aeronautical telemetry

Relevant studies have shown that the power flux spectral density (pfsd) generated by MSS satellites at aeronautical telemetry receiving stations must be limited to low levels in order to protect the telemetry receivers. As Recommendation ITU-R M.[8B/XA] (Document 8/53) provides the provisional coordination triggers for low and high satellite elevation angles, therefore, co-frequency, non-co-coverage operation is definitely possible since sufficient separation can be achieved between the operational areas of the aeronautical telemetry systems and the MSS coverage areas.

3 Proposal

In view of the above conclusions, the UAE Administration proposes additional MSS allocations of 2 x 7 MHz in the bands 1 492-1 525 MHz (space-to-Earth) and 1 675-1 690 MHz (Earth-to-space) as shown in the following modified frequency tables:

MOD UAE/22/1

1 350-1 525 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 492-1 525 FIXED MOBILE except aeronautical mobile MOBILE-SATELLITE (space-to-Earth) ADD S5.XXX S5.341 S5.342	**1 492-1 525** FIXED MOBILE S5.343 MOBILE-SATELLITE (space-to-Earth) S5.348A S5.341 S5.344 S5.348	**1 492-1 525** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) ADD S5.YYY S5.341 S5.348A

ADD UAE/22/2

S5.XXX The band 1 518-1 525 MHz is also allocated to the mobile-satellite (space-to-Earth) service on a primary basis.

S5.YYY The use of the band 1 518-1 525 MHz by the mobile-satellite service is subject to the condition that the power flux spectral density of emissions from MSS geostationary satellites at the aeronautical telemetry receiving station shall not exceed the pfsd levels given in the Recommendation ITU-R M.[8B/XA] (Document 8/53).

MOD UAE/22/3

1 660-1 710 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 675-1 690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) S5.341 ADD S5.ZZZ	**1 675-1 690** METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) S5.341 S5.377	**1 675-1 690** METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) S5.341 ADD S5.ZZZ

ADD UAE/22/4

S5.ZZZ Mobile-satellite systems operating in the band 1 683-1 690 MHz shall not cause harmful interference to earth stations of the meteorological-satellite service. To avoid causing harmful interference, mobile earth stations shall not operate except in a non-interfering signalling channel within the exclusion zones around the meteorological earth stations defined in Recommendation ITU-R SA.1158-2. The mobile-satellite system shall have position determination capabilities to ensure compliance with this provision.

Reasons: The need for additional allocation for MSS between the 1-3 GHz was highlighted in Resolution 213 (Rev.WRC-95) that has been on the agenda of subsequent World Radiocommunication Conferences. Moreover, CPM-99 has also indicated that if a suitable MSS downlink allocation cannot be found through the studies conducted under Resolution 220 (WRC-97), then every effort should be made to find a suitable MSS downlink allocation, taking into account the results of already available ITU-R relevant sharing studies. For WRC-2000, the preparatory work done on two agenda items namely 1.6.1 and 1.9, as reflected in the CPM Report, clearly points to the foreseen shortfall of 2 x 8 MHz of MSS spectrum by the year 2005.

Studies concluded prior to the earlier two WRCs have indicated the feasibility of making allocation in the 1 675-1 690 MHz for the MSS (Earth-to-space). Studies have also identified that sharing between MSS (space-to-Earth) and other existing services in the band 1 517-1 525 MHz is feasible taking into account the results of already available relevant ITU-R Recommendations concerning sharing criteria.

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PROPOSALS FOR THE WORK OF THE CONFERENCE

DELETION OF FOOTNOTES FROM THE TABLE OF FREQUENCY ALLOCATIONS

Introduction

Resolution 26 of WRC-97 called for the revision of the footnotes. The UAE Administration should be deleted from the following footnotes:

MOD UAE/23/1

S5.349 *Different category of service:* in Saudi Arabia, Azerbaijan, Bahrain, Bosnia and Herzegovina, Cameroon, Egypt~~, the United Arab Emirates,~~ France, the Islamic Republic of Iran, Iraq, Israel, Kazakstan, Kuwait, The Former Yugoslav Republic of Macedonia, Lebanon, Morocco, Mongolia, Oman, Qatar, Syria, Kyrgyzstan, Romania, Turkmenistan, Ukraine, Yemen and Yugoslavia, the allocation of the band 1 525-1 530 MHz to the mobile, except aeronautical mobile, service is on a primary basis (see No. **S5.33**).

MOD UAE/23/2

S5.355 *Additional allocation:* in Bahrain, Bangladesh, the Congo, Egypt~~, the United Arab Emirates,~~ Eritrea, Ethiopia, the Islamic Republic of Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Malta, Morocco, Oman, Qatar, Syria, Somalia, Sudan, Sri Lanka, Chad, Togo, Yemen and Zambia, the bands 1 540-1 645.5 MHz and 1 646.5-1 660 MHz are also allocated to the fixed service on a secondary basis.

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PLENARY MEETING

Canada

PROPOSALS FOR THE WORK OF THE CONFERENCE

CONTENTS

Proposals for agenda item 1.13.2

Agenda item 1.13.2 - To consider the inclusion in other frequency bands of similar limits in Articles S21 and S22, or other regulatory approaches to be applied in relation to sharing situations

Background

In accordance with the provisions of Resolutions 130 and 538, ITU-R has carried out technical studies of the power limits appearing in Articles S21 and S22 in relation to the sharing considerations among non-GSO and GSO FSS and GSO BSS systems. These studies were for satellite systems operating in the 10-30 GHz frequency range. The results of these studies are contained in Chapter 3 of the CPM Report to WRC-2000.

It is now evident that there is a growing interest in operating GSO and non-GSO systems in the frequency range 37.5-50.2 GHz. It is therefore timely, under agenda item 1.13.2, for WRC-2000 to address this matter.

Discussion

In section 3.2.4 of the CPM Report, the issue of GSO/non-GSO sharing outside of the frequency range 10-30 GHz is briefly discussed. In this brief discussion in section 3.2.4, the following salient points are made:

- in the frequency bands above 30 GHz, in the absence of current and imminent use by GSO and non-GSO systems, both types of operators should expect to exhibit flexibility in achieving the appropriate balance in the sharing environment;
- studies are required outside of the 10-30 GHz range which include both technical and regulatory approaches to establish the conditions for sharing between GSO and non-GSO systems.

Based on this advice in the CPM Report, and taking into account that there is an emerging interest in satellite systems to operate in the 40-50 GHz range, WRC-2000 should initiate studies for the GSO/non-GSO shared use of frequency bands in the 37.5-50.2 GHz range.

ADD CAN/24/115

RESOLUTION EEE (WRC-2000)

Frequency sharing in the range 37.5-50.2 GHz between GSO and non-GSO fixed-satellite systems

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that this Conference has made provisions for the operation of GSO and non-GSO satellite systems in the 10-30 GHz frequency range;

b) that there is an emerging interest in operating GSO and non-GSO satellite systems in the 37.5-50.2 GHz frequency range;

c) that there is a need to provide for the orderly development and implementation of new satellite technologies in the 37.5-50.2 GHz frequency range;

d) that systems based on the use of new technologies associated with both GSO and non-GSO satellite systems are capable of providing the most isolated regions of the world with high-capacity and low-cost means of communication;

e) that there should be equitable access to the radio-frequency spectrum and orbital resources in a mutually acceptable manner that allows for new entrants in the provision of services;

f) that the Radio Regulations must be sufficiently flexible to accommodate the introduction and implementation of innovative technologies as they evolve;

g) that the Radio Regulations state that in applying the provisions of Article **S22**, the level of accepted interference shall be fixed by agreement between the administrations concerned, using the relevant ITU-R Recommendations as a guide, but that these Recommendations have not yet been developed;

h) that the CPM Report to WRC-2000 stated that in the bands 37.5-50.2 GHz where there has been little or no deployment of satellite systems to date, both GSO and non-GSO operators should be expected to exhibit flexibility in achieving the appropriate balance in the sharing environment,

resolves

to urge administrations, in the application of Article **S22** to their GSO and non-GSO systems in the 37.5-50.2 GHz frequency range prior to WRC-03, to seek balanced sharing arrangements between these systems,

requests ITU-R

1 as a matter of urgency, to undertake the appropriate technical, operational and regulatory studies of sharing arrangements which achieve the appropriate balance between GSO and non-GSO systems;

2 to report the results of these studies to WRC-03.

Reasons: Due to the foreseen emergence of GSO and non-GSO satellite systems for operation in the 37.5-50.2 GHz frequency range, it is timely for ITU-R to undertake appropriate sharing studies.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 2 to
Document 24-E
1 May 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

Canada

PROPOSALS FOR THE WORK OF THE CONFERENCE

CONTENTS

Proposals for agenda item 1.2

Agenda item 1.2: To finalize remaining issues in the review of Appendix **S3** to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation **66 (Rev.WRC-97)** and the decisions of WRC-97 on adoption of new values, due to take effect at a future time, of spurious emissions for space services.

Additional proposal for the modification of Recommendation 66

Background information

Canada supports the proposal to modify Recommendation 66 (Rev.WRC-97) that was submitted by CITEL (see proposal CAN/24/36). The following proposals by Canada are intended to recommend other revisions to clarify other aspects of the recommendation.

At WRC-97, Recommendation 66 was revised, including the concerns of the safety services. Following WRC-97, in carrying out the studies specified in Recommendation 66, ITU-R Task Group 1/5 advised the representatives of the safety services in Study Groups 4 and 8 of the need to undertake the requested studies related to the safety services. Representations of the safety services in Study Groups 4 and 8 concluded that because there is an ongoing programme to deal with interference to the safety services on a case-by-case basis, there is no need to participate in the studies flowing from Recommendation 66. Consequently, in updating the recommendation, the references to the safety services should be deleted.

Proposals

The following additional proposals are considered important to ensure that Recommendation 66 (Rev.WRC-97) is updated to reflect the needs of wireless technologies.

NOTE - The proposal for the revision of Recommendation 66 (Rev.WRC-97) shown below contains additional revisions to those proposed by CITEL and by CAN/24/36.

RECOMMENDATION 66 (Rev.WRC-~~97~~2000)

Studies of the maximum permitted levels of unwanted emissions

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that Appendix **S3** specifies the maximum permitted levels of spurious emissions, in terms of the mean power level of any spurious component supplied by a transmitter to the antenna transmission line;

b) that the principal objective of Appendix **S3** is to specify the maximum permitted levels of spurious emissions that, while being achievable, provide protection against harmful interference;

c) that excessive levels of unwanted emissions may give rise to harmful interference;

SUP CAN/24/82

d)

Reasons: The suppression of *considering d)* is consequential to the suppression of *recommends* 9 contained in IAP/14/83.

~~*e)*~~*d)* that while Appendix **S3** applies generally to the mean power of a transmitter and its spurious emissions, it also takes account of a variety of emissions where interpretation of the term "mean power", and thus its measurement, would be difficult, particularly in the cases of digital modulation broadband systems, pulsed modulation and narrow-band high-power transmitters;

f)

Reasons: See IAP/14/76.

~~*g)*~~*e)* that unwanted emissions from transmitters operating in space stations may cause harmful interference, particularly emissions from wideband amplifiers which cannot be adjusted after launch;

MOD CAN/24/83

~~*h)*~~*f)* that unwanted emissions may cause harmful interference to ~~safety services and~~ radio astronomy and space services using passive sensors;

Reasons: For the safety services, the studies and the resolution of problems which are related to interference by unwanted emissions are dealt with on a case-by-case basis as part of an ongoing programme in the ITU-R study groups. It is, therefore, not necessary to include the safety services in this Recommendation. Also, see IAP/14/77.

MOD CAN/24/84

~~*i)*~~*g)* that, for technical or operational reasons, more stringent spurious emission limits than the general limits in Appendix **S3** may be required to protect specific services, such as ~~safety services and~~ passive services in specific bands or situations;

Reasons: See the reason for the suppression of *considering d)*. Also, see IAP/14/78.

~~*j)*~~*h)* that broadband digital modulation may cause unwanted emissions at frequencies far from the carrier frequency,

noting

MOD CAN/24/85

a) that ~~safety services and~~ passive services have in many cases been allocated frequencies adjacent or close to those of services employing high-power transmitters;

Reasons: See the reason for the deletion of *considering f).*

b) that some administrations have adopted more stringent limits for spurious emissions than those specified in Appendix **S3**,

recommends that ITU-R

SUP CAN/24/86

1

Reasons: See IAP/14/80.

SUP CAN/24/87

2

Reasons: See IAP/14/81.

~~3~~1 continue the study of spurious emission levels in all frequency bands, emphasizing the study of those frequency bands, services and modulation techniques not presently covered by Appendix **S3**;

~~4~~2 study the question of unwanted emissions resulting from transmitters of all services and all modulation methods, and, on the basis of those studies, develop a Recommendation or Recommendations for maximum permitted levels of spurious emissions and out-of-band emissions;

~~5~~3 establish appropriate measurement techniques for unwanted emissions, where those techniques do not currently exist, including the determination of reference levels for wideband transmissions as well as the applicability of reference measurement bandwidths;

~~6~~4 study the reasonable boundary of spurious emissions and out-of-band emissions with a view to defining such a boundary in Article **S1**;

MOD CAN/24/88

~~7~~5 study those frequency bands and instances where, for technical or operational reasons, more stringent spurious emission limits than the general limits in Appendix **S3** may be required to protect ~~safety services and~~ passive services such as radio astronomy, and the impact on all concerned services of implementing or not implementing such limits;

Reasons: See the reason for the modification of *considering f).*

MOD CAN/24/89

~~8~~6 study those frequency bands and instances where, for technical or operational reasons, out-of-band limits may be required to protect ~~safety services and~~ passive services such as radio astronomy, and the impact on all concerned services of implementing or not implementing such limits;

Reasons: See the reason for the modification of *considering f)*. Also, see IAP/14/82.

SUP CAN/24/90

9

Reasons: See IAP/14/83.

MOD CAN/24/91

~~10~~7 report the results of studies under *recommends that ITU-R* ~~6, 7 and 8~~4, 5 and 6 above to a competent world radiocommunication conference(s).

Reasons: See IAP/14/84.

Proposals for agenda item 1.3

Agenda item 1.3: To consider the results of ITU-R studies in respect of Appendix **S7/28** on the method for the determination of the coordination area around an earth station in frequency bands shared among space services and terrestrial radiocommunication services, and take the appropriate decisions to revise this Appendix.

Proposal for the revision of Appendix S7

Background information

ITU-R developed draft new Recommendation ITU-R SM.[1/1004], entitled "Determination of the coordination area around an earth station in frequency bands between 100 MHz and 105 GHz", which consolidates in a single recommendation methods for determining coordination areas. The Recommendation includes revised propagation models, draws upon the methods contained in Recommendations ITU-R IS.847-1, ITU-R IS.848-1 and ITU-R IS.849-1, and uses methodologies and parameter values provided by the relevant ITU-R Study Groups. The following proposals provide an outline of the principles supported by Canada in the revision of Appendix S7.

Canada supports the use of essential text from this Recommendation as the basis for the revision of Appendix S7. It is proposed to replace the text of Appendix S7 with text from Recommendation ITU-R SM.[1/1004] describing the different methodologies which must be used to calculate the size of the coordination area around an earth station in order to determine the need for international coordination as required by Appendix S5. In considering Recommendation ITU-R SM.[1/1004], it is clear that not all the material found in the Recommendation is essential to determine the need to coordinate with the stations of a neighbouring administration, in other words, to yield a regulatory finding. In particular, the Recommendation contains features which could facilitate the coordination process through the use of additional methods and contours (supplementary and auxiliary). These contours described in sections 1.6.1 and 1.6.2, as well as the Time Variant Gain (TVG) method of section 2.2.2 may assist in bilateral discussions, and as such have a place in the revised Appendix S7. Canada supports the inclusion of such texts with the clear understanding of the role of this material in the regulatory process. Finally, the Recommendation contains example calculations which are not appropriate for a treaty text and therefore should not be incorporated in the revised Appendix S7.

To facilitate the application of coordination procedures between earth stations and terrestrial stations, the CPM Report proposes that all the material relating to the determination of coordination areas be contained in a single appendix. Canada supports the relocation of information on predetermined coordination distances from Appendix S5 to Appendix S7.

APPENDIX S7

MOD CAN/24/92

Method for the determination of the coordination area around an earth station in frequency bands between ~~1 GHz and 40 GHz shared between space and terrestrial radiocommunication services~~ <u>100 MHz and 105 GHz</u>

Reasons: To reflect the changes introduced by new Recommendation ITU-R SM.[1/1004]. A revised Appendix S7 based on this draft new Recommendation is able to cover a broader range of frequency bands.

MOD CAN/24/93

1) Replace the entire text of Appendix S7 with the substance of Recommendation ITU-R SM.[1/1004] except as proposed below.

2) Indicate through a footnote against sections 1.6.1, 1.6.2 and 2.2.2 (and the associated Annexes) that such material is included to facilitate bilateral discussions during the coordination process.

3) Make consequential changes to section 2.2.

4) Delete all example calculations found in Recommendation ITU-R SM.[1/1004].

5) Transfer the predetermined coordination distances from Annex 1 of Appendix S5 as shown in Annex 1 to Chapter 7 of the CPM Report.

Reasons: After considerable effort, ITU-R has largely completed its studies related to Appendix S7 and has developed draft new Recommendation ITU-R SM.[1/1004] on the methods for determination of the coordination area around an earth station in frequency bands between 100 MHz and 105 GHz. Replacement of the existing Appendix S7 as proposed will incorporate the essential regulatory material from the new Recommendation to make a regulatory determination and provide guidance on the use of additional methods and contours which may be used to facilitate the coordination process in bilateral discussions. This proposal also moves the predetermined coordination distances into Appendix S7, consolidating the determination of earth station coordination distances in a single location. This approach also avoids certain inconsistencies between the existing regulatory provisions and the more generalized text within the Recommendation.

Since a detailed proposal has been made to WRC already, Canada will not attach a detailed proposal. This will be left to Committee 4 and its working groups.

Process to ensure Appendix S7 is maintained up to date

Background

ITU-R has undertaken considerable work since WRC-97 to develop a new Recommendation which could serve as the basis to update Appendix S7 with current methodologies by which an administration determines whether the proposed operation of an earth station might affect, or be affected by, the radiocommunication services of another administration sharing the same frequency band. Appendix S7 is also dependent on several tables of system parameters assumed in the determination of coordination distance. Despite this extensive effort, the work is not complete, particularly with respect to the tables of system coordination parameters. It is expected that ITU-R will continue to study the new technologies and developments of earth stations (whether part of a GSO or a non-GSO satellite network) and new applications or types of terrestrial stations, sharing the same frequency band. Notably, some of the entries in the tables of system coordination parameters for various services in Annex II of a revised Appendix S7 are blank, pending further study. Furthermore, each WRC might make allocation decisions requiring the updating of the system parameter values.

The need to keep Appendix S7 relatively current has been recognized by the CPM and by some proposals to this Conference. However, how to achieve this objective is less than clear without initiating a very long process to add an agenda item to permit a WRC to consider the item. Canada proposes to build upon the existing obligation by the Director, Radiocommunication Bureau, to report to a WRC as a means to update this Appendix while maintaining certain checks and balances to ensure any update is considered necessary by ITU-R as a whole.

ADD CAN/24/94

RESOLUTION [CAN/24/ABC] (WRC-2000)

The process to keep the tables of system parameters of Appendix S7 current

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that Appendix **S7** to the Radio Regulations is the method to determine the coordination area of an earth station, which requires assumed technical coordination parameters for the unknown terrestrial station or earth station;

b) that these technical coordination parameters are contained in Tables 1, 2 and 3 of Annex II of Appendix **S7 (Rev.WRC-2000)**;

c) that these technical coordination parameter tables are based directly on recommendations of ITU-R;

d) that ITU-R studies on radiocommunication systems are continuing, and the conclusions of these studies could lead to the revision of Appendix **S7**;

e) that the technical coordination parameter tables may also need to be modified when changes are made to the Table of Frequency Allocations at future WRCs;

f) that the technical coordination parameter tables do not include values for all the necessary parameters of certain space radiocommunication services and terrestrial radiocommunication services sharing frequency bands with equal rights,

recognizing

a) that Recommendation ITU-R SM.[Doc. 1/1004] was developed by ITU-R as a basis for the revision of Appendix **S7**;

b) that there is a need for future WRCs to keep Appendix **S7** current with the latest techniques and to ensure protection of other radiocommunication services sharing the same frequency bands with equal rights, particularly the revision of the tables of technical coordination parameters,

invites ITU-R

to recommend values for the missing entries in the tables of technical coordination parameters (Annex II of Appendix **S7**), and to maintain the relevant ITU-R texts in a format which would facilitate the future revision of Appendix **S7**,

resolves

1 that when the ITU-R Study Groups come to the conclusion that a revision of Appendix **S7** is warranted, based on their latest studies on the values of technical coordination parameters, the matter shall be considered by the Radiocommunication Assembly;

2 that, if the Radiocommunication Assembly confirms the proposal by the ITU-R Study Groups, the Director, Radiocommunication Bureau, shall identify the matter in the Director's Report to the upcoming WRC,

requests

1 that WRC consider the revision of Appendix **S7** in light of the recommendation of the Radiocommunication Assembly, pursuant to *resolves* 1 and 2 above; and,

2 that each WRC, when modifying the Table of Frequency Allocations, consider any consequential changes to the technical coordination parameters of Annex II of Appendix **S7**, and if necessary request ITU-R to study the matter.

Reasons: This new Resolution recognizes the importance of keeping Appendix **S7** up to date without the need to instigate a long process to have the Appendix updated. The need to have a complete set of technical coordination parameters is important to administrations to enable them to fulfil their obligations under Article **S9** of the Radio Regulations.

Related and consequential proposals

APPENDIX S5

ANNEX 1

SUP CAN/24/95

3

Reasons: Consequential change to CAN/24/93. The relevant material with appropriate modifications will now be found in Appendix S7.

ARTICLE S1

Terms and definitions

Section VII – Frequency sharing

MOD CAN/24/96

S1.171 *coordination area:* When determining the need for coordination, ~~T~~the area associated with surrounding an *earth station* outside of which a *terrestrial station* sharing the same frequency band neither causes nor is subject to interfering *emissions* greater than a permissible level sharing the same frequency band with terrestrial stations, or surrounding a transmitting earth station sharing the same bidirectionally allocated frequency band with receiving earth stations, beyond which the permissible level of interference will not be exceeded.

MOD CAN/24/97

S1.173 *coordination distance:* ~~Distance on a given azimuth from an *earth station* beyond which a *terrestrial station* sharing the same frequency band neither causes nor is subject to interfering *emissions* greater than a permissible level.~~When determining the need for coordination, the distance on a given azimuth from an *earth station* sharing the same frequency with terrestrial stations, or from a transmitting earth station sharing the same bidirectionally allocated frequency band with receiving earth stations, beyond which the permissible level of interference will not be exceeded.

Reasons: Consequential change identified in the CPM Report to align the text of the definitions with the text of the ITU-R Recommendation.

SUP CAN/24/98

RESOLUTION 60

Relating to information on the propagation of radio waves used in the determination of the coordination area

Canada supports the CITEL Inter-American proposal IAP/14/85 (Addendum 1 to Document WRC2000/14, 27 March 2000) to suppress this Resolution.

Reasons: Resolution 60 addressed the need to update the propagation models used in Appendix S7 (former Appendix 28). This has served its purpose and could be deleted.

Proposals for agenda item 1.6.1

Agenda item 1.6.1: Review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

Proposal for the use of high altitude stations in IMT-2000 terrestrial systems

Background information

This proposal addresses the option to use the high altitude platform stations (HAPS) for the delivery of terrestrial IMT-2000 within the bands that WARC-92 identified for terrestrial IMT-2000 in S5.388, subject to licensing, technical, sharing, coordination and implementation regulations by administrations. It addresses regulatory issues relating to HAPS in the context of IMT-2000 and is not related to the issue of providing more spectrum for the terrestrial component of IMT-2000.

A high altitude platform station (HAPS) is defined in S1.66A as “A station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth.” Each HAPS deploys a multibeam antenna capable of projecting numerous spot beams within its coverage area. The Radio Regulations, under S4.15A, state that “Transmissions to or from high altitude platform stations shall be limited to bands specifically identified in **S5**”. The only bands currently identified for use by HAPS in Article S5 are in footnote S5.552A that states that “The allocation to the fixed service in the bands 47.2-47.5 GHz and 47.9-48.2 GHz is designated for use by high altitude platform stations. The use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz is subject to the provisions on Resolution **122 (WRC-97)**”.

ITU-R TG 8/1 completed extensive studies regarding the ability of HAPS to provide IMT-2000 services within Regions 1 and 3 utilizing the bands 1 885-2 025 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz and within Region 2 utilizing the bands 1 885-1 980 MHz and 2 110-2 160 MHz identified for IMT-2000. These studies address, among other things, the ability of HAPS to coordinate and share with IMT-2000 stations operating in neighbouring administrations and with certain stations operating in other services in adjacent bands. Draft new Recommendation ITU-R M.[8/115], as approved by ITU-R Study Group 8 for adoption by correspondence, considers certain sharing and coordination requirements associated with the use of HAPS as a base station within a terrestrial IMT-2000 system. The current Resolution HAPS refers to minimum performance characteristics from ITU-R M.[8/115].

This proposal recognizes that in accordance with footnote S5.388, administrations may use the bands identified for IMT-2000, including the bands noted herein, for stations of other primary services to which they were allocated.

As with all other types of base stations operating as a base station in an IMT-2000 system, the proposal also recognizes the need for additional future studies on the compatibility of HAPS operating as a base station in an IMT-2000 system and other stations operating in the same and adjacent frequency bands.

This proposal calls for a footnote in RR S5 identifying HAPS as an optional method of delivery within an IMT-2000 system in the frequency bands identified for Regions 1 and 3, the bands 1 885-2 025 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz and for Region 2, the bands 1 885-1 980 MHz and 2 110-2 160 MHz, identified for IMT-2000, subject to the Resolution HAPS and national regulation.

MOD CAN/24/99

1 710-2 170 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td>1 710-1 930</td><td colspan="2">FIXED
MOBILE S5.380
S5.149 S5.341 S5.385 S5.386 S5.387 S5.388 ADD S5.BBB</td></tr>
<tr><td>1 930-1 970
FIXED
MOBILE
S5.388 ADD S5.BBB</td><td>1 930-1 970
FIXED
MOBILE
Mobile-satellite (Earth-to-space)
S5.388 ADD S5.BBB</td><td>1 930-1 970
FIXED
MOBILE
S5.388 ADD S5.BBB</td></tr>
<tr><td>1 970-1 980</td><td colspan="2">FIXED
MOBILE
S5.388 ADD S5.BBB</td></tr>
<tr><td>1 980-2 010</td><td colspan="2">FIXED
MOBILE
MOBILE-SATELLITE (Earth-to-space)
S5.388 S5.389A S5.389B S5.389F</td></tr>
<tr><td>2 010-2 025
FIXED
MOBILE
S5.388 ADD S5.BBB</td><td>2 010-2 025
FIXED
MOBILE
MOBILE-SATELLITE
(Earth-to-space)
S5.388 S5.389C S5.389D
S5.389E S5.390</td><td>2 010-2 025
FIXED
MOBILE
S5.388 ADD S5.BBB</td></tr>
<tr><td>2 025-2 110</td><td colspan="2">SPACE OPERATION (Earth-to-space) (space-to-space)
EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space)
FIXED
MOBILE S5.391
SPACE RESEARCH (Earth-to-space) (space-to-space)
S5.392</td></tr>
<tr><td>2 110-2 120</td><td colspan="2">FIXED
MOBILE
SPACE RESEARCH (deep space) (Earth-to-space)
S5.388 ADD S5.BBB</td></tr>
<tr><td>2 120-2 160
FIXED
MOBILE
S5.388 ADD S5.BBB</td><td>2 120-2 160
FIXED
MOBILE
Mobile-satellite (space-to-Earth)
S5.388 ADD S5.BBB</td><td>2 120-2 160
FIXED
MOBILE
S5.388 ADD S5.BBB</td></tr>
<tr><td>2 160-2 170
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MOBILE
S5.388 ADD S5.BBB S5.392A</td><td>2 160-2 170
FIXED
MOBILE
MOBILE-SATELLITE
(space-to-Earth)
S5.388 S5.389C S5.389D
S5.389E S5.390</td><td>2 160-2 170
FIXED
MOBILE
S5.388 ADD S5.BBB</td></tr>
</table>

ADD CAN/24/100

S5.BBB In Regions 1 and 3, the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz, and in Region 2 the bands 1 885-1 980 MHz and 2 110-2 160 MHz, may be used by high altitude platform stations as base stations to provide IMT-2000. These bands are allocated to the fixed, mobile and the mobile-satellite services, and the use by IMT-2000 applications using high altitude platform stations as an IMT-2000 base station in these bands shall not constrain the use of these bands by other stations of the primary services to which they are allocated. Resolution **HAPS (WRC-2000)** provides guidance on sharing and coordination matters for administrations considering deployment of HAPS stations.

Reasons: Radio Regulation S4.15A limits transmissions to and from HAPS to bands specifically identified in the Table of Frequency Allocations. The addition of S5.BBB to the Table of Frequency Allocations will provide administrations with the option to utilize HAPS for IMT-2000 services within the identified bands subject to not constraining the use of these bands by other stations of the primary services to which they are allocated.

ADD CAN/24/101

RESOLUTION HAPS (WRC-2000)

Use of high altitude platform stations providing IMT-2000 in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WARC-92 identified the bands 1 885-2 025 MHz and 2 110-2 200 MHz, intended for use on a worldwide basis for IMT-2000, including the bands 1 980-2 010 MHz and 2 170-2 200 MHz for the satellite component of IMT-2000, in No. **S5.388**;

b) that a high altitude platform station (HAPS) is defined in **S1.66A** as “A station located on an object at an altitude of 20 to 50 km and at a specified, nominal, fixed point relative to the Earth”;

c) that HAPS may offer a new means of providing IMT-2000 services with minimal network build out as it is capable to provide service to a large footprint together with a dense coverage;

d) that, in accordance with MOD **S5.388**, administrations may use the bands identified for IMT-2000, including the bands noted herein, for stations of other primary services to which they were allocated;

e) that these bands are allocated to the fixed, mobile and mobile-satellite services;

f) that ITU-R did not address sharing and coordination between HAPS and some existing systems, such as PCS and MMDS, currently operating in some administrations in the bands 1 885-2 025 MHz and 2 110-2 200 MHz;

g) that in accordance with **S5.BBB**, HAPS is allowed to be used as a base station of terrestrial IMT-2000 in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2, which are allocated to the fixed, mobile and the mobile-satellite services,

resolves

1 that administrations wishing to implement HAPS implemented in **S5.BBB** within a terrestrial IMT-2000 system should use as a guideline the minimum performance characteristics and operational conditions given in Recommendation ITU-R M.[8/115], until future studies relating to the compatibility of HAPS with systems other than IMT-2000 are completed;

2 that for the purpose of protecting stations operating in neighbouring administrations from co-channel interference, administrations using HAPS as base stations to IMT-2000 could use the specific pfd values at or beyond the boundary of the neighbouring administration in Recommendation ITU-R M.[8/115] as a guideline, subject to the agreement of the neighbouring administration,

invites ITU-R

to complete additional studies of HAPS sharing and coordination criteria with, between and into other systems in the bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3 and 1 885-1 980 MHz and 2 110-2 160 in Region 2, and in adjacent bands.

Reasons: To specify how HAPS systems are to be used in the bands.

Proposals for agenda item 4

Agenda item 4: In accordance with Resolution **95 (WRC-97)**, to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation

Proposal for modification to Resolution 51 (WRC-97)

Background information

Resolution 51 (WRC-97) was adopted at WRC-97 to bring into force amendments to certain provisions of the Radio Regulations immediately after the Conference. *Resolves* 3 of this resolution was adopted to maintain the maximum allowed time between the advanced publication of information (API) and the date of bringing into use of a satellite network to the regime that applied before WRC-97 (6+3 years) for those networks that were filed prior to 22 November 1997.

Resolves 3 of Resolution 51 (WRC-97) which maintains this timeline states:

"3 that, for satellite networks for which the API has been received by the Bureau prior to 22 November 1997, the maximum allowed time period from the date of receipt of the API to bring the relevant frequency assignments into use shall be six years plus the extension pursuant to No. **1550** (see also Resolution **49 (WRC-97)**);"

The extension under No. 1550 that was allowed prior to WRC-97 was three years. However, the six plus three year period was counted from the **date of publication** of the API and not the date of receipt, as evidenced by the text of No. 1550:

"**1550**
Orb-88 (4) The notified date of bringing into use of the first assignment of a satellite network shall not be later than six years following the date of publication of the special section of the weekly circular referred to in No. **1044**. This notified date of bringing into use will be extended at the request of the notifying administration by no more than three years."

Therefore, there is an inconsistency within *resolves* 3 which quotes the extension allowed under No. 1550, but makes this extension apply as of the date of receipt. To resolve the ambiguity created by the current language in *resolves* 3 of Resolution 51 (WRC-97), Canada proposes to correct this provision to align the time periods with those applicable at the time the API filings were communicated to the Bureau and thereby avoiding the accidental retroactive application of regulatory changes.

MOD CAN/24/102

RESOLUTION 51 (Rev.WRC-~~97~~2000)

Provisional application of certain provisions of the Radio Regulations as modified by WRC-97 and transitional arrangements

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that as a result of the review under Resolution 18 (Kyoto, 1994), a number of provisions relating to the advance publication, coordination and notification of assignments for satellite networks have been modified and these should be applied provisionally as soon as possible;

b) that it was decided to reduce the regulatory time-frame for bringing a satellite network into use, and to delete the advance publication information (API) if not followed by the coordination data within 24 months of the date of receipt of the API;

c) that there are a number of satellite networks for which the relevant information has been communicated to ITU prior to the end of this Conference, and it is necessary to provide for some transitional measures for the treatment of this information by the Radiocommunication Bureau,

resolves

1 that the provisions of Sections I, IA and IB of Article **S9** and provisions of Article **S11** (Nos. **S11.43A**, **S11.44**, **S11.44B** to **S11.44I, S11.47** and **S11.48**), as revised by this Conference, shall be applied by the Bureau and by administrations on a provisional basis as of 22 November 1997;

2 that, for satellite networks which are subject to coordination for which the API has been received by the Bureau prior to 22 November 1997 but the coordination data has not been received by the Bureau prior to this date, the responsible administration shall have until 22 November 1999 or the end of the period pursuant to the application of No. **1056A**, whichever date comes earlier, to submit the coordination data in accordance with the applicable provisions of the Radio Regulations; otherwise the Bureau shall cancel the relevant API in accordance with No. **1056A** or No. **S9.5D** as applicable;

3 that, for satellite networks for which the API has been received by the Bureau prior to 22 November 1997, the maximum allowed time period from the date of ~~receipt~~ publication of the API to bring the relevant frequency assignments into use shall be six years plus the extension pursuant to No. **1550** (see also Resolution **49 (WRC-97)**);

4 that the revised Appendix **S4** with respect to the API for satellite networks which are subject to coordination under Section II of Article **S9** shall be applied as of 22 November 1997;

5 that, for those networks which are subject to coordination for which the API has been received but not yet published prior to 22 November 1997, the Bureau shall publish only the information of the revised Appendix **S4** as modified by this Conference.

Reasons: Align the conditions in *resolves* 3 with those that were contained in RR No. 1550 which was in force at the time the APIs were submitted to the Bureau.

RESOLUTION 644 (WRC-97)

Background

WRC-97 adopted Resolution 644 “Telecommunication resources for disaster mitigation and relief operations”.

The ITU Plenipotentiary Conference (Minneapolis, 1998) endorsed Resolution 644 and adopted Resolution 36 (Rev.Minneapolis, 1998) which instructed the Secretary-General and urged Member States to undertake appropriate action on telecommunications in the service of humanitarian assistance. Thus, Resolution 644 should be updated by WRC-2000 to reflect these developments.

MOD CAN/24/103

RESOLUTION 644 ~~(WRC-97)~~(Rev.WRC-2000)

Telecommunication resources for disaster mitigation and relief operations

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that ITU, in the same spirit as reflected in Articles 40 and 46 of its Constitution and in Resolution **209 (Mob-87)**, has specifically recognized the importance of the international use of radiocommunications in the event of natural disasters, epidemics, famines and similar emergencies;

b) that the Plenipotentiary Conference of the International Telecommunication Union ~~(Kyoto, 1994)~~(Minneapolis, 1998), in endorsing Resolution ~~7~~19 of the World Telecommunication Development Conference ~~(Buenos Aires, 1994)~~(Valetta, 1998), adopted Resolution 36 (Rev.Minneapolis, 1998) on ~~telecommunications for disaster mitigation and disaster relief operations~~in the service of humanitarian assistance;

c) that administrations have been urged to take all practical steps to facilitate the rapid deployment and effective use of telecommunication resources for disaster mitigation and disaster relief operations by reducing and, where possible, removing regulatory barriers and strengthening transborder cooperation between States,

recognizing

a) the potential of modern telecommunication technologies as an essential tool for disaster mitigation and relief operations and the vital role of telecommunications for the safety and security of relief workers in the field;

b) the particular needs of developing countries and the special requirements of the inhabitants of remote areas;

c) the progress made in the implementation of Resolution 36 (Rev.Minneapolis, 1998) with respect to the preparation of the Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations,

noting

~~with appreciation the scheduling of~~ the Intergovernmental Conference on Emergency Telecommunications (ICET-98) from 16 to 18 June 1998 in Tampere, Finland, which ~~is expected to~~ adopted the Convention referred to in *recognizing c)* above,

resolves

to invite the ITU~~-R~~ Radiocommunication Sector to continue to study, as a matter of urgency, those aspects of radiocommunications that are relevant to disaster mitigation and relief operations, such as decentralized means of communications that are appropriate and generally available, including amateur radio facilities and mobile and portable satellite terminals,

requests the Director of the Radiocommunication Bureau

to support administrations in their work towards the implementation of Resolution 36 (Rev.Minneapolis, 1998),

instructs the Secretary-General

to work closely with the United Nations Emergency Relief Coordinator with a view to further increasing the Union's involvement in, and support to, disaster communications, and ~~to report on the outcome of the Tampere Conference to the 1998 Plenipotentiary Conference so that that Conference or the Council may take any action that it deems necessary,~~ to take any action deemed appropriate to implement the provisions of the Tampere Convention,

invites

the United Nations Emergency Relief Coordinator and the Working Group on Emergency Telecommunications to collaborate closely with ITU in further work towards the implementation of Resolution 36 (Rev.Minneapolis, 1998), and in particular the adoption of the Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations,

urges administrations

to give their full support to the adoption of the said Convention and its national implementation.

Reasons: Resolution 644 should be updated to reflect the decisions of the ITU Plenipotentiary Conference (Minneapolis, 1998) in Resolution 36 (Rev.Minneapolis, 1998) and the Tampere Convention.

Proposals for agenda item 7.1

Agenda item 7.1: To consider and approve the Report of the Director of the Radiocommunication Bureau on the activities of the Radiocommunication Sector since WRC-97

Proposal for modification to provision S5.43 (operations subject to not causing harmful interference)

Background information

One important element of the Report of the Director of the Radiocommunication Bureau on the activities of the Radiocommunication Sector since WRC-97 will be the section dealing with the Rules of Procedure (RoP) developed by the Radio Regulations Board (RRB). During the period since WRC-97, the RRB developed a RoP on S5.43. This RoP treats the application of S5.43 in all cases as meaning that service subject to not causing harmful interference means that the service in question must protect all services in the band, including secondary services, and cannot claim protection from these services. In essence, when a service is subject to S5.43, either explicitly such as in S5.282 or implicitly such as S5.268, it is often indicated that the service in question can operate subject to not causing harmful interference to another specified service or services, or even to another application in the same service. However, the RoP treats the application of S5.43 as meaning that the service subject to its application cannot cause harmful interference to any other services in the band, including secondary services. This has far-reaching consequences.

For convenience, the text of provision S5.43 is reproduced below:

“**S5.42** *Miscellaneous provisions*

S5.43 1) Where it is indicated in these Regulations that a service may operate in a specific frequency band subject to not causing harmful interference, this means also that this service cannot claim protection from harmful interference caused by other services to which the band is allocated under Chapter **SII** of these Regulations.”

Also for convenience, the text of the RoP on this Radio Regulation is provided below:

“**S5.43**

1 As this provision is similar in its wording to **S5.29** and **S5.30**, very often allocations on a non-interference basis are considered equivalent to a secondary service. This is correct when only a primary service is concerned, but this is not the case when a secondary service is concerned, because this provision refers to “services to which the band is allocated” and consequently an allocation on a non-interference basis shall not cause interference to or claim protection from even a secondary service. The respective statuses of the different allocations are summarized in the following table.

Assignment	has equality of rights with	shall not cause interference to or claim protection from
primary	primary	
secondary	secondary	primary
No. **S5.43**	No. **S5.43**	Primary Secondary
No. **S4.4**	No. **S4.4**	Primary Secondary No. **S5.43**

2 This provision covers only the case of allocations which are made subject to not causing harmful interference. In some cases, such as No. **S5.429**, the allocation is made without the right to claim protection. The Board is of the view that such allocations are also deemed not to cause harmful interference and this provision applies to them."

As can be seen from the above, any service which is subject to provision S5.43, is treated as "tertiary", meaning that it cannot cause interference or claim protection from any other services allocated in the same frequency bands, including secondary services. This is sufficient in cases where the service is allocated subject to not causing interference to all other services in the band, but not when the allocation to this service is subject to that service not causing harmful interference to one or more specific other services.

There are **three cases** where provision S5.43 can be invoked:

1) Service A is allocated subject to S5.43 with respect to all other services allocated in the band;

2) Service A is allocated subject to S5.43 with respect to one or more services allocated in the band;

3) Service A is allocated subject to S5.43 with respect to another usage of the same service.

Furthermore, the RRB in its RoP decided that where a service is allocated subject to not claiming protection from interference, the same treatment would apply as if the allocation was subject to not causing harmful interference.

There are several footnotes in Article S5 which specify that the allocations are subject to "not causing harmful interference" or "not claiming protection from interference", and where S5.43 would therefore apply either explicitly or implicitly. In the majority of cases, a service is subject to this regulation per case 2) above. A fewer number of cases appear that fit cases 1) or 3) above. Since in the majority of cases, the allocation is subject to not causing harmful interference into a single other service, it does not appear reasonable to make the allocation subject to not causing harmful interference to all other services sharing the band. For example, under the RoP for S5.43, in bands governed by S5.558, the aeronautical mobile service would need to protect and could not claim protection from many services, whereas the allocation was subject to these conditions only with respect to the inter-satellite service.

The difficulty probably stems from the language in provision S5.43 itself. The first part of this provision, which states "that a service may operate in a specific frequency band subject to not causing harmful interference," does not differentiate between the three possible cases described previously; the second part, which states "this means also that this service cannot claim protection from harmful interference caused by other services to which the band is allocated under Chapter **SII** of these Regulations," uses the generic form of services sharing the band. This leads to the understanding that an allocation that is made subject to not causing interference to a single other service or even another usage in the same service, will need to protect all other services in the band. Canada believes that where it is indicated that a service shall not cause harmful interference to another service, it should not be subject to protecting all other services allocated in the band.

The following modification to provision S5.43 would limit its application only between those services that are stated in the relevant provisions (footnotes). The addition of a new provision S5.43A, would cover the reciprocal procedure that is currently subject of the Rules of Procedure.

MOD CAN/24/104

S5.43 1) Where it is indicated in these Regulations that a service or stations in a service may operate in a specific frequency band subject to not causing harmful interference to another service or to another station in the same service, this means also that ~~this~~ the service which is subject to not causing harmful interference cannot claim protection from harmful interference caused by this other ~~services~~ service or other stations in the same service~~to which the band is allocated under Chapter **SII** of these Regulations~~.

Reasons: Clarify the application of S5.43 where its scope is limited to one or more services but not all services to which the band is allocated.

ADD CAN/24/105

S5.43A 1*bis*) Where it is indicated in these Regulations that a service or stations in a service may operate in a specific frequency band subject to not claiming protection from another service or from another station in the same service, this means also that the service which is subject to not claiming protection cannot cause harmful interference to this other service or other stations in the same service.

Reasons: Add reciprocal procedure to provision S5.43.

Proposals for agenda item 7.2

Agenda item 7.2: To recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent Conference and on possible agenda items for future conferences

Proposals regarding the agenda for WRC-03

Background

The agenda for the next WRC (WRC-03) will be drafted during WRC-2000 for consideration by Council. Sections 8.1.1 and 8.1.2 of the CPM text respectively outline the items included in Resolution 722 (WRC-97) and the items formally identified in Resolution 721 (WRC-97). Canada makes the following proposals regarding the items contained in these sections of the CPM text, as well as regarding new items. As far as the preliminary agenda for the subsequent Conference (WRC-05) is concerned, Canada has no formal proposal at this time.

RESOLUTION 722 (WRC-97)

SUP CAN/24/106

Preliminary agenda for the 2001 World Radiocommunication Conference

Reasons: A new resolution containing the agenda items for WRC-03 should replace Resolution 722 (WRC-97).

SUP CAN/24/107

2.3

2.3.1

2.3.2

Reasons: Open-ended agenda items, like these, are potentially sweeping in nature and are better dealt with in ITU-R Recommendations rather than at a WRC. Having studies of unwanted emissions carried out in ITU-R would also allow time to gain experience using the technical Recommendations resulting from these studies.

NOC CAN/24108

2.12 consideration of the need to realign the allocations to the amateur, amateur-satellite and broadcasting services around 7 MHz on a world-wide basis, taking into account Recommendation **718 (WARC-92)**;

Reasons: WRC-97 considered the need for a subsequent WRC to take action on this long-standing incompatibility between services around 7 MHz; namely amateur, broadcasting and fixed, and thus included this matter under Resolution 722 (WRC-97).

Resolution 641 (Rev.HFBC-87) and Recommendation 718 (WARC-92) recognize this incompatibility problem together with the desirability to have worldwide exclusive allocations for these services.

There has been increasing pressure to harmonize and balance the spectrum needs of the amateur and broadcasting services as well as responding to the fixed service requirements in support of many national and international applications, including those of humanitarian aid and disaster relief.

It is therefore considered essential that this agenda item be maintained for WRC-03 in order to respond effectively to the above services and facilitate better planning and efficient spectrum utilization around 7 MHz.

ADD CAN/24/109

2.14 consider the need for interregional regulatory provisions, including power flux-density limits, to protect the fixed service in the bands 17.7-17.8 GHz (in Regions 1 and 3) and 21.4-22 GHz (in Region 2) from BSS systems in Region 2 and Regions 1 and 3, respectively;

Reasons: At WARC-92 the broadcasting-satellite service received regional allocations for the delivery of HDTV, namely at 17.3-17.8 GHz in Region 2 and at 21.4-22 GHz in Regions 1 and 3. The allocations to the BSS come into effect 1 April 2007 in accordance with RR S5.517 and S5.530. The sub-band 17.7-17.8 GHz and the band 21.4-22 GHz are also allocated worldwide on a primary basis to the fixed service.

Pfd limits on the BSS are not desirable in principle. Nevertheless, it is important to protect the fixed service (FS) in Region 2 in the band 21.4-22 GHz from unintentional, and potentially unacceptable, levels of interference emitted by the BSS in Regions 1 and 3. Similarly, FS systems operating in the band 17.7-17.8 GHz in Regions 1 and 3 will require protection from Region 2 BSS operation.

There are a variety of existing and planned FS systems in this spectrum range including broadband, high spectral efficiency point-to-point back-haul and wireless access systems carrying Internet and multimedia services. The pfd limits in the 17 and 22 GHz spectrum ranges in RR S21 (–115/–105 dBW/m^2 in any 1 MHz) were developed over 25 years ago. While Recommendation ITU-R F.760-1 confirmed the adequacy of these limits in 1992 for point-to-point FS operation, Resolution 525 (WARC-92) considers RR S21 pfd limits to be coordination triggers for the band 21.4-22 GHz in Regions 1 and 3 prior to 1 April 2007. It may not be desirable or acceptable to simply treat the current RR S21 limits as trigger values to protect the FS in Region 2. Furthermore, alternative regulatory provisions may need to be developed to ensure protection of the FS on an interregional basis without constraining the development of BSS systems. Note that in Region 2 the FS does not share the band 21.4-22 GHz with a space service; thus avoidance of the GSO is not a requirement for the FS. It is important that ITU-R study this matter, including a review of Recommendation ITU-R F.760-1, and provide recommendations addressing interregional sharing conditions in time for the next WRC, to ensure that BSS systems will incorporate the most current provisions of the Radio Regulations into system designs.

ADD CAN/24/110

2.15 to consider allocation of additional spectrum for the Earth exploration-satellite service (EESS) around 5 GHz;

Reasons: Systems currently being designed to operate in the EESS at 5.25-5.46 GHz will be capable of achieving higher imaging resolution. These new performances will require a frequency bandwidth greater than what is currently available. As these systems are operating on a worldwide basis, a global primary allocation is required to protect their operation. The band 5.46-5.57 GHz should be studied to provide an extension of the existing EESS allocation.

SUP CAN/24/111

3.1

Reasons: Resolution 528, adopted at WARC-92, calls for a conference to be convened preferably not later than 1998 for the planning of BSS sound in the 1-3 GHz band, and the development of procedures for the complementary terrestrial broadcasting.

At WRC-97 a proposal was made that called for convening a planning conference by the year 2002. However, after discussion at WRC-97, it was agreed to include the consideration of the results of studies related to Resolution 528 in agenda item 3 of Resolution 722.

Satellite transmission of digital sound broadcasting has not developed as fast as it was anticipated in 1992 mainly due to the very high up-front cost associated with satellite systems and the non-availability of receivers. Added to this are reasons unique to each administration such as the current use of the bands by fixed and mobile services and the saturation of terrestrial sound broadcasting in all parts of a country. A further complication is the fact that there are three frequencies being covered by Resolution 528, namely the 1.5 GHz band, the 2.3 GHz band and the 2.56 GHz band.

JWP 10-11S, in conjunction with WP 9D, has studied the feasibility of frequency sharing with FS in certain situations but the studies are not conclusive and more work is needed to cover all the situations and all frequency bands. Also, if the APT proposal is adopted, a whole new area of study will open up related to non-GSO BSS sound. In the meantime, JWP 10-11S recently approved a Recommendation providing guidelines for the orderly implementation of satellite digital sound broadcasting (DSB) in the absence of a planning conference.

It is therefore Canada's view that the review of studies related to Resolution 528 as stated in agenda item 3.1 of Resolution 722 should not take place before WRC-05.

SUP CAN/24/112

3.2

Reasons: Canada believes that it is premature to extend the table of allocation beyond 275 GHz at this time. The requirements of the radio services in this portion of the spectrum are not sufficiently known to ensure their fair treatment. Furthermore, the existing footnote S5.565 is believed to be sufficient to protect the operation of the scientific passive services above 275 GHz.

SUP CAN/24/113

3.4

Reasons: Resolution 728 (WRC-97) calls for studies in the band 470-862 MHz. Canada is of the view that consideration of proposals to implement MSS in this frequency range could negatively impact on the implementation of digital TV and the reuse of a part of this frequency band for other services in the longer time-frame. This agenda item could also complicate any future WRC general consideration of the allocations in the upper portion of this band.

SUP CAN/24/114

3.5

Reasons: There is no known requirement to obtain feeder-link spectrum for MSS in this frequency range. There is also a concern that such an allocation may cause interference to the radioastronomy allocation in the band 1 400-1 427 MHz and to the fixed service applications in this spectrum range.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 1 to Document 24-E
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PLENARY MEETING

Canada

PROPOSALS FOR THE WORK OF THE CONFERENCE

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Proposals for agenda item 1.1

Agenda item 1.1: Requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution **26 (Rev.WRC-97)**.

Addition of country names of Region 2 in the footnotes to Tables S5.293 and S5.480 of the ITU Radio Regulations

Background information

Footnote S5.293 raises the status of the fixed and mobile services to a primary basis in nine countries in Region 2 in the bands 470-512 MHz and 614-806 MHz. The use of those services is subject to agreement under No. S9.21. Canada anticipates that with the full implementation of digital television, less spectrum will be required for television services than presently. By joining footnote S5.293, Canada would have the option of implementing fixed and mobile in some parts of the frequency bands specified in the footnote, subject to agreement under No. S9.21.

CAN/24/35

In addition to CAN/24/2 (Document WRC2000/24, 16 February 2000), Canada also supports the Inter-American proposal IAP/14/74 (Addendum 1 to Document WRC2000/14, 27 March 2000) as it is consistent with the Canadian proposal (i.e. open footnote S5.293 to enable countries in Region 2 to add their names).

Proposals for agenda item 1.2

Agenda item 1.2: To finalize remaining issues in the review of Appendix **S3** to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation **66 (Rev.WRC-97)** and the decisions of WRC-97 on adoption of new values, due to take effect at a future time, of spurious emissions for space services.

Proposal to modify Recommendation 66 (Rev.WRC-97)

Background information

Recommendation **66** is being modified to reflect the current status of this document. Work has been completed on space service spurious emissions, consequently Canada is supporting CITEL Inter-American proposals (IAP/14/75 to IAP/14/84). These proposals include the suppression of *considering f), recommends* 1 and 2, editing "*recognizing i)"* to conform to the concept in the *recommends* that limits may be needed for specific situations. In addition, the CITEL proposals include the suppression of *recommends* 9 based on the TG 1/5 finding that OOB emission limits are not appropriate at this time.

CAN/24/36

Canada supports the CITEL Inter-American proposals IAP/14/75 to IAP/14/84 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposals for agenda item 1.4

Agenda item 1.4: To consider issues concerning allocations and regulatory aspects related to Resolutions **126 (WRC-97)**, **128 (WRC-97)**, **129 (WRC-97)**, **133 (WRC-97)**, **134 (WRC-97)** and **726 (WRC-97)**.

Proposal addressing the use of the frequency range 37-43.5 GHz by the fixed service and other allocated services (Resolution 133, 128, 726 and 134)

Background information

WRC-97 added co-primary allocations for the fixed-satellite service (FSS) (space-to-Earth) in Regions 2 and 3 and some countries of Region 1 in the band 40.5-42.5 GHz and upgraded worldwide secondary allocations to the fixed service (FS) to co-primary status. Canada has also added the FS on a co-primary basis in the band 40.5-42.5 GHz in its domestic allocations. Also, this band is allocated on a co-primary basis to the broadcasting service and broadcasting-satellite service (BSS).

Resolution 134 (WRC-97) makes the date of the provisional application of the allocation to the FSS in Regions 1 and 3 in the band 40.5-42.5 GHz 1 January 2001, and calls for review of the allocation and provisional application date. On the basis of studies conducted in ITU-R, it is appropriate to advance the date of the application of the FSS allocation in Regions 1 and 3 to 2 June 2000 (upon the conclusion of WRC-2000), and to extend the allocation to all of Region 1 (thereby enabling the removal of Nos. S5.551C, S5.551D and S5.551E, and the suppression of Resolution 134 (WRC-97)).

The use of FSS allocations is subject to the ITU-R studies referred to in Resolutions 128 and 129. Since HDFS and ubiquitously deployed FSS and BSS terminals cannot share the same spectrum in the same area, it is necessary to identify regulatory solutions to meet the spectrum requirements for HDFS (both point-to-point and point-to-multipoint), and FSS (both global and regional) in the range 37-51.4 GHz. Further, it should be recognized that the next allocation to the FSS, above the 40/50 GHz bands, is near 80 GHz. In this frequency range, physical factors such as high propagation losses may affect implementation of FSS systems. To date, no studies in ITU-R have addressed the feasibly of implementation of FSS systems in frequency bands near 80 GHz.

Resolution 133 deals with sharing of the FS with other services in the range 37-40 GHz. Many administrations have authorized high-density fixed systems (point-to-point and point-to-multipoint systems) in parts of the 37-40 GHz band. It is expected that the new broadband operators will deploy point-to-multipoint and point-to-point systems in urban areas. HDFS deployments can make sharing difficult with FSS systems, depending on the population of earth station receivers and the nature of the business plan. It is recognized that economy of scale is a key factor in the success of high-density deployments of FS and FSS systems and that this will be enhanced by the degree of global spectrum harmonization.

A number of administrations are actively seeking spectrum for high-density FS and FSS systems in the 37-42.5 GHz frequency range. Given the system characteristics, service requirements and the need to provide global spectrum for FSS systems, it is anticipated that approximately 2 GHz of spectrum is required to meet future needs of high-density FSS systems in this frequency range. Within the frequency range 37-42.5 GHz, it is proposed to use the band 37-40 GHz by high-density FS applications and the band 40-42 GHz for high-density FSS applications. The allocations to FS and FSS are retained in the range 37.5-42.5 GHz in order to provide flexibility to administrations to implement lower density applications subject to certain constraints. Furthermore, it should be noted that, as a result of this proposal, an appropriate pairing of 2 GHz will be needed for high-density

FSS near 50 GHz for earth-to-space transmissions, taking into account existing allocations in that band. The band 48.2-50.2 GHz appears at this time to be suitable for that purpose.

It should also be noted that high-density FSS applications are similar in nature to BSS systems, particularly in the delivery of multimedia and inter-active services. Taking this into account, it is proposed to align the broadcast satellite allocation with the high-density FSS allocation in the 40-42 GHz band. This results in a new allocation to the BSS in the band 40-40.5 GHz. The alignment of FSS and BSS in the 40-42 GHz band also presents an opportunity to make available additional HDFS spectrum in the 42-43.5 GHz band.

It is proposed that the protection of the radio astronomy service in the frequency band 42.5-43.5 GHz be dealt with under the provisions of Resolution 128 (Rev.WRC-2000).

In order to provide the opportunity for the deployment of high-density FS and FSS systems it is necessary to develop a regulatory means that recognizes the ubiquitous nature of these systems while at the same time ensuring that other allocated services continue to have access to the spectrum, subject to certain constraints. To meet this goal, an approach referred to as “soft partitioning” appears to be the most suitable. The soft partitioning approach employs footnotes to indicate that a band is available for high-density applications in either terrestrial or space services. It does not involve removal or downgrading of any of the currently allocated services. In the proposal outlined below, the bands 37-40 GHz and 42-43.5 GHz have been identified through footnote S5.547 as being available for high-density applications in the fixed service. In addition, the band 40-42 GHz has been identified through footnote S5.55X for high-density FSS applications. None of the currently allocated services are removed from these bands.

CAN/24/37

Canada supports the CITEL Inter-American proposals IAP/14/86 to IAP/14/106 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposal to address issues related to the fixed service and Earth exploration-satellite (passive) service in the 55.78-56.26 GHz band

Background information

Footnote S5.547 indicates that the band 55.78-59 GHz (among others) is available for high-density applications in the fixed service. Resolution 726 (WRC-97) resolves that administrations should take into account that this band is available for high-density application in the fixed service, when considering allocations or other regulatory provisions in relation to this band.

ITU-R studied the sharing situation between the fixed service and the Earth exploration-satellite (passive) service in the 55.78-56.26 GHz band without reaching a conclusion on the requirement of a power limit on emissions from stations in the fixed service. The CPM Report supports two methods to address the sharing issue: The first method indicates that no further limits are necessary in this band. The second method imposes some limitations on the fixed service in this band. Within the second method, three possible limits are proposed. In addition some of the subsequent ITU-R studies produced alternate power limits.

Due to this lack of firm conclusions, Canada believes that it is premature to impose a power limit on the fixed service in the band 55.78-56.26 GHz based on studies to date. Consequently it is proposed to maintain the current allocation table and address this matter through the development of appropriate ITU-R Recommendations.

NOC CAN/24/38

55.78-66 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
55.78-56.9	EARTH EXPLORATION-SATELLITE (passive) FIXED INTER-SATELLITE S5.556A MOBILE S5.558 SPACE RESEARCH (passive) S5.547 S5.557	

Proposals for agenda item 1.5

Agenda item 1.5: To consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution **122 (WRC-97)**.

Proposal to modify Resolution 122, high altitude platform stations in the fixed service

Background information

Resolution 122 (WRC-97), “Use of the bands 47.2-47.5 GHz and 47.9-48.2 GHz by high altitude platform stations in the fixed service and by other services”, instructs the Director of the Radiocommunication Bureau, that from 22 November 1997, to accept notices in the 47.2-47.5 GHz and 49.2-48.2 GHz only for high altitude platform stations in the fixed service and for feeder links for the broadcasting-satellite services pending review of sharing studies between co-primary services in the band. On the basis of studies conducted in ITU-R, it is appropriate to modify Resolution 122 (WRC-97) to take account of draft new Recommendation ITU-R [4-9S/AAX] that establishes the performance parameters for certain FSS antennas that can share with HAPS systems and to take account of the need for continued studies.

CAN/24/39

Canada supports the CITEL Inter-American proposal IAP/14/107 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposals for agenda item 1.6.1

Agenda item 1.6.1: Review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary.

Proposal to identify additional spectrum for IMT-2000

CAN/24/40

In addition to CAN/24/6 to CAN/24/13 (Document WRC2000/24, 16 February 2000), Canada also supports the Inter-American proposals IAP/14/108 to IAP/14/110 (Addendum 1 to Document WRC2000/14, 27 March 2000).

The CITEL Inter-American proposals IAP/14/108 to IAP/14/110 (Addendum 1 to Document WRC2000/14, 27 March 2000) indicate that the frequency range 1 710-1 885 MHz should be identified worldwide for additional spectrum for advance mobile applications in the context of IMT-2000. This is consistent with the Canadian proposal found in Document WRC2000/24, 16 February 2000.

Proposals for agenda item 1.10

Agenda item 1.10: To consider results of ITU-R studies carried out in accordance with Resolution **218 (WRC-97)** and take appropriate action on this subject.

Proposal to modify footnotes S5.353A and S5.357A

Background information

In order to accommodate AMS(R)S traffic, it would be necessary that all MSS systems using this spectrum, within a certain geographical area, be technically able to release all, or parts, of the spectrum to any MSS operator that has a requirement for priority 1 to 6 AMS(R)S traffic. The technical and operational requirements for achieving such transfer of AMS(R)S spectrum resources would have to be developed by ICAO and the MSS system operators, and then implemented by MSS operators according to agreed upon specifications. Only MSS systems compliant with these requirements should have access to the 10 MHz identified in S5.357A of paired generic MSS spectrum to ensure the availability of this spectrum to satisfy AMS(R)S priority 1 to 6 communications.

The proposed resolution is intended to replace Resolution 218 and calls for ITU-R to study and develop the technical and operational requirements and specifications for intra-system and inter-system prioritization and pre-emption methods.

CAN/24/41

Canada supports the CITEL Inter-American proposals IAP/14/112 to IAP/14/117 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposals for agenda item 1.13.1

Agenda item 1.13.1: To review and, if appropriate, revise the power limits appearing in Articles **S21** and **S22** in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services.

Modifications to Section II of Article S22 in relation to the sharing conditions among non-GSO FSS, FSS and GSO BSS services

Background information

Resolution 130 (WRC-97) and Resolution 538 (WRC-97) each requested ITU-R to conduct a) “appropriate technical, operational and regulatory studies” to review the regulatory conditions relating to the coexistence of non-GSO FSS and GSO FSS and GSO BSS systems, in order to ensure that undue constraints are not placed on the development of non-GSO FSS, GSO FSS and GSO BSS systems, and b) the development of a methodology for calculating the power levels produced by non-GSO FSS systems and the compliance of these levels with the applicable limits established pursuant to Resolutions 130 and 538. Joint Task Group 4-9-11 was established by ITU-R to pursue these mandates and to determine the necessary technical bases.

At CPM-99, a compromise was reached on a number of the key technical criteria that would provide adequate protection to GSO FSS and GSO BSS systems without unduly constraining non-GSO FSS systems. Many of the elements of this compromise are reflected in Chapter 3 of the CPM Report. The CPM Report recognizes, however, that there are other essential elements of the compromise package which have yet to be developed. CITEL has made proposals to address these other essential elements. Taking into account the work of ITU-R and CPM-99 on this matter, the following is proposed:

CAN/24/42

Canada supports the CITEL Inter-American proposals IAP/14/242 to IAP/14/268 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposed modifications to APS4

Background information

CPM-99, to facilitate introduction of non-GSO FSS systems while affording protection to GSO FSS and BSS, agreed to three types of $efpd_{down}$ limits. These are: validation limits, to be verified by the Radiocommunication Bureau using an agreed software tool; operational limits, to provide operational GSO earth stations protection from synchronization loss; and additional operational limits to ensure protection to operational 3 m and 10 m. GSO FSS earth stations operating in the 10.7-12.75 GHz bands. The operational limits, which are single values for 100 per cent of the time, provide an opportunity for development of regulatory procedures to be implemented by the BR which would afford GSO systems a means of redress in the event such limits are exceeded by non-GSO FSS systems. The additional operational limits are specified values associated with periods of time. Such limits, as with the operational limits, must be met in practice, by each non-GSO FSS system. With regard to the additional operational $epfd_{down}$ limits, an administration proposing a non-GSO FSS system would have to commit that the proposed system will meet these additional operational limits. The administrations propose that this requirement be met by the inclusion of an additional data entry in Appendix S4.

CAN/24/43

Canada supports the CITEL Inter-American proposals IAP/14/269 to IAP/14/270 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Revisions to Articles S9, S11 and Appendix S5 for non-GSO systems which are subject to S22.2

Proposals for advanced publication under Article S9

Background information

In order to provide for the advanced publication of information for non-GSO systems, a new footnote is required for Article S9, Sub-Section IB, and a reference point for this footnote added to No. S9.5B.

CAN/24/44

Canada supports the CITEL Inter-American proposals IAP/14/271 to IAP/14/276 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Additions and/or modifications to Articles S9, S11, S22 and Appendices S4 and S5 to require coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antenna

Background information

WRC-97 adopted provisional power flux-density limits in certain frequency bands which would apply to non-GSO FSS systems to protect GSO FSS networks, and GSO BSS networks. Resolution 130 (WRC-97), *Use of non-geostationary systems in the fixed-satellite service in certain frequency bands*, and Article S22 of the Radio Regulations contain limits corresponding to an interference level caused by one non-GSO system in the frequency bands 10.7-12.75 GHz, 17.8-18.6 GHz, and 19.7-20.2 GHz. Studies demonstrate that neither the WRC-97 provisional $epfd_{down}$ limits and associated percentages of time nor the proposed modifications agreed during ITU-R studies adequately protect existing GSO FSS networks with very large earth station antennas. Section 3.1.2 of the CPM Report for WRC-2000 concludes that transmissions to earth stations with very large antennas need to be protected and that an additional regulatory procedure would be necessary. Coordination triggers based on the characteristics of the satellite network using the GSO were agreed by ITU-R and confirmed by CPM-99. In addition to the GSO network triggers, it was decided to include the condition of the $epfd_{down}$ radiated by the non-GSO FSS system. CPM-99 decided that two values would be needed in each band and that exceeding either $epfd_{down}$ value would trigger coordination. WP 4A completed the studies on the $epfd_{down}$ thresholds to trigger coordination. Annex 3 to Chapter 3 of the CPM Report contains example regulatory and procedural text and the coordination triggers agreed by WP 4A. Building on the CPM Report text, this proposal includes additions and/or modifications to Articles S9, S11 and S22 and Appendices S4 and S5 to require coordination between non-GSO FSS transmitting space stations and GSO receive earth stations with very large earth station antennas.

CAN/24/45

Canada supports the CITEL Inter-American proposals IAP/14/277 to IAP/14/286 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where epfd limits have been adopted

Background information

ITU-R and CPM-99 agreed that “[t]here is a need to provide a regulatory mechanism that would ensure protection of GSO FSS and GSO BSS networks from the maximum aggregate equivalent power flux-density produced by multiple non-GSO FSS systems in frequency bands where equivalent power flux-density (epfd) limits have been adopted.", see CPM-99 Report, section 3.1.1.3.2. With respect specifically to the GSO BSS, section 3.1.3.3 of the CPM-99 Report to WRC-2000 states that "[t]here is a need to ensure that the aggregate epfd produced by all co-frequency non-GSO FSS systems does not exceed the maximum interference levels, as determined by the agreed to aggregate epfd masks, that are necessary to protect these GSO BSS systems." This agreement can be implemented by including aggregate $epfd_{down}$ limits annexed to a WRC-2000 resolution. Such a resolution is proposed below based on the agreement reached within ITU-R.

In addition to the single-entry $epfd_{down}$ limits (validation, operational and additional operational), CPM-99 agreed that a mechanism was needed which would provide assurance to GSO FSS and GSO BSS systems that the aggregate interference from all non-GSO FSS systems would not exceed that determined as an acceptable level. Aggregate validation limits had already been developed within ITU-R based on the single-entry validation limits and are contained in Table WWW-1A to WWW-1D below.

Canada is supporting the IAP proposal for the aggregate epfd down levels. Canada is making proposals regarding the suppression of Resolutions 130 and 538. As a result, there would be a need to review and revise the changes made in IAP/14/287 from the CPM text.

CAN/24/46

Canada supports the CITEL Inter-American proposal IAP/14/287 (Addendum 1 to Document WRC2000/14, 27 March 2000) noting the comments in the background information.

Proposed new Section VII for Article S15

Background information

The CPM-99 Report indicated the need for regulatory procedures to implement the operational and additional operational $epfd_{down}$ limits which identify non-GSO systems exceeding the operational/additional operational limits and ensure immediate reduction of the interference level to the operational/additional operational limits by any non-GSO system exceeding those limits. CITEL Administrations in IAP/14/288 identified certain options for possible procedures, which would form a new Section VII to Article S15. This additional proposal puts forward one of the options of IAP/14/288 which involves removal of S15.60 and revision to S15.59.

Canada proposes to modify the CITEL Inter-American proposal IAP/14/288 (Addendum 1 to Document WRC2000/14, 27 March 2000) as follows:

ARTICLE S15

Interferences

ADD CAN/24/47

Section VII – Assuring compliance with operational limits and additional operational limits in Article S22

S15.47 § 35 When an administration identifies $epfd_{down}$ levels in excess of the applicable operational $epfd_{down}$ limits or additional operational $epfd_{down}$ limits of Tables **S22-4A** and **S22-4B**

and footnote 3 to Table **S22-1D** of the Radio Regulations, it shall first attempt to identify the source of the excess $\text{epfd}_{\text{down}}$ levels.

S15.48 § 36 If the administration operating the affected geostationary-satellite network is able to identify the source of the excess $\text{epfd}_{\text{down}}$ interference, the administration may proceed to No. **S15.56** below.

S15.49 § 37 An administration that is unable to determine the source of the excess $\text{epfd}_{\text{down}}$ interference it is experiencing, shall, send a request for cooperation to all administrations operating non-geostationary fixed-satellite service systems in the band(s) where excess $\text{epfd}_{\text{down}}$ interference was experienced. The request should provide all relevant details, such as the location and operating frequencies of the affected geostationary earth station, and provide the dates, times, and, if available, levels of the excess $\text{epfd}_{\text{down}}$ interference experienced. A copy of the request shall be sent concurrently to the Bureau and to the non-GSO FSS operators, where possible.

S15.50 § 38 Each administration receiving the request shall acknowledge receipt, within five days. The administration receiving the request is urged to provide, with its acknowledgement, any information that may be used to identify the source of the excess $\text{epfd}_{\text{down}}$ interference. A copy of the acknowledgment and associated information shall be provided concurrently to the Bureau.

S15.51 § 39 If any administration fails to respond to a request made within five days, the Bureau shall send, by the close of the next business day, each such non-responding administration the acknowledgment called for in No. **S15.50** to be provided within three days thereafter. The Bureau shall provide copies of the request to the requesting administration and all recipients of the initial request.

S15.52 § 40 Once an administration has acknowledged receipt of the request made in No. **S15.49** above, it shall, within an additional three days thereafter, provide the requesting administration, the Bureau, and all other recipients of the initial request pursuant to No. **S15.49** above either with an admission that a non-geostationary fixed-satellite service system for which it is responsible is the cause of the excess $\text{epfd}_{\text{down}}$ interference or with information indicating that no non-geostationary fixed-satellite service system for which it is responsible could have caused the excess $\text{epfd}_{\text{down}}$ interference experienced by the network of the requesting administration.

S15.53 § 41 If any administration receiving a request pursuant to No. **S15.51** above fails to respond within the specified three-day period, the Bureau shall immediately include the following statement in the "Remarks" column of the Master Register for the relevant frequency assignments for the subject non-geostationary fixed-satellite service system: "The use of these frequency bands by [name of system/name of administration] is the subject of an unresolved complaint of excess interference."

S15.54 § 42 The statement shall remain in the Master Register until such time as the responsible administration either provides information pursuant to No. **S15.52** above indicating that its non-geostationary fixed-satellite system is not the cause of the excess interference or, if it is the source of the excess $\text{epfd}_{\text{down}}$ interference, that it has complied with the obligations set forth in **S15.57**. The Bureau shall include notice of this entry in the Master Register in the Weekly Circular.

S15.55 § 43 If any administration fails to provide a timely and complete response pursuant to No. **S15.51** above, the remedial measures of Nos. **S15.52** and **S15.53** shall apply.

S15.56 § 44 Once the source of the excess $\text{epfd}_{\text{down}}$ interference has been identified, the administration operating the affected GSO satellite network shall, inform the administration operating the non-geostationary fixed-satellite service system causing the excess interference of the excess, and request immediate corrective action. The notification/request for corrective action should provide all relevant details such as the amount and source of the excess $epfd_{down}$ interference received, and shall be copied to the Radiocommunication Bureau.

S15.57 § 45 Upon receipt of a request for corrective action made pursuant to No. **S15.56** above, the administration operating the non-geostationary fixed-satellite service system causing the excess interference shall immediately reduce emissions of the subject system to the levels required in Table **S22-4A** or Table **S22-4B** or footnote 3 to Table **S22-1D**, as appropriate, and, within five days of receipt of the request, so advise the administration whose network is affected. A copy of the acknowledgement and confirmation of the action taken shall be sent to the Bureau.

S15.58 § 46 Within five days after receipt of a request for corrective action made pursuant to No. **S15.56** above, in cases where the procedures in Nos. **S15.49** through **S15.55** above had not previously been applied, the administration receiving the request may, as an alternative to reducing emissions in the manner set forth in No. **S15.57**, provide the requesting administration and the Bureau with information indicating that no non-geostationary fixed-satellite service system for which it is responsible could have caused the excess $epfd_{down}$ interference experienced by the network of the requesting administration. In such a case, the procedures in Nos. **S15.49** through **S15.55** shall be applied.

S15.59 § 47 If any administration fails to comply with No. **S15.57** above, the Bureau shall request that administration to take steps immediately to reduce the emissions of its non-GSO system to a level that is within the limits contained in Tables **S22-4**.

Reasons: The procedures provide a means to assure compliance by non-GSO systems with the operational limits contained in Table S22-4.

Proposed suppression of Resolution 130 (WRC-97)

Background information

The proposals below are submitted since the limits in the Annex to this Resolution have been revised and are to be included in Article S22 and Article S5 has been modified to reflect the remaining provisions of Resolution 130.

CAN/24/48

Canada proposes the suppression of Resolution 130 and its associated Annex 1 as proposed in IAP/14/289 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Suppression of Resolution 538 (WRC-97)

Background information

The proposals below are submitted since the limits in the Annex to this Resolution have been revised and are to be included in Article S22 and Article S5 has been modified to reflect the remaining provisions of Resolution 538.

CAN/24/49

Canada proposes the suppression of Resolution 538 and its associated Annex 1 as proposed in IAP/14/290 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposed modifications to Article S5 to reflect the provisions of Resolutions 130 and 538

ARTICLE S5

MOD CAN/24/50

S5.441 The use of the bands 4 500-4 800 MHz (space-to-Earth), 6 725-7 025 MHz (Earth-to-space) by the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by a non-geostationary-satellite systems in the fixed-satellite service ~~shall be in accordance with the provisions of Resolution **130 (WRC-97)**~~is subject to the application of the provisions of MOD **S9.10** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. In these bands, non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service.

MOD CAN/24/51

S5.484A The use of the bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 13.75-14.5 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), 29.5-30 GHz (Earth-to-space) by a non-geostationary~~- and geostationary~~-satellite system~~s~~ in the fixed-satellite service is subject to application of the provisions of ~~Resolution **130 (WRC-97)**. The use of the band 17.8-18.1 GHz (space-to-Earth) by non-geostationary fixed-satellite service systems is also subject to the provisions of Resolution **538 (WRC-97)**~~MOD **S9.10** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. In these bands, non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service.

MOD CAN/24/52

S5.487A *Additional allocation:* in Region 1, the band 11.7-12.5 GHz, in Region 2, the band 12.2-12.7 GHz and, in Region 3, the band 11.7-12.2 GHz, are also allocated to the fixed-satellite service (space-to-Earth) on a primary basis, limited to non-geostationary systems and subject to the application of the provisions of ~~Resolution **538 (WRC-97)**~~MOD **S9.10** for coordination between non-geostationary-satellite systems in the fixed-satellite service. In these bands, non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from GSO networks in the broadcasting-satellite service.

MOD CAN/24/53

S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2 by non-geostationary-satellite systems in the fixed-satellite service is subject to the provisions of ~~Resolution **538 (WRC-97)**~~MOD **S9.10** for coordination between non-geostationary-satellite systems in the fixed-satellite service. In these bands, non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service. The use of the band 17.3-17.8 GHz in Region 2 by systems in the fixed-satellite service (Earth-to-space) is limited to geostationary satellites.

Reasons: These modifications to Article S5 are to replace the references to Resolutions 131 and 538 with references to MOD S9.10 in Article S9. Additional text on No. S5.516 to clarify the intent that there is no allocation in the band 17.3-17.8 GHz in Region 2 for non-GSO FSS (Earth-to-space). The possibility of an allocation was to be based on sharing studies between the non-GSO FSS and the existing and planned services. Studies show that sharing between radiolocation stations and non-GSO FSS networks and non-GSO FSS networks is not feasible due to severe interference from operational radiolocation stations and these services are not compatible. In addition, the band 17.3-17.8 GHz in Region 2 is allocated to BSS beginning 1 April 2007. Studies show that transmit non-GSO FSS earth stations are not compatible with receive BSS earth stations.

Methodologies for ensuring compliance with operational and additional operational $\mathbf{epfd_{down}}$ limits

Background information

CPM-99, to facilitate introduction of non-GSO FSS systems while affording protection to GSO FSS and BSS, agreed to three types of $epfd_{down}$ limits. These are: validation limits, to be verified by the Radiocommunication Bureau using an agreed software tool; operational limits, to provide operational GSO earth stations protection from synchronization loss; and additional operational limits to ensure protection to operational 3 m and 10 m GSO FSS earth stations operating in the 10.7-12.75 GHz bands. The operational limits, which are single values for 100 per cent of the time, provide an opportunity for development of regulatory procedures to be implemented by the BR which would afford GSO systems a means of redress in the event such limits are exceeded by non-GSO FSS systems. The additional operational limits are specified values associated with periods of time. Such limits, as with the operational limits, must be met in practice, by each non-GSO FSS system.

With regard to both the operational limits and the additional operational limits, ITU-R has initiated studies on how to ascertain whether these limits are exceeded. At the recent meeting of WP 4A (20-29 February 2000), a preliminary draft new recommendation was developed concerning measurement techniques which can be used to determine if the operational limits are exceeded into operating GSO earth stations. As for the additional operational limits, preliminary views of WP 4A are that such limits cannot be measured, but rather, a detailed computer simulation of an non-GSO FSS system, utilizing operational assumptions, including traffic distribution and beam loading is required. Work is continuing in both these areas. Proposed Resolution CEA (WRC-2000) is responding to this requirement.

ADD CAN/24/54

RESOLUTION CEA (WRC-2000)

Development of methodologies for assuring compliance by non-geostationary satellite systems in the fixed-satellite service in certain frequency bands with the operational epfd$_{down}$ and additional operational epfd$_{down}$ limits in Article S22

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-2000 adopted a number of epfd limits that apply to non-geostationary-satellite systems in the fixed-satellite service in certain frequency bands between 10.7 and 30.0 GHz;

b) that compliance with the validation epfd limits adopted by WRC-2000 will be verified by the Radiocommunication Bureau before a non-geostationary fixed-satellite service system would be eligible for a favourable finding under the procedures in Article **S11** of the Radio Regulations;

c) that the operational epfd$_{down}$ limits and additional operational epfd$_{down}$ limits adopted by WRC-2000 in No. **S22.5G** of the Radio Regulations and associated Tables **S22-4A** and **S22-4B** and footnote 3 to Table **S22-1D** apply only to operational non-geostationary fixed-satellite service systems, and compliance with these limits is not subject to validation by the Radiocommunication Bureau in order for a non-geostationary fixed-satellite service system to receive a favourable finding under the procedures in Article **S11** of the Radio Regulations;

d) that the operational epfd$_{down}$ limits and the additional operational epfd$_{down}$ limits provide protection from unacceptable interference to operational geostationary fixed-satellite service and broadcasting-satellite service networks from co-frequency non-geostationary fixed-satellite service systems in the subject frequency bands;

e) that administrations operating geostationary fixed-satellite service and/or broadcasting-satellite service networks in frequency bands where operational epfd$_{down}$ limits and/or additional operational epfd$_{down}$ limits have been established require reliable means of ascertaining that operational non-geostationary fixed-satellite service systems are in compliance with the applicable limits;

f) that administrations operating non-geostationary fixed-satellite service systems in frequency bands where operational epfd$_{down}$ limits and/or additional operational epfd$_{down}$ limits have been established require reliable means of ascertaining the validity of assertions from administrations operating geostationary fixed-satellite service and/or broadcasting-satellite service systems that a particular non-geostationary fixed-satellite service system is operating in violation of the applicable limits;

g) that studies within ITU-R are an appropriate means for developing the methodologies and/or associated assessment techniques that administrations may use to ascertain compliance by a non-geostationary fixed-satellite service system with the operational $epfd_{down}$ limits and additional operational $epfd_{down}$ limits,

recognizing

a) that geostationary-satellite networks in the fixed-satellite service and broadcasting-satellite service are operational or will be operational in the frequency bands where operational $epfd_{down}$ limits and additional operational $epfd_{down}$ limits apply, and that non-geostationary fixed-satellite service systems subject to the limits are planned for operation in the same bands;

b) that No. **S22.5F** provides that non-geostationary fixed-satellite service system for which complete notification or coordination information, as appropriate, has been received by the Bureau after 21 November 1997 shall be subject to the power limits in Article **S22**, as adopted by WRC-2000;

c) that pursuant to No. **S22.5G** of the Radio Regulations, any exceedance of the operational $epfd_{down}$ limits or additional operational $epfd_{down}$ limits by a non-geostationary fixed-satellite service system to which the limits apply is a violation of No. **S22.2** of the Radio Regulations;

d) that in view of the importance of the protection that the operational $epfd_{down}$ limits and additional operational $epfd_{down}$ limits are intended to provide to geostationary-satellite networks, and because there is to be no validation by the Bureau of compliance with these limits, it is important to discourage violations of the operational $epfd_{down}$ limits and additional operational $epfd_{down}$ limits by a non-geostationary fixed-satellite service system; if a violation nevertheless occurs, it should be corrected in the most expeditious manner,

resolves to instruct ITU-R

1 to study as a matter of urgency, and develop methodologies that will permit administrations operating geostationary fixed-satellite service, geostationary broadcasting-satellite service, or non-geostationary fixed-satellite service networks in the frequency bands to which the operational $epfd_{down}$ limits and/or additional operational $epfd_{down}$ limits in Article **S22** apply:

a) to assess the interference levels (through either measurement or simulation) produced by operational non-geostationary fixed-satellite service systems in the same bands;

b) to ensure that non-geostationary fixed-satellite service systems comply with the applicable limits; and

c) to develop appropriate methods, such as software tools, to be used by administrations in determining whether a proposed non-geostationary fixed-satellite service system complies with the additional operational limits;

2 to develop, as a matter of urgency, an appropriate mechanism and format for administrations operating non-GSO FSS systems to make available their satellite ephemeris data and update such data on a regular basis.

Proposed modifications to Section VI of Article S22

Background information

The CPM Report contains options to deal with earth stations off-axis e.i.r.p. limits. WRC-97 adopted such limits in Article S22, Section VI, for parts of the frequency band 12.75-14.5 GHz. These provisions, however, were suspended pending the review of these limits by WRC-2000. Canada proposes the suppression of Section VI of Article S22.

ARTICLE S22

Space services[1]

MOD CAN/24/54*bis*

Section VI – Earth station off-axis power limitations in the fixed-satellite service~~11~~

MOD CAN/24/55

S22.26 § 9 ~~The level of equivalent isotropically radiated power (e.i.r.p.) emitted by an earth station shall not exceed the following values for any off-axis angle φ which is 2.5° or more off the main-lobe axis of an earth station antenna:~~The level of equivalent isotropically radiated power (e.i.r.p.) emitted by an earth station at angles in all directions off the main beam axis has a significant impact on interference caused to other geostationary-satellite networks and non-geostationary-satellite networks. Enhanced utilization and easier coordination would be attained by minimizing such off-axis radiation and administrations are encouraged to achieve the lowest values practicable bearing in mind the latest ITU-R Recommendations. Minimizing such levels is particularly important in intensively used uplink bands.

~~*Off-axis angle*~~	~~*Maximum e.i.r.p.*~~
~~2.5° ≤ φ ≤ 7°~~	~~(39 – 25 log φ) dB(W/40 kHz)~~
~~7° < φ ≤ 9.2°~~	~~18 dB(W/40 kHz)~~
~~9.2° < φ ≤ 48°~~	~~(42 – 25 log φ) dB(W/40 kHz)~~
~~48° < φ ≤ 180°~~	~~0 dB(W/40 kHz)~~

SUP CAN/24/56

S22.27 to S22.29

SUP CAN/24/57

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[11] S22.VI.1

Reasons: Canada proposes a hybrid approach of Options 1 and 3 from Annex 7 to Chapter 3 of the CPM Report. Under the hybrid approach, sections S22.27 through S22.29 of Section VI of Article S22 would be suppressed. Additionally, section S22.26 would be modified to indicate that administrations operating GSO FSS networks should comply with the e.i.r.p. density levels contained in the appropriate Recommendation. The advantage to this approach is that, as technology evolves, it allows ITU-R recommended levels to be assessed and modified within ITU-R in a timely manner. Further, it points administrations to the technical guidelines that have been developed within ITU-R. At the same time, it provides guidance to the non-GSO FSS designer on the level of interference from co-frequency GSO FSS systems that would be present.

Proposals for agenda item 1.15.1

Agenda item 1.15.1: To consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments.

Proposal for RNSS allocation (space-to-Earth) in the upper part of the band 960-1 215 MHz

Background information

Additional radionavigation-satellite service (RNSS) signals will greatly enhance the accuracy, reliability and robustness of the civil global positioning system (GPS) by enabling more effective corrections to be made for the time delay effects of the ionosphere on the signals from space. The International Civil Aviation Organization (ICAO) has stated the requirement for an additional civil signal to support global navigation satellite system (GNSS) requirements and for space-based augmentation systems. A requirement for aeronautical users is to have the protected signal operate within radio spectrum allocated to the aeronautical radionavigation service (ARNS), which would also include the possibility of terrestrial augmentation systems.

However, studies show that airborne RNSS receivers at altitudes of 10 000 ft and above may not be compatible with the existing environment in certain geographic areas. The band 1 151-1 215 MHz has been identified by CITEL to accommodate additional spectrum for an international civil aviation safety-of-life service. The DME/TACAN constitutes the primary source of interference but because of its importance to civil aviation navigation, it must be protected for continued use for the foreseeable future.

Sharing of the same spectrum by two or three different RNSS networks would require compatible power levels and signal types in the design and operation of the different networks. Use of independent spectrum by each RNSS network would decrease the chance of a single interference incident affecting more than one network. Therefore, the allocation should accommodate the spectrum requirement of two or three different RNSS systems.

Canada supports the CITEL proposal for a new allocation to RNSS in the band 1 164-1 212 MHz with appropriate regulatory measures to protect the current use and the development of airborne electronic aids to air navigation and any directly associated ground-based facilities.

CAN/24/58

Canada supports the CITEL Inter-American proposals IAP/14/125 to IAP/14/126 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposal for RNSS allocation (space-to-Earth) in the upper part of the band 1 260-1 300 MHz

Background information

The band 1 260-1 300 MHz is allocated on a primary basis to the radiolocation, to the Earth exploration-satellite (active) and to the space research (active) services. Domestic footnotes allocate this band on a primary basis in several countries to the fixed and mobile services and to the radionavigation service. In Canada and the United States, the band 1 240-1 300 MHz is also allocated to the aeronautical radionavigation service on a primary basis. The band 1 260-1 300 MHz is also allocated to the amateur service on a secondary basis.

Footnote S5.282 allows the use of the amateur-satellite service (Earth-to-space) on a non-protection no-interference basis with respect to other services operating in this band in accordance with the table (see S5.43). The usage of this band by the amateur satellite service is expected to increase.

Similar to the band 1 215-1 260 MHz, the band 1 260-1 300 MHz is used by radars. Furthermore, this band is used for high-power wind profiler radars. It is not suitable for safety of life applications, similarly to the RNSS usage in the band 1 215 to 1 260 MHz.

Canada supports the CITEL proposal regarding a new allocation in the band 1 260-1 300 MHz, (space-to-Earth) for RNSS non-safety-of-life applications.

CAN/24/59

Canada supports the CITEL Inter-American proposals IAP/14/127 to IAP/14/128 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposal for RNSS (Earth-to-space) 5 000-5 010 MHz and (space-to-Earth) 5 010-5 030 MHz

Background information

In accordance with the ITU Radio Regulations, the band 5 000-5 250 MHz is allocated on a primary basis to the aeronautical radionavigation service in all three ITU Regions. The band 5 000-5 030 MHz is not used nor intended to be used for the international standard MLS system.

Results of ITU-R studies show that with the 10 MHz of separation and the use of adequate and existing filter technology by the RNSS, the protection requirements of the radio astronomy service as contained in Recommendation ITU-R RA.769-1 are met.

The use of RNSS (space-to-Earth) is compatible with the MLS operations in the band 5 030-5 150 MHz if the pfd at the surface of the Earth does not exceed –124.5 dB(W/m^2), in a 150 kHz band, as specified by ICAO. The use of RNSS (Earth-to-space) is compatible with the MLS operations through careful location of the radiobeacons.

Canada supports the CITEL proposal regarding the allocation to RNSS in the band 5 010-5 030 MHz (space-to-Earth), and the allocation to RNSS in the band 5 000-5 010 MHz (Earth-to-space).

CAN/24/60

Canada supports the CITEL Inter-American proposals IAP/14/129 to IAP/14/131 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposal for RNSS (Earth-to-space) in the band 1 300-1 350 MHz

Background information

The band 1 300-1 350 MHz is allocated worldwide on a primary basis to the aeronautical radionavigation service and on a secondary basis to the radiolocation service. New allocations for RNSS are required to support developments and some proposed RNSS systems would require a limited number of terrestrial radio beacons for synchronization. Footnote S5.149 indicates spectral line observations by the radio astronomy service and that precautions should be taken to protect the RA service from harmful interference.

Careful location of the radiobeacons should protect the RA astronomy service.

Results of ITU-R studies show that the required separation distance between radars and terrestrial beacons would be less than 60 km to protect the radars.

By making the radiolocation allocation primary, equal status would be given to both the RNSS (Earth-to-space) and the radiolocation radars, which would need to be coordinated. A footnote would preserve the higher status of the aeronautical radionavigation service.

CAN/24/61

Canada supports the CITEL Inter-American proposals IAP/14/132 to IAP/14/133 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposals for agenda item 1.15.2

Agenda item 1.15.2: To consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the bands 1 215-1 260 MHz and 1 559-1 610 MHz.

Proposal for the addition of a space-to-space direction to the RNSS allocations in the bands 1 215-1 260 MHz and 1 559-1 610 MHz

Background information

Canada supports the Inter-American proposals (IAP/14/134-135) on this agenda item. This proposal is intended to clarify the implementation aspect of the IAP proposals.

The IAP recognizes that no additional protection for spaceborne receivers will be required for the reception of signals from radionavigation satellites. However, it does not include any regulatory provisions in Article S5 to reflect this understanding. Consequently, Canada is proposing a new footnote to ensure that the RNSS (space-to-space) service does not impose additional constraints on the mobile satellite service operating in adjacent bands.

CAN/24/62

Canada supports the CITEL Inter-American proposals IAP/14/134 to IAP/14/135 (Addendum 1 to Document WRC2000/14, 27 March 2000).

In addition, Canada proposes the following:

MOD CAN/24/63

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 559-1 610	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) (space-to-space) S5.341 S5.355 S5.359 S5.363 ADD S5.XYZ	

ADD CAN/24/64

S5.XYZ Space-borne radionavigation receivers operating in the 1 559-1 610 MHz shall not impose additional constraints on the use of the bands 1 525-1 559 MHz and 1 610-1 660.5 MHz by systems in the mobile-satellite service.

Reasons: Provide an allocation for space-to-space use for RNSS while not imposing additional constraints on MSS stations in the bands 1 610-1 660.5 MHz and 1 525-1 559 MHz.

Proposals for agenda item 1.16

Agenda item 1.16: To consider allocation of frequency bands above 71 GHz to the Earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution **723 (WRC-97)**.

Proposal to modify the allocations of frequency bands above 71 GHz

Background information

Canada has reviewed the requirements of the passive and active services in the frequency bands above 71 GHz. This review included specific Canadian requirements, the requirements of the international EES, SR and RA communities and the spectrum needs of the active services. Based on this review, Canada supports the CITEL Inter-American proposals IAP/14/137 to IAP 14/228.

Canada recognizes that the requirements of the active services in this range of the spectrum are not well defined and it is expected that they will not be known until the technology for these frequency bands matures. To ensure accommodation of the spectrum needs of the active services requirements when they become known, Canada supports the adoption of Resolutions XXX (WRC-2000) and YYY (WRC-2000) as shown in the CITEL Inter-American proposals. These Resolutions recognize the need for future world radiocommunication conferences to review and revise as appropriate the allocations above 71 GHz in order to meet the requirements of the active services. In addition, these Resolutions request ITU-R to develop means of equitably distributing the burden of sharing among the active and passive services.

CAN/24/65

Canada supports the CITEL Inter-American proposals IAP/14/137 to IAP/14/228 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposals for agenda item 1.19

Agenda item 1.19: To consider the report of the Inter-conference Representative Group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system.

Ensuring the protection of other radiocommunication services and Region 2 BSS against interference from any revisions to the Regions 1 and 3 Plan, and not requiring these services to provide greater protection to Regions 1 and 3 BSS than at present

Background information

WRC-97 updated the Regions 1 and 3 BSS and feeder-link Plans, including the relevant technical criteria, and provided assignments for all new countries. However, there was general dissatisfaction with the number of channels assigned (five for Region 1 and four for Region 3). The new replanning is intended to provide for each Region 1 and 3 country an amount of spectrum that permits the economical development of BSS systems.

To prepare for this, WRC-97 adopted Resolution 532, which created the IRG (Inter-conference Representative Group) and the associated GTE (Group of Technical Experts). The same Resolution specified in Annex 1 the principles that will govern the studies of the IRG and GTE. The IRG and GTE studied the feasibility of increasing to around ten the number of 27 MHz channels per country provided in the WRC-97 Plan for Regions 1 and 3. Under agenda item 1.19 as originally adopted at WRC-97, WRC-99 (now WRC-2000) would then use the results of the IRG/GTE studies to decide whether or not a subsequent WRC should revise the WRC-97 Plan.

However, the 1998 meeting of ITU Council amended agenda item 1.19 to its present form. The goal of “around ten channels” was replaced by “an amount of spectrum that permits the development of an economical BSS system”. And the purpose of the IRG/GTE studies was changed from determining the feasibility of the goal, to providing the basis for a subsequent conference to construct a new Plan. Nonetheless, the IRG/GTE planning studies are still constrained to observe the eight “principles” set forth in Annex 1 to Resolution 532, including those intended to ensure compatibility with other services and to preserve the integrity of the Region 2 Plan.

These guiding principles (see Annex 1 to Resolution 532) include the following:

7 Ensure that the integrity of the Region 2 Plan and its associated provisions is preserved, by providing the same protection to the assignments contained in those Plans as is now received under the relevant provisions of the Radio Regulations, and by not requiring more protection from assignments in the Region 2 Plan than that currently provided under the Radio Regulations.

8 Ensure compatibility between the BSS in Regions 1 and 3 and services having allocations in the planned bands in all three Regions.

At the final IRG meeting a report was prepared on the results of the technical, planning feasibility and regulatory studies. This report will be submitted by the Director, BR, to WRC-2000.

CAN/24/66

Canada supports the CITEL Inter-American proposal IAP/14/229 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Annex 7 to Appendix S30. Ensuring continued future access for Region 2 FSS networks to the GSO arc segment 37° W to 10° E in the band 11.7-12.2 GHz as currently provided by Annex 7 of Appendix S30

Background information

In addition to inviting ITU-R to study the technical possibilities for increasing the minimum capacity assigned to all Region 1 and 3 countries in the BSS Plan for those Regions, Resolution 532 (WRC-97) requested the IRG "to examine Annex 7 [of Appendix S30/30] in the light of its studies for possible revision of the BSS Plans and with respect to the decisions taken by WRC-97, such as the reduction of the downlink e.i.r.p." In response, the IRG and its associated Group of Technical Experts (GTE) examined Annex 7 in considerable detail.

The examination focused principally on Section A 3) of Annex 7, quoted here in its entirety.

"Any new orbital position in the Regions 1 and 3 Plan in the range of the orbital arc between 37° W and 10° E associated with a new assignment, or resulting from a modification of an assignment in the Plan, shall be coincident with, or within 1° to the east of, a nominal orbital position in the Region 1 and 3 Plan at the date of entry into force of the Final Acts of the 1977 Conference (in force on 1 January 1979).

In the event of a modification to an assignment in the Regions 1 and 3 Plan, the use of a new nominal orbital position not coincident with any nominal orbital position in the Plan at the date of entry into force of the Final Acts of the 1977 Conference (in force on 1 January 1979) shall involve an 8 dB reduction in the e.i.r.p. compared to that appearing in the Regions 1 and 3 Plan for the assignment before modification."

The need for such restrictions was agreed at WARC SAT-77 to take four facts into account: a) the band 11.7-12.2 GHz is allocated on a primary basis to the FSS in Region 2, the BSS in Regions 1 and 3, and the terrestrial services (FS, MS, and BS) in all three Regions; b) the GSO arc segment 37° W to 10° E is of common interest to the Region 2 FSS and the Region 1 BSS; c) the BSS Plan adopted at WARC SAT-77 utilized "nominal orbital positions" at regular 6° intervals beginning with, and moving eastward from, 37° W; and, d) in 1977, the e.i.r.p. of a typical FSS satellite was over 20 dB lower than that assumed for the BSS satellites in the Plan.

One obvious consequence was that, in order to serve Region 2 from the orbital arc in question, future FSS systems would necessarily have to operate from positions between adjacent BSS orbital positions in the Plan. Technical studies at WARC SAT-77 showed that, for an FSS network serving eastern South America and a BSS Plan assignment serving western Africa, such operation required a minimum orbital separation of about 2.5° between the FSS and the BSS satellites. Accordingly, the first paragraph of Section A 3) ensures that future additions to the BSS Plan will not reduce the separation between adjacent BSS positions below 5°.

Another consequence was that, to facilitate sharing with both terrestrial services and the Region 2 FSS, it would be desirable to use lower satellite e.i.r.p. for additions to the BSS Plan at positions different from those in the original Plan. For this reason, the second paragraph of Section A 3) of Annex 7 specifies an 8 dB e.i.r.p. reduction when the Plan modification involves a new orbital position. It should be noted that this constraint is not confined to the arc 37° W to 10° E.

The technical examination by ITU-R of the orbital position and e.i.r.p. constraints of Annex 7 led to the following main conclusions:

1) Despite the fact that the technical characteristics of both FSS and BSS networks have changed considerably since 1977 (higher e.i.r.p.s and smaller antennas for the FSS; lower e.i.r.p.s and even smaller antennas for the BSS; the use of digital modulation,

lower system noise temperatures, and antennas with improved side lobe levels in both), all of the technical studies conclude that the worst-case minimum required separation between a Region 2 FSS and a Region 1 BSS satellite remains at about 2 to 2.5°.

2) With the general reduction of 5 dB in the satellite e.i.r.p. assumed in revising the original BSS Plan at WRC-97, the 8 dB reduction for in the second paragraph of Section A 3) of Annex 7 is no longer required to protect the terrestrial services.

3) The sharing criteria of Annex 1 of Appendix S30 (for protecting Region 2 FSS networks that have been notified or are in coordination from modifications to the Regions 1 and 3 Plans) and the corresponding criteria of Annex 4 of Appendix S30 (to protect the Plan from new Region 2 FSS systems) are not, in themselves, sufficient to ensure either access by Region 2 FSS networks or appropriate interference protection to both FSS and BSS in the orbital arc 37° W to 10° E.

4) The results of the IRG planning feasibility studies demonstrated that compliance with the Annex 7 orbit position limitations was not a barrier to the successful elaboration of a Plan for Regions 1 and 3 providing the desired 10 channels for each country (12 channels for Region 3 countries).

In addition to the foregoing technical conclusions, it was observed that, although the countries of North America have made heavy use of the GSO at positions west of about 60° W for FSS networks providing national coverage, the countries of South America have not yet made significant use of more easterly orbital positions. Indeed, although several planned “international” FSS networks include the 11.7-12.2 GHz band at positions in the orbital arc identified in Annex 7, only one such network is in operation, and none of them seek to use the full band or to offer a representative range of services. It can therefore be argued that, just as the WRC-97 Plan provides long-term guarantees of orbit-spectrum access for national-coverage BSS systems for the developing countries of Regions 1 and 3, the developing countries of Latin America continue to need provisions that will allow them to implement future national or multinational FSS systems. The need for such provisions is probably greater today than it was in 1977 precisely because of the heavy FSS use of more westerly orbital positions.

CAN/24/67

Canada supports the CITEL Inter-American proposals IAP/14/295 to IAP/14/298 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposals for agenda item 1.19*bis*

Agenda item 1.19*bis*: In accordance with Article S14, to consider objections expressed by administrations with respect to the Radio Regulations Board’s Rules of Procedure relating to the application of RR 2674/S23.13 in order for the Bureau to modify its findings in accordance with the conclusions of the Conference.

Radio Regulations Board’s Rules of Procedure relating to the application of RR 2674/S23.13

Background information

No. S23.13 (RR 2674) states that, “In devising the characteristics of a space station in the broadcasting-satellite service, all technical means available shall be used to reduce, to the maximum, the radiation over the territory of other countries unless an agreement has been previously reached with such countries.” No. S23.13 (RR 2674) was adopted at WARC-71. It was intended as a statement of good engineering practice to reduce BSS interference with the terrestrial services outside of the intended service area.

At WRC-95, however, some countries sought to have the interpretation of No. S23.13 (RR 2674) revised to require, as a condition for registration, the approval of other countries within the service area of a BSS system proposed as a plan modification. After thorough debate, WRC-95 instructed the RRB to revise its Rules of Procedures to reflect the results of its debate. The decision reached by WRC-95 reflected a difficult compromise on the parts of all parties involved. The RRB made the revisions, but further concerns were raised at WRC-97. These concerns led WRC-97 to adopt Resolution 536, which resolves that: “in addition to observing No. **S23.13/2674**, and before providing satellite broadcasting services to other administrations, administrations originating the services should obtain the agreement of those other administrations.”

Still dissatisfied after a review of the RRB Rules for RR S23.13 under the “review of finding” procedures of Article S14, the concerned countries persuaded the 1998 meeting of the ITU Council to adopt new agenda item 1.19*bis*.

CAN/24/68

Canada supports the CITEL Inter-American proposal IAP/14/230 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposals for agenda item 1.20

Agenda item 1.20: To consider the issues related to the application of Nos. **S9.8**, **S9.9** and **S9.17** and the corresponding parts of Appendix **S5** with respect to Appendices **S30** and **S30A**, with a view to possible deletion of Articles 6 and 7 of Appendices **S30** and **S30A**, also taking into consideration Recommendation **35 (WRC-95)**.

pfd limits in Annex 1 to Appendix S30 (Sections 5 *b)* and 5 *c)*)

Background information

Annex 1 to Appendix S30 of the Radio Regulations specifies limits for determining whether a service is affected by a proposed modification to the BSS Plan (i.e., when it is necessary to seek the agreement of any other administration). Section 5 of Annex 1 specifies limits to the change in the pfd to protect the terrestrial services of administrations in Regions 1 and 3 from modifications to the Region 2 Plan. In particular, section 5 *c)* specifies the pfd limits for administrations in Region 1 east of longitude 30° E. Further, through section 8 *a)*, the pfd limits in section 5 *b)* of Annex 1 apply to protect terrestrial services in Regions 1 and 3 from modifications to the Regions 1 and 3 BSS Plan.

This pfd limit is very stringent at low angles of elevation. For example, in order to meet this pfd limit the BSS spacecraft power must be significantly lower in remote areas of a Region as compared to other areas in the center of the Region. As a result, the provision of BSS service to these areas requires larger BSS receive dishes, in some cases as large as 2.4 m.

A relaxation in the pfd limit in section 5 *c)* of Annex 1 of Appendix **S30**, as proposed below, would allow the use of 60 cm BSS receive dishes in these areas for BSS service. ITU-R studied possible modifications to the limits in sections 5 *b)* and 5 *c)* of Annex 1. Section 5.2.3.5 of the CPM Report contains a proposed change to these limits. Consistent with the CPM Report, the following changes to section 5 of Annex 1 of Appendix S30 are proposed. As a result of these modifications to sections 5 *b)* and 5 *c)*, Table 3 of Article 10 of Appendix S30 should be reviewed and revised appropriately.

CAN/24/69

Canada supports the CITEL Inter-American proposal IAP/14/231 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Application of footnotes S5.487 and S5.490

Background information

One of the issues related to the application of Articles 6 and 7 (or S9) of Appendices S30 and S30A, is the scope of footnotes S5.487 and S5.490. Footnote S.5.487 relates to Regions 1 and 3 and states that other services in the 11.7-12.5 GHz band in Regions 1 and 3 shall not cause harmful interference to BSS operating "in accordance with the provisions of Appendix **S30**". Footnote S5.490 relates to Region 2 in the band 12.2-12.7 GHz and states that existing and future terrestrial radiocommunication services shall not cause interference to BSS operating "in conformity with the broadcasting-satellite Plan for Region 2 contained in Appendix **S30**".

The question that has been raised in this regard is whether these footnotes apply only to assignments in the Plan or also to assignments that are in operation as a result of successful application of Article 4 procedures. This situation was discussed at the CPM and alternative arguments are presented in section 5.2.3.5 of Chapter 5 of the CPM Report. Some views were expressed that these provisions provide a super-primary status to the BSS over other co-primary services in the band, in that it requires the other services not to cause harmful interference to the broadcasting-satellite stations operating in accordance with the provisions of Appendix S30. From this some expressed the view that these footnotes should not apply to modifications to the Plans.

However, when administrations agreed to the BSS Plans they did so with the understanding that modification procedures would be available to provide administrations with the flexibility of modifying their assignments to suit their future needs and/or take advantage of currently available technology. Further, administrations understood and agreed that assignments which have been implemented after successful completion of the Article 4 modification procedures would be entitled to the same rights as the original assignments in the Plan. This is clearly stated in section 4.3.17 of Appendix S30 where it states in this regard: "The frequency assignment concerned shall enjoy the same status as those appearing in the appropriate Regional Plan and will be considered as a frequency assignment in conformity with the Plan". The text establishes the link with S5.487 and S5.490 concerning assignments in conformity with the plans or their provisions.

CAN/24/70

Canada supports the CITEL Inter-American proposals IAP/14/300 to IAP/14/301 (Addendum 2 to Document WRC2000/14, 29 March 2000).

Retention of Articles 6 and 7 in Appendices S30 and S30A

Background information

At present, Appendices S30 and S30A are self-contained insofar as the procedures for coordinating assignments to other services with those in the BSS Plans are concerned. For example, Article 6 of Appendices S30 and S30A covers the coordination, notification, and recording of terrestrial stations in the BSS and feeder-link bands respectively, and Article 7 plays a similar role for FSS assignments. The main purpose of agenda item 1.20 is to decide whether to suppress Articles 6 and 7 and replace them by the general coordination procedures of Article S9 and the notification and recording procedures of Article S11. Related to this issue are various sharing situations, which need to be addressed. In addition certain Regions 1 and 3 administrations believe that modifications under Article 4 cannot be considered under this agenda item.

A wide-ranging discussion on these issues took place at the CPM. The results are reflected in section 5.2 of the CPM Report, Chapter 5 and its Annexes 1 and 2 where the two approaches concerning the procedures are included. Annex 1 contains the text for Approach A which calls for retaining the procedures in Article 6 and 7 and provides updates to address certain new sharing situations which have been identified. Annex 2 contains approach B, which calls for suppressing Articles 6 and 7 and moving their contents to Articles S9 and S11 which contain the procedures for all other services.

After careful review of the situation, including the relevant text of the CPM, it is evident that the relocation of Articles 6 and 7 to Articles S9 and S11, with subsequent complex and significant changes which run the risk of unintended consequences is not necessary to improve the current situation. The existing Articles 6 and 7 have been used for 20 years and no problems have arisen that could not be corrected by updating these Articles. This has been amply demonstrated in Annex 1 of Chapter 5 of the CPM Report (Approach A) which contains updates of the existing procedures in the appendices to meet new situations that have been identified in recent studies and applications.

Keeping all the procedures relating to BSS in one place in the Radio Regulations, i.e. in Appendices S30 and S30A, would continue to make them simpler to use and update when necessary.

CAN/24/71

Canada supports retention and updating of Articles 6 and 7 as detailed in Inter-American proposals IAP/14/302 to IAP/14/361 (Addendum 2 to Document WRC2000/14, 29 March 2000).

Reasons: To ensure appropriate and user-friendly procedures for use in BSS applications.

pfd limits in Annex 1 to Appendix S30 (Section 8 *b)*)

Background information

Chapter 5 of the CPM Report addresses issues associated with Appendices S30 and S30A of the Radio Regulations. Specifically section 5.2.3.5 covers issues related to protection of the terrestrial service from modifications to the Appendix S30 BSS Plans. Sections 4, 5 and 8 of Annex 1 of Appendix S30 specifies power flux-density (pfd) limits to determine if terrestrial services may be affected by modifications to the Plans.

The CPM Report addresses in detail Sections 5 *b)* and 5 *c)* of Annex 1 (pfd limits to protect terrestrial services in Regions 1 and 3) and proposes modifying those pfd limits to be consistent with the pfd limits contained in Table S21-4 of Article S21 for the protection of the fixed service from the fixed-satellite service. Additionally, section 5.2.3.5 of the CPM Report encourages review of the pfd limits to protect terrestrial services in sections 4, 5 and 8 of Annex 1 of Appendix S30 for possible modification or consolidation.

This proposal addresses section 8 *b)* of Annex 1, which provides the pfd limit to determine if terrestrial services in Region 2 may be affected by a modification to the Region 2 BSS Plan. The current limit is a single pfd value that does not vary as a function of arrival angle as is typical of pfd limits to protect terrestrial services in the Radio Regulations. After review of the existing limit it is proposed that the power flux-density limit in 8 *b)* be modified to bring it into alignment with the pfd limits to protect the fixed service in other parts of the Radio Regulations. This proposal is consistent with the proposal contained in the CPM Report regarding pfd limits to protect terrestrial services in Regions 1 and 3.

CAN/24/72

Canada supports the CITEL Inter-American proposal IAP/14/299 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposals for agenda item 4

Agenda item 4: In accordance with Resolution **95 (WRC-97)**, to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation.

Suppression of Resolution 63

Background information

Resolution 63 can be suppressed as the necessary studies related to this Resolution have been completed.

CAN/24/73

Canada supports the CITEL Inter-American proposal IAP/14/234 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposals for agenda item 7

Agenda item 7: In accordance with Article 7 of the Convention (Geneva, 1992).

Proposals for agenda item 7.1

Agenda item 7.1: To consider and approve the report of the Director of the Radiocommunication Bureau on the activities of the Radiocommunication Sector since WRC-97.

Update of Appendix S5 for the simplification of the Radio Regulations

Background information

Resolution 86 of the 1998 Plenipotentiary Conference (PP-98) calls for proposals to WRC-2000 for the simplification of the coordination and notification procedures contained in Articles S9 and S11, and *inter alia* Appendix S5, of the Radio Regulations. The CPM-99 Report contains a section dealing with this agenda item in section 7.5.2.10. This section of the CPM-99 Report describes example modifications to Appendix S5 of the Radio Regulations to establish the coordination regime between space stations and terrestrial stations in bands where S9.11A applies and also to correct certain editorial deficiencies.

One of the main deficiencies of Appendix S5 is the lack of clarity regarding the relationship between space stations of non-GSO FSS or non-GSO MSS, including its feeder links, and terrestrial services under Article S9.14. In particular, section 2 of Annex 1 to Appendix S5 contains “hard limits” which have to be met and which are intended to protect terrestrial services, thereby eliminating the need for coordination between these services and space stations. Unfortunately, the language in Appendix S5 is not explicit and could lead to misinterpretation. To avoid such possibilities, CPM-99 proposed to remove section 2 of that Appendix and to add clarifying language to make it unambiguous that coordination is not required between the space stations and terrestrial services when Article S21 “hard limits” apply in bands covered by S9.14. Canada supports the CPM-99 text and proposes to delete the text of section 2 of the Annex, which is redundant since the specific pfd limits are already contained in Articles S21 and S22. Furthermore, because these limits are not used to determine the need for coordination, which is the “raison d’être” of Appendix S5, there are no reasons to include “hard limits” in Appendix S5. This would also avoid potential problems such as the current differences between the text in Annex 1 to Appendix S5 and that of Article S21. Canada has further reviewed the text contained in the CPM-99 Report and believes that there are a few additional areas that need to be considered and these are described in detail in the proposal section.

This CPM-99 Report also proposes changes to Appendix S5 of the Radio Regulations to correct certain editorial discrepancies. Canada supports the CPM in this regard.

Finally, since Appendix S7 will likely be updated by WRC-2000 based on the new Recommendation (SM.XX) developed by ITU-R Task Group 1/6, further simplification of Appendix S5 can be achieved. References to Recommendations ITU-R IS.847, IS.848 and IS.849 should be replaced by references to the updated Appendix S7. It is expected that RA-2000 will adopt the new Recommendation (SM.XX). Also, the totality of sections 2 and 3 of Annex 1 of Appendix S5 could be deleted as a result.

CAN/24/74

Canada supports the CPM-99 example changes to Appendix S5 to clarify the application of S9.14. However, Canada believes that it is necessary to evaluate all possible cases to ensure that the Radio Regulations are complete and unambiguous in this respect.

The following describes the possible cases under S9.14 and the solution proposed by Canada:

1) Where “hard” pfd limits are included in Article S21 or in an Article S5 footnote and there is no coordination threshold in Appendix S5.

2) Where there are no “hard” pfd limits in either Article S21 or in an Article S5 footnote, but there is a coordination threshold in Appendix S5.

3) Where there are neither “hard” pfd limits in Article S21 and in Article S5 footnotes, nor is there a coordination threshold in Appendix S5 (the concern raised at the CPM by one administration).

4) Where “hard pfd limits” are included in Article S21 or in an Article S5 footnote, and there is also a coordination threshold in Appendix S5.

Cases 1) and 2) above are adequately treated in the example CPM text; however, further consideration is required for cases 3) and 4). For case 3), in bands where there are no limits in Articles S21 or in S5 footnotes and where there are no coordination thresholds, Canada proposes to use band overlap as the trigger for coordination. There are such precedents in the current Appendix S5, for example in the case of S9.12 and S9.13. For case 4), there is a single situation in the current Radio Regulations, as described in the Annex to this proposal, in the 15.43-15.63 GHz band. Canada proposes changes to the language in Table S5-1 of Appendix S5 to make it complete and precise.

The treatment of this issue is clear with regards to coordination of space stations transmissions in the space-to-Earth direction with respect to terrestrial services. However, the coordination of space station receivers in the Earth-to-space direction and terrestrial services is not so clear. For instance, there is no procedure for the coordination of terrestrial services with a space station (i.e., there is no provision like S9.14 for the reverse coordination). To avoid unintended consequences, it is proposed to limit this application to the space-to-Earth direction only.

Also, under agenda item 1.13, Canada proposes a modification to S9.10 for the coordination between non-GSO FSS systems in bands covered by Resolutions 130 and 538. Therefore, for clarity, the reference will be changed in Table S5-1A to this modified provision.

APPENDIX S5

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article S9

Only those relevant portions of the text of relevant Tables and the Annex 1 to Appendix S5 have been reproduced.

MOD CAN/24/75

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.12** 1) Non-GSO/ non-GSO	A station in a satellite network using a non-geostationary-satellite orbit in the frequency bands for which a footnote refers to **S9.11A** in respect of any other satellite network using a non-geostationary-satellite orbit, with the exception of coordination between earth stations operating in the opposite direction of transmission	See Table S5-~~2~~1A	Condition: bandwidths overlap	Check by using the assigned frequencies and bandwidths	
No. **S9.12** 2) Non-GSO/ GSO	A station in a satellite network using a non-geostationary-satellite orbit in the frequency bands for which a footnote refers to **S9.11A** in respect of any other satellite network using the geostationary-satellite orbit, with the exception of coordination between earth stations operating in the opposite direction of transmission	See Table S5-21A	Condition: bandwidths overlap	Check by using the assigned frequencies and bandwidths	

Reasons: Frequency bands where S9.11A applies are in Table S5-1A, not Table S5-2.

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.13** GSO/non-GSO	A station in a satellite network using the GSO in the frequency bands for which a footnote refers to No. **S9.11A** in respect of any other satellite network using a non-GSO, with the exception of coordination between earth stations operating in the opposite direction of transmission	See Table S5-~~2~~1A	Condition: bandwidths overlap	Check by using the assigned frequencies and bandwidths	
No. **S9.14** Non-GSO/ terrestrial, GSO/terrestrial	For a space station in a satellite network in the frequency bands for which a footnote refers to No. **S9.11A** in respect of stations of terrestrial services where threshold(s) is (are) exceeded	See Table S5-~~2~~1A	~~See § 1 of Annex 1 of this Appendix~~Three cases exist: 1) There are pfd limits in Article **S21** or in footnotes to Article **S5**, but no threshold(s) in § 1 of Annex 1 of this Appendix, so coordination is not required 2) The threshold(s) of § 1 of Annex 1 of this Appendix is(are) exceeded 3) There are no pfd limits in Article **S21** nor in footnotes to Article **S5**, and no threshold(s) in § 1 of Annex 1 of this Appendix, so condition is bandwidth overlap	~~See § 1 of Annex 1 of this Appendix~~ Case 1: Coordination is not required Case 2: See § 1 of Annex 1 of this Appendix Case 3: Check by using the assigned frequencies and bandwidths	

TABLE S5-1 (*continued*)

No. **S9.15** Non-GSO/ terrestrial	A specific earth station or a typical earth station in respect of terrestrial stations in frequency bands for which a footnote refers to No. **S9.11A** allocated with equal rights to space and terrestrial services, where the coordination area of the earth station includes the territory of another country	See Table S5-~~2~~1A	The coordination area of the earth station covers the territory of another administration	See ~~§ 2 of Annex 1 of this~~ Appendix **S7**	

Reasons: Frequency bands where S9.11A applies are in Table S5-1A, not Table S5-2. Under S9.14, **Case 1)** applies when there are no coordination thresholds but there are "hard limits", so coordination is not required. **Case 2)** applies when there is a coordination threshold and it is exceeded, then coordination is required even if there is a "hard limit" in Articles S21 or in a footnote of Article S5. **Case 3)** applies when there are no coordination thresholds and no "hard limits" so that coordination is required when there is bandwidth overlap.

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.16** Terrestrial/ non-GSO	A transmitting station in a terrestrial service within the coordination area of an earth station in a non-GSO network in frequency bands for which a footnote refers to No. **S9.11A**	See Table S5-~~2~~1A	Transmitting terrestrial station is situated within the coordination area of a receiving earth station	See ~~§ 2 of Annex 1 of this~~ Appendix **S7**	The coordination area of the affected earth station has already been determined using the calculation method of No. **S9.15**
No. **S9.17A** GSO, non-GSO/ GSO, non-GSO	A specific earth station in respect of other earth stations operating in the opposite direction of transmission in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission, where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of a coordinated earth station, with the exception of the frequency bands subject to the Plans in Appendix **S30A**	Any frequency band allocated to a space service	The coordination area of the earth station covers the territory of another administration or the earth station is located within the coordination area of an earth station	~~i) For bands in Table S5-2, see § 2 of Annex 1 of this Appendix~~ ~~ii)~~ See Appendix **S7** ~~Recommendations ITU-R IS.847, ITU-R IS.848 and ITU-R IS.849~~	

Reasons: Frequency bands where S9.11A applies are in Table S5-1A, not Table S5-2. Under S9.17A, reference to Recommendations ITU-R IS.847, IS.848 and IS.849 are replaced by Appendix S7 assuming that it gets updated with the material from Recommendation ITU-R SM.XX which is pending approval by RA-2000.

MOD CAN/24/76

TABLE S5-1A

Applicability of No. S9.11A for space services

NOTE – Section 1 of Annex 1 contains the relevant coordination thresholds for sharing between the mobile-satellite service (MSS) (space-to-Earth) and terrestrial services~~ as well as the relevant coordination areas for mobile earth stations operating below 3 GHz~~. It also contains the relevant coordination thresholds for sharing between non-GSO MSS feeder links (space-to-Earth) and terrestrial services~~ as well as the relevant coordination areas for earth stations providing feeder links for non-GSO satellites operating in the MSS and for non-GSO FSS earth stations~~.

MOD CAN/24/77

TABLE S5-1A (*end*)

Frequency band	**RR foot-note/Res.**	**Space services[1] in the footnote to which No. S9.11A applies**		**Other space services[1] to which No. S9.11A applies equally**	**Date of provisional application of allocation if later than 22.11.1997**
~~10.7-11.7 GHz~~	~~**S5.441**~~ ~~**S5.484A**~~	~~Non-GSO FSS~~[2]	~~↓~~	~~—~~	~~see Res. **130**~~[3]
~~11.7-12.2 GHz (R2)~~ ~~12.2-12.75 GHz (R3)~~ ~~12.5-12.75 GHz (R1)~~	~~**S5.484A**~~	~~Non-GSO FSS~~[2]	~~↓~~	~~—~~	~~see Res. **130** and Res. **538**~~[3]~~, as appropriate~~
~~11.7-12.5 GHz (R1)~~ ~~11.7-12.2 GHz (R3)~~ ~~12.2-12.7 GHz (R2)~~	~~**S5.487A**~~	~~Non-GSO FSS~~[2]	~~↓~~	~~—~~	~~see Res. **538**~~
~~12.5-12.75 GHz~~	~~Res. **130**~~	~~Non-GSO FSS~~[2]	~~↑~~	~~—~~	~~see Res. **130**~~
~~12.75-13.25 GHz~~	~~**S5.441**~~	~~Non-GSO FSS~~[2]	~~↑~~	~~—~~	~~see Res. **130**~~
~~13.75-14.5 GHz~~	~~**S5.484A**~~	~~Non-GSO FSS~~[2]	~~↑~~	~~—~~	~~see Res. **130**~~
15.43-15.63 GHz	**S5.511A**	FSS (limited to non-GSO MSS feeder link)	↓	---	
15.63-15.65 GHz	**S5.511D**	Non-GSO FSS	↓	FSS ↑	
~~17.3-18.1 GHz (R1,R3)~~	~~**S5.516**~~	~~Non-GSO FSS~~[2]	~~↑~~	~~BSS~~	~~see Res. **538**~~
~~17.8-18.1 GHz (R2)~~	~~**S5.516**~~	~~Non-GSO FSS~~[2]	~~↑~~	~~—~~	~~see Res. **538**~~
~~17.8-18.6 GHz~~	~~**S5.484A**~~	~~Non-GSO FSS~~[2]	~~↓~~	~~—~~	~~see Res. **130**, for 17.8-18.1 GHz, see also Res. **538**~~
18.8-19.3 GHz	**S5.523A**	Non-GSO FSS	↓	GSO FSS	
19.3-19.6 GHz	**S5.523B**	FSS (non-GSO MSS feeder link)	↑	---	
19.3-19.7 GHz	**S5.523D**	FSS (GSO and non-GSO MSS feeder link)	↓	---	
~~19.7-20.2 GHz~~	~~**S5.484A**~~	~~Non-GSO FSS~~[2]	~~↓~~	~~—~~	~~see Res. **130**~~
~~27.5-28.6 GHz~~	~~**S5.484A**~~	~~Non-GSO FSS~~[2]	~~↑~~	~~—~~	~~see Res. **130**~~
28.6-29.1 GHz	**S5.523A**	Non-GSO FSS	↑	GSO FSS	
29.1-29.5 GHz	**S5.535A**	FSS (GSO and non-GSO MSS feeder link)	↑		
~~29.5-30 GHz~~	~~**S5.484A**~~	~~Non-GSO FSS~~[2]	~~↑~~	~~—~~	~~see Res. **130**~~

[1] NOTE:
AMSS: AERONAUTICAL MOBILE-SATELLITE SERVICE
BSS: BROADCASTING-SATELLITE SERVICE
FSS: FIXED-SATELLITE SERVICE
LMSS: LAND MOBILE-SATELLITE SERVICE
MMSS: MARITIME MOBILE-SATELLITE SERVICE
MSS: MOBILE-SATELLITE SERVICE
RDSS: RADIODETERMINATION-SATELLITE SERVICE
(small letters show secondary allocations.)

R1: Region 1
R2: Region 2
R3: Region 3
↓ space-to-Earth
↑ Earth-to-space

[2] ~~Coordination of non-GSO FSS systems only with respect to other non-GSO FSS systems.~~

[3] ~~For information: Non-GSO FSS systems operated in accordance with Resolutions **130 (WRC-97)** and **538 (WRC-97)** shall also apply the provisions of Nos. **S9.17** and **S9.17A**, as appropriate.~~

Reasons: The entire No. S9.11A process does not apply in these frequency bands; only S9.12 applies directly through a footnote. In Canadian proposals under WRC-2000 agenda item 1.13, the coordination between non-GSO FSS networks will draw upon MOD S9.10.

ANNEX 1

1 Coordination thresholds for sharing between MSS (space-to-Earth) and terrestrial services in the same frequency bands and between non-GSO MSS feeder links (space-to-Earth) and terrestrial services in the same frequency bands

NOC CAN/24/78

1 to **1.3**.

SUP CAN/24/79

2 to **2.5**.

Reasons: These limits are already contained in Articles S21 (sections 2.1, 2.3, 2.4) and S22 (section 2.2) and are not used for determining whether coordination is required. Therefore, they are not relevant to Appendix S5 and should remain in Articles S21 and S22.

SUP CAN/24/80

3 to end.

Reasons: Consequential to other Canadian proposals related to the update of Appendix S7 earth station coordination procedures based on the new ITU-R Recommendation (Recommendation ITU-R SM.xxx) and the transfer the predetermined coordination distances of Tables 2, 3, and 4 to Appendix S7. Nothing unique remains in section 3 that is not in the updated Appendix.

Annex to Canadian proposals for Resolution 86 (PP-98)

The following table shows the applicable criteria in bands covered under S9.11A. It uses the format of Table S5-1A for convenience and is not meant to indicate any changes to this Table in the Radio Regulations.

Frequency band	**RR foot-note/Res.**	**Space services[1] in the footnote to which No. S9.11A applies**		**Other space services[1] to which No. S9.11A applies equally**	**Applicable criteria (hard limit in Article S21 or a footnote to S5; coordination trigger)**
137-137.025 MHz 137.175-137.825 MHz	**S5.208**	MSS	↓	SPACE OPERATION METEOROLOGICAL-SATELLITE SPACE RESEARCH	Threshold in AP S5
137.025-137.175 MHz 137.825-138 MHz	**S5.208**	mss	↓	---	Threshold in AP S5
148-149.9 MHz	**S5.219**	MSS	↑	---	
149.9-150.05 MHz	**S5.220**	MSS	↑	--- (See **S5.220**)	
312-315 MHz	**S5.255**	Mss	↑	---	
387-390 MHz	**S5.255**	Mss	↓	---	
399.9-400.05 MHz	**S5.220**	MSS	↑	--- (See **S5.220**)	
400.15-401 MHz	**S5.264**	MSS	↓	METEOROLOGICAL-SATELLITE SPACE RESEARCH	Threshold in AP S5
454-455 MHz	**S5.286A**	MSS (**S5.286D**, **S5.286E**)	↑	---	
455-456 MHz	**S5.286A**	MSS (R2, **S5.286E**)	↑	---	
459-460 MHz	**S5.286A**	MSS (R2, **S5.286E**)	↑	---	
1 492-1 525 MHz	**S5.348**	MSS (R2, except USA)	↓	---	Threshold in AP S5
1 525-1 530 MHz	**S5.354**	MSS	↓	SPACE OPERATION	Threshold in AP S5
1 530-1 533 MHz	**S5.354**	MSS	↓	SPACE OPERATION	
1 533-1 535 MHz	**S5.354**	MSS	↓	SPACE OPERATION	
1 535-1 544 MHz	**S5.354**	MSS	↓	---	
1 544-1 545 MHz	**S5.354**	MSS	↓	---	
1 545-1 555 MHz	**S5.354**	MSS	↓	---	
1 555-1 559 MHz	**S5.354**	MSS	↓	---	
1 610-1 626.5 MHz	**S5.364**	MSS, RDSS (R2, **S5.369**)	↑	---	
1 610-1 626.5 MHz	**S5.364**	rdss (R1, R3,VEN)	↑	---	
1 613.8-1 626.5 MHz	**S5.365**	mss	↓	---	
1 626.5-1 631.5 MHz	**S5.354**	MSS	↑	---	
1 631.5-1 634.5 MHz	**S5.354**	MSS	↑	---	
1 634.5-1 645.5 MHz	**S5.354**	MSS	↑	---	
1 645.5-1 646.5 MHz	**S5.354**	MSS	↑	---	
1 646.5-1 656.5 MHz	**S5.354**	MSS	↑	---	

1 656.5-1 660 MHz	**S5.354**	MSS	↑	---	
1 660-1 660.5 MHz	**S5.354**	MSS	↑	---	
1 675-1 700 MHz	**S5.377**	MSS (R2)	↑	--- (see **S5.377**)	
1 700-1 710 MHz	**S5.377**	MSS (R2)	↑	SPACE RESEARCH (**S5.384**)	
1 980-2 010 MHz	**S5.389A**	MSS	↑	---	
2 010-2 025 MHz	**S5.389C**	MSS (R2)	↑	---	
2 160-2 170 MHz	**S5.389C**	MSS (R2)	↓	SPACE RESEARCH **S5.392A** (RUS)	Threshold in AP S5
2 170-2 200 MHz	**S5.389A**	MSS	↓	SPACE RESEARCH **S5.392A** (RUS)	Threshold in AP S5
2 483.5-2 500 MHz	**S5.402**	MSS RDSS (R2, **S5.400**)	↓	---	Threshold in AP S5
2 483.5-2 500 MHz	**S5.402**	rdss (R1, R3)	↓	---	
2 500-2 520 MHz	**S5.414** **S5.403**	MSS	↓	FSS (R2, R3), RDSS (**S5.404**)	Threshold in AP S5
2 520 -2 535 MHz	**S5.403**	MSS (–AMSS)	↓	BSS, FSS (R2, R3)	Threshold in AP S5
2 655-2 670 MHz	**S5.420**	MSS (–AMSS)	↑	BSS, FSS (R2, R3)	
2 670-2 690 MHz	**S5.419** **S5.420**	MSS	↑	FSS (R2, R3)	
5 091-5 150 MHz	**S5.444A**	FSS (limited to non-GSO MSS feeder link)	↑	AMSS (**S5.367**)	
5 150-5 250 MHz	**S5.447A** **S5.447C**	FSS (limited to non-GSO MSS feeder link)	↑	RDSS (**S5.447C**)	
5 150-5 216 MHz	**S5.447B**	FSS (limited to non-GSO MSS feeder link)	↓	RDSS (**S5.447C**)	Article S21 pfd limits
6 700-7 075 MHz	**S5.458B**	FSS (limited to non-GSO MSS feeder link)	↓	Non-GSO FSS	Article S21 pfd limits
15.43-15.63 GHz	**S5.511A**	FSS (limited to non-GSO MSS feeder link)	↓	---	Article S21 pfd limits; coordination threshold in AP S5
15.63-15.65 GHz	**S5.511D**	Non-GSO FSS	↓	FSS ↑	Coordination threshold in S5.511D and AP S5
18.8-19.3 GHz	**S5.523A**	Non-GSO FSS	↓	GSO FSS	Article S21 pfd limit
19.3-19.6 GHz	**S5.523B**	FSS (non-GSO MSS feeder link)	↑	---	
19.3-19.7 GHz	**S5.523D**	FSS (GSO and non-GSO MSS feeder link)	↓	---	Article S21 pfd limit
28.6-29.1 GHz	**S5.523A**	Non-GSO FSS	↑	GSO FSS	
29.1-29.5 GHz	**S5.535A**	FSS (GSO and non-GSO MSS feeder link)	↑		

PP-98 Resolution 86 - Separation of uplink and downlink data

Background information

Appendix S4 of the Radio Regulations contains lists of characteristics to be supplied to effect the coordination process. Characteristics of satellite networks are listed in Annex 2A to Appendix S4. Specifically, Section D of Annex 2A to Appendix S4 applies to simple frequency-changing ("bent pipe") transponders. Appendix S8 contains the method of calculation for determining if coordination is required between GSO satellite networks sharing the same frequency bands. Under this method, if the increase in equivalent noise temperature for the entire satellite link ("ΔT/T") exceeds a percentage threshold value of 6%, coordination is required. In order to apply the method of Appendix S8, it is necessary to consider all possible combinations of uplink and downlink frequencies and test each combination against the ΔT/T threshold.

Although it is expected that on-board processing capability will increasingly become a part of spacecraft designs, the overwhelming majority of existing satellites, and of spacecraft currently in the design and construction stages, use "bent-pipe" designs. At the same time, technological advances, the allocation of additional bands to satellite services, and the economics of satellite network design have led to increasingly complex satellite designs which employ multiple frequency bands and satellite antenna beams. To increase flexibility, and for a variety of technical and regulatory reasons, cross-strapping capability is often included, so that a mapping between uplink and downlink frequencies is possible. This cross-strapping information is incorporated in the information supplied pursuant to Appendix S4. As the number of cross-strapping possibilities increases, the amount of calculation under Appendix S8 increases geometrically.

The current situation imposes a burden on those filing satellite networks and in particular on the resources of BR, thereby contributing to the backlog of satellite filings. It is proposed to simplify the process by calculating the ΔT/T values independently for uplinks and downlinks. The values of ΔT/T calculated for both the uplink and downlink would each be compared with the threshold value of 6%, as is now the case when there is a change in modulation on board the satellite. This proposal may result in some increase in the number of satellite networks identified, for example when the ΔT/T threshold is exceeded only on the uplink in a network that is heavily downlink limited, and vice versa. However, such cases should quickly be resolved during the coordination process.

APPENDIX S4

Consolidated list and tables of characteristics for use in the application of the procedures of Chapter SIII

ANNEX 2A

Characteristics of satellite networks or earth or radio astronomy stations[2]

SUP CAN/24/81

D Overall link characteristics

With consequential modifications to Appendix S8.

Reasons: Separation of the uplink and downlink ΔT/T calculations would simplify the preparation of filings and reduce the workload of the BR. If this change were made, the information listed in Section D of Annex 2A to Appendix S4 would no longer be required. As a consequence of this change, Appendix S8 would also require some modification.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

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PLENARY MEETING

Canada

PROPOSALS FOR THE WORK OF THE CONFERENCE

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Proposals for agenda item 1.8

Agenda item 1.8: To consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands.

Proposal for communications by earth stations on board vessels using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service

CAN/24/16

The following proposals replace CAN/24/16 (Document WRC2000/24, 16 February 2000) to align with the set of IAPS on this agenda item:

1) Canada supports the CITEL Inter-American proposals IAP/14/42 to IAP/14/43 (Document WRC2000/14, 18 January 2000).

2) Canada supports the CITEL Inter-American proposals IAP/14/44 to IAP/14/45 (Corrigendum 1 to Document WRC2000/14, 21 March 2000).

Proposals for agenda item 1.11

Agenda item 1.11: To consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions **214 (Rev.WRC-97)** and **219 (WRC-97)**.

Proposal addressing constrains on existing allocation for non-geostationary (non-GSO) MSS below 1 GHz

CAN/24/18 to
CAN/24/20

The following proposals replace CAN/24/18 to CAN/24/20 (Document WRC2000/24, 16 February 2000):

Canada supports the CITEL Inter-American proposals IAP/14/237 to IAP/14/241 (Addendum 1 to Document WRC2000/14, 27 March 2000).

NOTE - Canada continues to support CAN/24/21 (Document WRC2000/24, 16 February 2000).

Proposals for agenda item 1.13.1

Agenda item 1.13.1: To review and, if appropriate, revise the power limits appearing in Articles **S21** and **S22** in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services.

Resolution 131 (WRC-97): Power flux-density limits applicable to non-geostationary fixed-satellite service systems for protection of terrestrial services in the bands 10.7-12.75 GHz and 17.7-19.3 GHz

CAN/24/23 to
CAN/24/28

The following proposals replace CAN/24/23 to CAN/24/28 (Document WRC2000/24, 16 February 2000):

Canada supports the CITEL Inter-American proposals IAP/14/118 to IAP/14/128 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Reasons: The proposals in Document WRC2000/24, 16 February 2000) are aligned with the CITEL Inter-American proposals addressing Resolution 131 (WRC-97).

Proposals for agenda item 1.13.2

Agenda item 1.13.2: To consider the inclusion in other frequency bands of similar limits in Articles **S21** and **S22**, or other regulatory approaches to be applied in relation to sharing situations.

CAN/24/29

The following proposal replaces CAN/24/29 (Document WRC2000/24, 16 February 2000):

Canada supports the CITEL Inter-American proposal IAP/14/124 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Reasons: The proposal in Document WRC2000/24, 16 February 2000 is aligned with the CITEL Inter-American proposal IAP/14/124 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Proposals for agenda item 2

Agenda item 2: To examine the revised ITU-R recommendations incorporated by reference in the Radio Regulations in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution **27 (Rev.WRC-97)**.

Proposals to modify Resolution 27 (Rev.WRC-97) and Resolution 28 (WRC-95)

CAN/24/33 to
CAN/24/34

The following proposals replace CAN/24/33 to CAN/24/34 (Document WRC2000/24, 16 February 2000):

Canada supports the CITEL Inter-American proposals IAP/14/232 to IAP/14/233 (Addendum 1 to Document WRC2000/14, 27 March 2000).

Reasons: The proposals in Document WRC2000/24, 16 February 2000 are aligned with the CITEL Inter-American proposals IAP/14/232 to IAP/14/233 (Addendum 1 to Document WRC2000/14, 27 March 2000).

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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Canada

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* Pursuant to Resolution 26 (Rev.WRC-97) the Secretariat notes that this contribution was received on 15 February 2000.

Introduction

The Administration of Canada is pleased to have the opportunity to submit proposals in support of the work of the World Radiocommunication Conference (Istanbul, 2000). These proposals represent the collective views of a joint government and industry WRC preparatory committee.

In a rapidly changing environment stimulated by such developments as the WTO Agreement on trade in telecommunication services, new competitive service offerings are now forming the basis for proposals to facilitate choice to the consumer of radiocommunication products and services. In Canada's view, the Radio Regulations should create the conditions, which favour the orderly evolution of radiocommunication technology, and should not deter it through a rigid protection of the status quo. Older radio technologies should be protected for as long as they remain a significant and appropriate component of a given telecommunication infrastructure, but the Regulations should permit upgrading of the infrastructure through the introduction of new technologies when required.

When the Conference considers changes to the Regulations, it must take into account all of the needs of the service requiring such changes, and the needs of other services sharing the band. Therefore, the Canadian proposals place particular emphasis on the need for the Conference to agree on appropriate technical sharing criteria, the development of appropriate coordination mechanisms, and on the determination of suitable transition arrangements. Furthermore, in Canada's view it is absolutely imperative that the Conference should resolve issues to the maximum extent possible. Otherwise, ever-changing Regulations create a climate of uncertainty that discourage the use and development of new radiocommunication systems. Moreover, a lack of resolve to take decisions can overburden the agendas of subsequent conferences through the deferral of certain items, and therefore complicate decision-making even further in the future. The budgetary consequences of WRC decisions also need to be taken into account, particularly in terms of the post-Conference work, which the Radiocommunication Bureau is obliged to undertake. This is especially critical with regard to the impact of such work on the ongoing programmes and activities of the ITU-R, given the current climate of financial constraint, which prevails in the Union as a whole.

In addressing the agenda of WRC-2000, Canada has taken into account recent ITU-R studies and Recommendations, the results of CPM-99, new developments in radiocommunication technology, related service issues and consequential regulatory changes that are necessary for the success of the Conference. The following summary represents the first package of proposals to be submitted by Canada to support the work of the Conference, followed by a substantive presentation of each item. Subsequent proposals may be submitted as addenda.

Proposals for agenda item 1.1

Agenda item 1.1: Requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution **26 (Rev.WRC-97)**.

Proposal for suppression of footnote S5.124 (broadcast services in the band 3 950-4 000 kHz)

Background information

Canada supports administrations taking the initiative to review and propose the deletion of country footnotes that are no longer required. Having reviewed the ITU Table of Frequency Allocations country footnotes applicable to Canada, the footnote S5.124 pertaining to broadcasting services in the band 3 950-4 000 kHz is no longer necessary. The footnote states that in Canada this band is also allocated to the broadcasting service on a primary basis. No broadcasting services are operating or planning to operate in this band and it is no longer allocated to broadcasting services.

SUP CAN/24/1

S5.124

Reasons: Footnote S5.124 is no longer required.

Proposal for modification of footnote S5.293 to include the Administration of Canada

Background information

Footnote S5.293 raises the status of the fixed and mobile services to a primary basis in nine countries in Region 2 in the bands 470-512 MHz and 614-806 MHz. The use of those services is subject to agreement under No. S9.21. Canada anticipates that with the full implementation of digital television, less spectrum will be required for television services than at present. By joining footnote S5.293, Canada would have the option of implementing fixed and mobile in some parts of the frequency bands specified in the footnote, subject to agreement under No. S9.21.

MOD CAN/24/2

S5.293 *Different category of service:* in Canada, Chile, Colombia, Cuba, the United States, Guyana, Honduras, Jamaica, Mexico and Panama, the allocation of the bands 470-512 MHz and 614-806 MHz to the fixed and mobile services is on a primary basis (see No. **S5.33**), subject to agreement obtained under No. **S9.21**.

Proposals for agenda item 1.2

Agenda item 1.2: To finalize remaining issues in the review of Appendix S3 to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation **66 (Rev.WRC-97)** and the decisions of WRC-97 on adoption of new values, due to take effect at a future time, of spurious emissions for space services.

Proposal to modify Appendix S3

Background information

Recommendation 66 (Rev.WRC-97) directs the ITU-R to submit a report to WRC-2000 with a view to finalizing the space services spurious emission limits in Appendix S3 of the Radio Regulations. Canada along with the other CITEL Administrations propose text that would remove the “design objectives” designation from the space services spurious emission limits and make related appropriate modifications applicable to deep-space systems, satellites with spurious emissions falling within the necessary bandwidth of another transmitter on the same satellite, and amateur earth stations below 30 MHz. Also, it is proposed to adequately recognize the case of very narrowband and unmodulated signals, particularly for the space services. Furthermore, it is proposed to correct an oversight in Appendix S3 regarding limits for the radiodetermination service, and specify that spurious emission levels for radar systems be determined from radiated emissions.

CAN/24/3

Canada supports the CITEL Inter-American Proposals IAP/14/1 to IAP/14/8
(Document WRC2000/14, 18 January 2000).

Proposals for agenda item 1.4

Agenda item 1.4: To consider issues concerning allocations and regulatory aspects related to Resolutions **126 (WRC-97)**, **128 (WRC-97)**, **129 (WRC-97)**, **133 (WRC-97)**, **134 (WRC-97)** and **726 (WRC-97)**.

Proposal for the confirmation of the fixed service allocation in the 31.8-33.4 GHz frequency range (Resolutions 126 and 726)

Background information

Resolutions 126 and 726 invite the ITU-R to address, among other issues, sharing between high-density fixed systems (HDFS) and other radiocommunication services sharing spectrum in the bands 31.8-33.4 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz.

The term “high-density” applications in the fixed service (HDFS) describes a significant level of deployment of point-to-point and/or point-to-multipoint systems within a given area. In bands above 30 GHz propagation conditions, availability of small, light-weight components and a high degree of frequency reuse are key factors in permitting the deployment of a large population of fixed systems. The term “high density” refers a large number of terminals operating within a small geographical area. It does not refer to population density, although there is a strong correlation between high population centres and the deployment of HDFS.

At WRC-97, a number of frequency bands above 30 GHz were identified through Resolution 726 as available for the deployment of high-density fixed systems. Included in Resolution 726 is the frequency range 31.8-33.4 GHz. WRC-97 amended the table of frequency allocations to include the fixed service on a primary basis in the 31.8-33.4 GHz range subject to conditions found in Resolution 126. The first condition stipulated that this allocation to the fixed service would not go into force until 1 January 2001. Secondly, this allocation would be reviewed at WRC-2000 taking into account the results of sharing studies and the future requirements of the other allocated services. The frequency range 31.8-33.4 GHz also has primary allocations to the radionavigation, space research (space-to-Earth) (deep space) and the inter-satellite services.

The ITU-R, through various working parties, has studied the sharing potential between the fixed service (high-density applications) and the other primary services. With regard to sharing between the fixed and radionavigation services, studies indicated that sharing is possible through the use of practical mitigation and operational measures, recognizing that fixed systems may receive unintentional emissions from airborne radionavigation systems. However, actual interference events are expected to be rare. The CPM Report recommended that sharing between the fixed and radionavigation services could be addressed through the development of appropriate ITU-R Recommendations. Sharing between the fixed service and the space research deep space facilities is considered practical as there are only a few deep space sites in the world and coordination with the fixed stations is feasible. Studies have also concluded that interference levels from high-density fixed stations into inter-satellite receivers are well within acceptable limits.

CAN/24/4

Canada supports the CITEL Inter-American Proposals IAP/14/9 to IAP/14/14 (Document WRC2000/14, 18 January 2000).

Proposal addressing high-density applications in the fixed service in bands above 50 GHz (Resolution 726)

Background information

The band 51.4-52.6 GHz is allocated to the fixed and mobile services on a primary basis with the radio astronomy service allocated by No. S5.556. Furthermore, the RAS shares the band 58.2-59 GHz with the FS, the MS, the EESS (passive) and the SRS (passive) and the band 64-65 GHz with the FS, the MS and the ISS by No. S5.556. In addition, the FS, MS, ISS, EESS (passive) and SRS (passive) share the bands 55.78-58.2 GHz and 65-66 GHz on a primary basis. No. S5.547 provides for the introduction of high-density FS applications into these bands.

While there are currently no known uses of the bands by RAS, sharing between HDFS and RAS is deemed to be a national issue. Although sharing is considered under Recommendation ITU-R SA.1259, there are currently no plans for the space research service allocation in the bands.

There is currently no planned use for EESS in the band 65-66 GHz and no studies have been completed. In the band 55.78-59 GHz studies have indicated that sharing is feasible; however, concern has subsequently been expressed for the sub-band 55.78-56.26 GHz band. Work is continuing in the ITU-R to consider this matter.

CAN/24/5

With regard to the bands 51.4-52.6 GHz, 55.78-59 GHz, and 64-66 GHz, RR S5.547 should not be modified.

Reasons: The review and, if necessary, revision of sharing criteria between spaceborne passive sensors in the EESS and HDFS can be accomplished within the ITU-R through the development of Recommendations.

Proposals for agenda item 1.6.1

Agenda item 1.6.1: Review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary.

Proposal to identify additional spectrum for IMT-2000

Background information

In Canada, cellular and PCS services are experiencing significant growth, and there is strong interest in the evolution of these services towards IMT-2000. In view of the present PCS use of the 2 GHz band and the MSS allocations in the frequency spectrum currently identified for IMT-2000 by RR S5.388, there is limited clear spectrum available for the implementation of IMT-2000.

In order to consider additional requirements for the terrestrial component of IMT-2000, current PCS and cellular services should be able to evolve to IMT-2000 in existing bands to the extent possible. ITU-R Task Group 8/1 (TG 8/1) efforts towards global harmonization of technology and spectrum, and in particular, the forecast of 160 MHz of additional spectrum beyond that currently in the bands used for first and second generation mobile systems (e.g. cellular and PCS in Region 2) to implement IMT-2000 should be supported.

Proposals to identify frequency bands to accommodate the additional forecasted requirements should take into account the principles of placing priority on the selection of bands already allocated to the mobile service and of taking into consideration the impact on existing uses of the spectrum. Also, consideration should be given to the possibility of achieving harmonization through all or parts of the identified band(s) with other regions of the world.

Considering current and planned uses of spectrum for other radio services and, taking into account the review by TG 8/1 of possible candidate bands for IMT-2000, it is proposed that the frequency band 1 710-1 885 MHz be identified as additional spectrum for the terrestrial component of IMT-2000. According to the Task Group 8/1 survey results, most administrations in Region 1 (CEPT countries, South Africa), Region 2 (Brazil, Canada, United States) and certain administrations in Region 3 (Australia, China, Japan, Korea, Malaysia, New Zealand) have either already allocated various portions of the band 1 710-1 855 MHz to the mobile service or have identified them as possible candidates for IMT-2000.

In some administrations, the band 1 710-1 850 MHz, is currently used by the fixed service. Transition issues related to the use of this band by other services have been studied. Fixed systems operating in or near to IMT-2000 service areas may re-establish service in other bands including 2 025-2 110 MHz and 2 200-2 290 MHz.

In cases where there is concern about potential interference to space operations and space research uplinks operating in parts of the band 1 710-1 850 MHz, a number of options could be available. It is recommended that the ITU-R develops Recommendations to identify practical mitigation techniques. In addition, where aggregate interference problems are anticipated, it is recommended that these space facilities migrate to the 2 025-2 110 MHz band as spacecraft and ground transmitters are replaced. It should be noted that WARC-92 identified this band for space operations, space research and Earth exploration-satellite (Earth-to-space). Furthermore, WRC-97 adopted S5.391, which prevents this band from being used by high-density mobile systems, thus providing protection to spacecraft receivers. The band, 1 710-1 850 MHz, has the advantages of being immediately adjacent to the spectrum currently identified for IMT-2000 and is also used today in parts of ITU Region 1 for PCS, increasing the possibility of harmonization with other regions.

The frequency range 1 710-1 885 MHz should be identified worldwide for additional spectrum for advanced mobile applications in the context of IMT-2000 through a modification of footnote S5.388.

The CPM Report to WRC-2000 suggests a means of implementation of HAPS in the bands currently identified or IMT-2000 by the use of a footnote. Canada is of the view, that until studies are complete to demonstrate the feasibility of sharing, it would be premature to adopt any specific regulatory provisions for HAPS in these bands.

With respect to the satellite component of IMT-2000, consideration has been given to identifying some of the existing mobile-satellite allocations in the 1-3 GHz range for IMT-2000. Additional designation of certain mobile-satellite bands for satellite IMT-2000 applications is proposed, through the new footnote S5.XXX shown below.

MOD CAN/24/6

470-890 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="6">470-790
BROADCASTING

S5.149 S5.291A S5.294 S5.296 S5.300 S5.302 S5.304 S5.306 S5.311 S5.312</td><td>470-512
BROADCASTING
Fixed
Mobile
S5.292 S5.293</td><td rowspan="2">470-585
FIXED
MOBILE
BROADCASTING

S5.291 S5.298</td></tr>
<tr><td rowspan="2">512-608
BROADCASTING
S5.297</td></tr>
<tr><td rowspan="2">585-610
FIXED
MOBILE
BROADCASTING
RADIONAVIGATION
S5.149 S5.305 S5.306 S5.307</td></tr>
<tr><td rowspan="2">608-614
RADIO ASTRONOMY
Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)</td></tr>
<tr><td rowspan="5">610-890
FIXED
MOBILE
BROADCASTING

S5.149 S5.305 S5.306 S5.307 S5.311 S5.320 <u>MOD S5.388</u></td></tr>
<tr><td rowspan="2">614-806
BROADCASTING
Fixed
Mobile

S5.293 S5.309 S5.311</td></tr>
<tr><td rowspan="2">790-862
FIXED
BROADCASTING
S5.312 S5.314 S5.315 S5.316 S5.319 S5.321 <u>MOD S5.388</u></td></tr>
<tr><td rowspan="2">806-890
FIXED
MOBILE
BROADCASTING

S5.317 S5.318 <u>MOD S5.388</u></td></tr>
<tr><td>862-890
FIXED
MOBILE except aeronautical mobile
BROADCASTING S5.322

S5.319 S5.323 <u>MOD S5.388</u></td></tr>
</table>

MOD CAN/24/7

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
890-942 FIXED MOBILE except aeronautical mobile BROADCASTING S5.322 Radiolocation	**890-902** FIXED MOBILE except aeronautical mobile Radiolocation S5.318 S5.325 MOD S5.388	**890-942** FIXED MOBILE BROADCASTING Radiolocation
	902-928 FIXED Amateur Mobile except aeronautical mobile Radiolocation S5.150 S5.325 S5.326	
	928-942 FIXED MOBILE except aeronautical mobile Radiolocation	
S5.323 MOD S5.388	S5.325	S5.327 MOD S5.388

MOD CAN/24/8

1 610-1 660 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 610-1 610.6 MOBILE-SATELLITE (Earth-to-space) ADD S5.XXX AERONAUTICAL RADIONAVIGATION S5.341 S5.355 S5.359 S5.363 S5.364 S5.366 S5.367 S5.368 S5.369 S5.371 S5.372	**1 610-1 610.6** MOBILE-SATELLITE (Earth-to-space) ADD S5.XXX AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) S5.341 S5.364 S5.366 S5.367 S5.368 S5.370 S5.372	**1 610-1 610.6** MOBILE-SATELLITE (Earth-to-space) ADD S5.XXX AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) S5.341 S5.355 S5.359 S5.364 S5.366 S5.367 S5.368 S5.369 S5.372
1 610.6-1 613.8 MOBILE-SATELLITE (Earth-to-space) ADD S5.XXX RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION S5.149 S5.341 S5.355 S5.359 S5.363 S5.364 S5.366 S5.367 S5.368 S5.369 S5.371 S5.372	**1 610.6-1 613.8** MOBILE-SATELLITE (Earth-to-space) ADD S5.XXX RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) S5.149 S5.341 S5.364 S5.366 S5.367 S5.368 S5.370 S5.372	**1 610.6-1 613.8** MOBILE-SATELLITE (Earth-to-space) ADD S5.XXX RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION Radiodetermination-satellite (Earth-to-space) S5.149 S5.341 S5.355 S5.359 S5.364 S5.366 S5.367 S5.368 S5.369 S5.372
1 613.8-1 626.5 MOBILE-SATELLITE (Earth-to-space) ADD S5.XXX AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) S5.341 S5.355 S5.359 S5.363 S5.364 S5.365 S5.366 S5.367 S5.368 S5.369 S5.371 S5.372	**1 613.8-1 626.5** MOBILE-SATELLITE (Earth-to-space) ADD S5.XXX AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) S5.341 S5.364 S5.365 S5.366 S5.367 S5.368 S5.370 S5.372	**1 613.8-1 626.5** MOBILE-SATELLITE (Earth-to-space) ADD S5.XXX AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) Radiodetermination-satellite (Earth-to-space) S5.341 S5.355 S5.359 S5.364 S5.365 S5.366 S5.367 S5.368 S5.369 S5.372

MOD CAN/24/9

1 710-2 170 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 710-1 930	FIXED MOBILE S5.380 S5.149 S5.341 S5.385 S5.386 S5.387 MOD S5.388	
1 930-1 970 FIXED MOBILE MOD S5.388	**1 930-1 970** FIXED MOBILE Mobile-satellite (Earth-to-space) MOD S5.388	**1 930-1 970** FIXED MOBILE MOD S5.388
1 970-1 980	FIXED MOBILE MOD S5.388	
1 980-2 010	FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) ADD S5.XXX MOD S5.388 S5.389A S5.389B S5.389F	
2 010-2 025 FIXED MOBILE MOD S5.388	**2 010-2 025** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) ADD S5.XXX MOD S5.388 S5.389C S5.389D S5.389E S5.390	**2 010-2 025** FIXED MOBILE MOD S5.388
2 025-2 110	SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE S5.391 SPACE RESEARCH (Earth-to-space) (space-to-space) S5.392	
2 110-2 120	FIXED MOBILE SPACE RESEARCH (deep space) (Earth-to-space) MOD S5.388	
2 120-2 160 FIXED MOBILE MOD S5.388	**2 120-2 160** FIXED MOBILE Mobile-satellite (space-to-Earth) MOD S5.388	**2 120-2 160** FIXED MOBILE MOD S5.388
2 160-2 170 FIXED MOBILE MOD S5.388 S5.392A	**2 160-2 170** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) ADD S5.XXX MOD S5.388 S5.389C S5.389D S5.389E S5.390	**2 160-2 170** FIXED MOBILE MOD S5.388

MOD CAN/24/10

2 170-2 520 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 170-2 200	FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) ADD S5.XXX MOD S5.388 S5.389A S5.389F S5.392A	
2 200-2 290	SPACE OPERATION (space-to-Earth) (space-to-space) EARTH EXPLORATION-SATELLITE (space-to-Earth) (space-to-space) FIXED MOBILE S5.391 SPACE RESEARCH (space-to-Earth) (space-to-space) S5.392	
2 290-2 300	FIXED MOBILE except aeronautical mobile SPACE RESEARCH (deep space) (space-to-Earth)	
2 300-2 450 FIXED MOBILE Amateur Radiolocation S5.150 S5.282 S5.395	**2 300-2 450** FIXED MOBILE RADIOLOCATION Amateur S5.150 S5.282 S5.393 S5.394 S5.396	
2 450-2 483.5 FIXED MOBILE Radiolocation S5.150 S5.397	**2 450-2 483.5** FIXED MOBILE RADIOLOCATION S5.150 S5.394	
2 483.5-2 500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) ADD S5.XXX Radiolocation S5.150 S5.371 S5.397 S5.398 S5.399 S5.400 S5.402	**2 483.5-2 500** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) ADD S5.XXX RADIOLOCATION RADIODETERMINATION-SATELLITE (space-to-Earth) S5.398 S5.150 S5.402	**2 483.5-2 500** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) ADD S5.XXX RADIOLOCATION Radiodetermination-satellite (space-to-Earth) S5.398 S5.150 S5.400 S5.402

MOD CAN/24/11

S5.388 The bands 824-849 MHz, 869-894 MHz, 1 710-1 885 MHz, 1 885-2 025 MHz and 2 110-2 200 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of these bands by other services to which they are allocated. The bands should be made available for IMT-2000 in accordance with Resolution **212 (Rev.WRC-~~97~~2000)**.

ADD CAN/24/12

S5.XXX The bands 1 610-1 626.5 MHz, 1 980-2 010 MHz, 2 170-2 200 MHz, and 2 483.5-2 500 MHz allocated to the MSS on a worldwide basis and the bands 2 010-2 025 MHz, and 2 160-2 170 MHz allocated to MSS in Region 2, are available for use for the satellite component of IMT-2000. The bands should be made available for IMT-2000 in accordance with Resolution **212 (Rev.WRC-2000)**.

Reasons: The frequency range 1 710-1 885 MHz has, in many parts of the world, already been impacted by the introduction of earlier generation (pre-IMT-2000) personal mobile systems. For example, the introduction of GSM1800 in Europe and other parts of the world in the frequency range 1 710-1 785/1 805-1 880 MHz and of PCS in the Americas in 1 850-1 990 MHz has resulted in the displacement of many fixed systems specifically in these sub-bands and more generally in the range 1 710-1 885 MHz. In the 1 610-1 626.5 MHz and 2 483.5-2 500 MHz, new mobile-satellite service systems are being deployed, providing global coverage and pre-IMT-2000 services. These pre-IMT-2000 systems are expected to have the capability to evolve to IMT-2000. In addition, this frequency range, 1 710-1 885 MHz is adjacent to the spectrum currently identified for IMT-2000, thus providing a large block of contiguous spectrum for future IMT-2000 systems. These attributes will facilitate cost-effective expansion of existing systems to meet advanced mobile applications in the context of IMT-2000 requirements.

MOD CAN/24/13

RESOLUTION 212 (Rev.WRC-~~97~~2000)

Implementation of International Mobile Telecommunications-2000 (IMT-2000)*

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that ITU-R has recommended the 1-3 GHz band as the most suitable for IMT-2000;

~~*b)* that ITU-R has recommended approximately 60 MHz for use by personal stations and approximately 170 MHz for use by mobile stations;~~

~~*c)* that ITU-R has recognized that space techniques are an integral part of IMT-2000;~~

~~*d)* that, in No. **S5.388**, this Conference has identified bands to accommodate this future service,~~

b) that WARC-92 identified 230 MHz for IMT-2000 by regulatory provision of **S5.388**;

c) that ITU-R identified a further requirement of 160 MHz in addition to the spectrum identified in **S5.388** and also the spectrum currently used by earlier generations of personal communications;

d) that ITU-R has recognized that space techniques are an integral part of IMT-2000;

e) that WARC-92 identified the worldwide allocations for the mobile-satellite service as part of the satellite component of IMT-2000;

f) that ITU-R has completed the development of recommendations on detailed specifications of the radio interface of IMT-2000;

g) that harmonized worldwide bands for IMT-2000 are desirable to achieve benefits of economies of scale,

considering further

~~*a)* that ITU-R has not completed its studies regarding duplexing methods, modulation techniques, channelling arrangements, signalling or communication protocols;~~

~~*b)* that no worldwide intersystem numbering plan currently exists that would facilitate worldwide roaming,~~

h) that WRC-2000 identified XXX MHz of additional spectrum for the terrestrial component of IMT-2000;

i) that WRC-2000 identified the bands for the satellite component of IMT-2000,

* IMT-2000 was previously known as Future Public Land Mobile Telecommunication Systems (FPLMTS).

noting

a) that the implementation of the terrestrial component of IMT-2000 ~~in the bands 1 885-2 025 MHz and 2 110-2 200 MHz~~ is expected to commence around the year 2000, subject to market and technical considerations;

b) that the availability of the satellite component of IMT-2000 ~~in the bands 1 980-2 010 MHz and 2 170-2 200 MHz simultaneously with the terrestrial component of IMT-2000 in the bands identified in No.~~ ~~**S5.388**~~ would improve the overall implementation and the attractiveness of IMT-2000 to both developed and developing countries~~,~~;

c) that ITU-R has identified additional work to address further developments in advanced mobile systems including IMT-2000 applications and applications beyond IMT-2000,

~~*invites administrations*~~

~~to give due consideration to the accommodation of other services currently operating in these bands when implementing IMT-2000,~~

invites ITU-R

to continue its studies ~~with a view to developing suitable and acceptable technical characteristics for IMT-2000 that will facilitate worldwide use and roaming,~~ on further enhancements of IMT-2000 including the provision of Internet Protocol (IP) based applications and optimized arrangements for the harmonized use of spectrum identified for IMT-2000, and ensure that IMT-2000 can also meet the telecommunication needs of the developing countries and rural areas,

invites ITU-T

a) to complete its studies of signalling and communication protocols;

b) to develop a common worldwide intersystem numbering plan and associated network capabilities that will facilitate worldwide roaming,

resolves

that administrations which implement IMT-2000:

a) should make the necessary ~~frequencies~~spectrum available for system development;

b) should use those frequencies when IMT-2000 is implemented;

c) should use the relevant international technical characteristics, as identified by ITU-R and ITU-T Recommendations.

Reasons: Resolution 212 was modified to make it generally applicable to any band designated for IMT-2000 systems under RR S5.388.

Proposals for agenda item 1.6.2

Agenda item 1.6.2: Identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000.

Proposal for the identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000

Background information

At the time that the WRC-2000 agenda was established, studies were under way within TG 8/1 to examine whether global roaming could be accomplished by identifying one or more global radio control channels that could allow radios to be tuned to the appropriate frequency band. Identifying a "physical" channel was preferred in favour of using other approaches that could include the development of a "logical" channel structure for this purpose.

Based on discussions to date within TG 8/1, it has been determined that facilitation of multimode terminal operation and worldwide roaming of IMT-2000 is possible without a specific physical global radio control channel.

CAN/24/14

Canada supports the CITEL Inter-American Proposal IAP/14/15 (Document WRC2000/14, 18 January 2000).

Proposals for agenda item 1.7

Agenda item 1.7: Review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting operational, distress and safety communications, taking into account Resolution **346 (WRC-97)**.

Proposal to protect the operational, distress and safety communications in the HF bands used by the aeronautical mobile (R) and maritime mobile services

Background information

Working Party 8B and the CPM (Geneva, 1999) have identified two issues comprising this agenda item:

1) HF bands allocated for distress and safety communications of the maritime and aeronautical mobile (R) services have been subjected to an increase in harmful interference caused by unauthorized use. It is essential for the safety-of-life and property that these distress and safety channels are kept free from unauthorized use and harmful interference;

2) several maritime HF distress and safety frequencies are also used for international routine calling. The routine calling can cause interference to distress and safety communications due to the caller not being aware of ongoing traffic on the ship-calling frequency since the ship is tuned to a different receive frequency for coast station calls and replies.

In addition, both the CPM Report and the report of the SCRPM to the CPM address the issue of interference in the HF bands by providing possible methods to satisfy this agenda item. One method proposes the modification of Resolution 207 (Mob-87), where administrations would be drawn towards the fact that the interference is often due to unauthorized sources and to study solutions in assisting the mitigation of this interference. Another method calls upon the ITU-R to study the future technical and operational needs of the maritime mobile and aeronautical mobile (R) services in particular solutions providing effective and efficient distress and safety communications. Therefore, Canada and other CITEL Administrations propose the modification of Resolution 207 and the addition of new Resolution [HF].

Maritime issues

The protection of maritime HF distress and safety frequencies, in particular the frequencies 12 290 kHz and 16 420 kHz, is addressed in Resolution 346 (WRC-97). A significant source of interference to distress traffic on these frequencies is due to their use as calling frequencies. Resolution 346 calls for administrations to minimize the use of these frequencies for non-safety calling purposes by coast and ship stations.

GMDSS distress and safety frequencies are also used for calling in some of the other maritime HF bands. In each maritime HF band one channel is designated as an international calling channel pair for radiotelephony. In the 4, 6, 12 and 16 MHz bands, the distress and safety frequency is the same as the ship's transmitting frequency on the calling channel.

The radio telephony calling channels are used on a duplex basis, whilst the distress and safety frequencies are used on simplex. When a ship is calling a coast station, it transmits on the distress frequency. The problem is that at times the ship has difficulty monitoring whether there is ongoing distress traffic, because its receiver is on the corresponding coast station frequency. This problem occurs in the 4, 6, 12 and 16 MHz bands and not in the 8, 18, 22 and 25 MHz bands. The problem is being caused by the transmitting station not adhering to existing regulatory standards which require a station to listen on its transmitting frequency prior to transmitting. Equipment modification may be necessary in order to listen on the ship frequency of a duplex pair prior to transmitting on that frequency. Once initial contact has been established and working frequencies coordinated, traffic handling is accomplished directly on the coordinated working frequencies.

The CPM identified that compliance with existing Radio Regulations S52.224, which requires that a station listens before transmitting, is a method to help alleviate the interference problem. Further regulations are not required, rather enforcement of the existing regulation. CPM considered the modification of Article S52 and Appendices S13 and S17 to exclude routine calling from the HF distress and safety frequencies as a method to satisfy the agenda item. This method may require modification of existing equipment.

Canada proposed no change to divide the existing distress and calling channels into two separate frequencies - one exclusive distress and safety frequency and one international radiotelephony calling frequency. The distress frequencies should remain the same as they are at present where calling is allowed and no modifications to the distress procedures are required. Strict compliance and enforcement of existing Radio Regulations S52.224, which requires that a station listen before it transmits, would alleviate this problem.

This proposal provides the minimum modifications required in the Radio Regulations and its Appendices in order to improve the situation on the HF radiotelephony distress and safety frequencies.

CPM further encouraged the use of digital selective calling (DSC) instead of calling by radiotelephony, while recognizing that all vessels may not be fitted with DSC.

This proposal also encourages ships and coast stations to use digital selective calling. If voice calling is required, it should in the first instance be performed on the coast station working channel and then on the appropriate calling frequency.

Aeronautical issues

The interference to HF frequencies allocated to the aeronautical mobile (R) service between 2 850 kHz and 22 000 kHz appears to be the result of unauthorized non-aviation use of aeronautical mobile (R) frequencies. In some parts of the world the aeronautical mobile (R) HF frequencies are being used for land mobile, broadcast, fixed point-to-point communications and in maritime applications such as in support of fishing fleets. These unauthorized uses have resulted in frequent cases of harmful interference and have diminished the spectrum available for the aeronautical mobile (R) safety-of-life applications.

Administrations should ensure that stations of services other than the aeronautical mobile (R) service refrain from using frequencies in the bands allocated exclusively to the aeronautical mobile (R) service. Administrations should make every effort to identify and locate the source of any unauthorized emission causing harmful interference. Recognizing that such emissions are capable of endangering human life and property and the safe and regular conduct of aircraft operations, Administrations should take necessary measures to prevent stations from operating in contravention of ITU Radio Regulations.

Working Party 8B and the CPM recommend modifications of Article S15 to ensure that suitable provisions are made for the aeronautical mobile (R) service.

Canada proposes modifications to Article S15 to include reference to Appendix S27. This modification will ensure special consideration is given to avoiding interference on the frequencies used for safety and regularity of flight. Currently, Article S15 only refers to Article S31 Appendix S13, which is primarily for maritime services.

It is proposed that no change be made to Appendix S27 at this time. Presently, the HF bands allocated to the aeronautical mobile (R) service are nearly saturated by the use of analogue voice communications. This spectrum must be maintained for the new digital high frequency data link (HFDL) communications. HFDL communications will provide a capability for the transfer of air traffic control and aeronautical operational control data to and from pilots operating over oceanic airspace, on polar routes, and in airspace over sparsely populated or undeveloped countries where other communications systems are not practical. The International Civil Aviation Organization (ICAO) was to have completed Standards and Recommended Practices for HFDL. Appendix S27 contains the Allotment Plan for the aeronautical use of HF aeronautical mobile (Route) service. After WRC-2000 review of Appendix S27, if necessary, should be performed by ICAO and by ITU-R Working Party 8B and consequently considered by a subsequent WRC.

CAN/24/15

Canada supports the CITEL Inter-American Proposals IAP/14/16 to IAP/14/41 (Document WRC2000/14, 18 January 2000).

Proposals for agenda item 1.8

Agenda item 1.8: To consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands.

Proposal for communications by earth stations on board vessels using frequencies allocated to the fixed-satellite service and used by existing space segment in the fixed-satellite service

Background information

This item concerns provision of communications by earth stations on board vessels (ESVs) using frequencies allocated to the fixed-satellite service and used by the existing space segment in the fixed-satellite service. These stations operate in three distinct modes: at sea; while stationary in or near port; and in motion approaching or departing from port.

Operations at sea (beyond a certain distance for near-shore coordination) by ESVs in the fixed-satellite service do not present a potential for interference to stations in the fixed service operating in accordance with the 6 GHz FS allocation, and therefore need not be coordinated. Operations while these earth stations are stationary at predetermined points can be coordinated bilaterally with fixed service systems. Technical and regulatory issues concern the potential for interference between in-motion operations by these ESVs operating close to shore and stations in the fixed service both on and offshore.

The studies that have been conducted in ITU-R have illustrated that the values for the minimum coordination distance are principally affected by the interference criteria required to protect the fixed service and the number of passages per unit time by vessels equipped with earth stations. Based on different values for these assumptions, the results of these preliminary studies yielded a range of values for the minimum distance from 100 km to 540 km. It should be noted that studies submitted to the CPM by some administrations suggested values for the minimum distance of 150 km to 370 km. However, there should be a single minimum distance value.

CAN/24/16

Canada supports the CITEL Inter-American Proposals IAP/14/42 to IAP/14/45 (Document WRC2000/14, 18 January 2000).

Proposals for agenda item 1.9

Agenda item 1.9: To take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service (MSS) in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions **213 (Rev.WRC-95)** and **220 (WRC-97)**.

Proposal addressing the table of allocation in the 1 559-1 567 MHz frequency range (with respect to MSS) and the suppression of Resolution 220

Background information

Proposals were made to WRC-97 to reallocate portions of the 1 559-1 610 MHz band which, with the exception of a fixed service allocation in some countries, currently is exclusively allocated to the radionavigation-satellite service and aeronautical radionavigation service worldwide. Other proposals were made not to change the existing allocations in these bands. In Resolution 220 (WRC-97), the ITU-R was requested to study, as a matter of urgency, the technical criteria and operational and safety requirements to determine if sharing between the aeronautical radionavigation and radionavigation-satellite services, operating or planned to be operate, in the band 1 559-1 610 MHz, and the mobile-satellite service in a portion of the 1 559-1 567 MHz frequency range, is feasible, taking into account the essential need to protect systems operating in the aeronautical radionavigation and radionavigation-satellite services in the band 1 559-1 610 MHz.

There are millions of RNSS receivers in use today for a wide range of applications, including safety-of-life-critical navigation on land, at sea, and in the air. Today, most of these receivers operate with the global positioning system (GPS), an important element of the global navigation satellite system (GNSS) that operates in the 1 559-1 610 MHz band.

GPS provides position and time information to users by means of one-way transmissions using RNSS (space-to-Earth) allocations. GPS is information technology that uses systems of hardware and software, as well as information (time and ephemeris) transmitted from satellites to provide derived information to the user.

GLONASS and GPS are established elements of the International Civil Aviation Organization (ICAO) GNSS, operating in the band 1 559-1 610 MHz. These systems are accepted by the ICAO Council for use in international civil aviation. ICAO is currently developing standards and recommended practices for international application in civil aviation. The GNSS will be used during all phases of flight, including precision approaches and landing, and under all weather conditions. The latter places extensive requirements on the performance characteristics of the system. The aeronautical use of RNSS is recognized in the Radio Regulations as a safety-of-life application. GPS is the sole basis for the formation of International Atomic Time and Coordinated Universal Time (UTC) by the International Bureau of Weights and Measures. GPS is also the primary means by which clocks are synchronized within telecommunications networks for Time Division Multiple Access transmissions. Time and frequency functions are or will be available on other RNSS systems.

As Resolution 220 (WRC-97) recognizes RNSS and ARNS systems are evolutionary and other types of GNSS are under development for operation in the band 1 559-1 610 MHz. There are both aeronautical and non-aeronautical safety-of-life services in the 1 559-1 610 MHz band, and it is well established that there is an essential need to protect systems operating in the ARNS and RNSS.

The core signal structures of the MSS and the RNSS and ARNS are fundamentally different: MSS uses a two-way signal while ARNS and RNSS transmits a weak, receive-only signal. Having systems from a radiocommunication service operate on a co-primary, co-frequency basis in the

1 559-1 610 MHz band would limit ARNS and RNSS operators' flexibility to adjust their spectrum usage, and would hamper efforts to develop a GNSS that is capable of meeting evolving international needs and of providing adequate protection for international civil use worldwide.

Studies undertaken in the ITU addressed current aeronautical radionavigation and radionavigation-satellite service systems, as well as future radionavigation services planned for this band.

These studies reached the following conclusions:

- MSS (space-to-Earth) and ARNS/RNSS are fundamentally incompatible in any portion of the 1 559-1 567 MHz band. Not only do MSS signals disrupt ARNS/RNSS, but GNSS pseudolites disrupt MSS signals.
- The –112 dB(W/m^2/MHz) power flux-density level at the Earth's surface that is mentioned in Resolution 220 clearly would not protect existing RNSS systems (such as GPS) from harmful interference.
- The RNSS is extensively used, and is continuing to undergo a tremendous expansion which drives further evolution. These factors, along with the many critical timing, positioning, and navigation uses of RNSS sharing of the 1 559-1 610 MHz band, weigh conclusively against sharing any portion of the band segment at 1 559-1 567 MHz with any co-frequency communication service.
- The use of pseudolites in the ARNS/RNSS bands at 1 559-1 567 MHz is in its early stages, but is expected to increase in terms of numbers, geographic scope, and complete utilization of the frequency band in the near future. This use is incompatible with co-frequency MSS (space-to-Earth).

CAN/24/17

Canada supports the CITEL Inter-American Proposals IAP/14/46 to IAP/14/47 (Document WRC2000/14, 18 January 2000).

Proposals for agenda item 1.11

Agenda item 1.11: To consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions **214 (Rev.WRC-97)** and **219 (WRC-97)**.

Proposal addressing constraints on existing allocation for non-geostationary (non-GSO) MSS below 1 GHz

Background information

A number of studies have been carried out since MSS allocations for non-GSO satellite systems were first agreed at WARC-92. These have led to ITU-R Recommendations which indicate the sharing techniques which are being used by those systems to share with each other and other co-primary services.

The table below (Non-GSO MSS sharing summary) from Recommendation ITU-R M.[YA] "Methods for achieving coordinated use of multiple non-GSO MSS systems below 1 GHz and sharing with other services in existing MSS allocations" summarizes the techniques and Recommendations applied to existing MSS allocations. Many of these techniques are being employed in practice successfully.

Non-GSO MSS sharing summary

	Narrow-band	**Wideband**
Fixed and mobile (148-149.9 MHz) (455-456 MHz and 459-460 MHz in Region 2) (454-455 MHz by footnotes)	Combination: – Dynamic channel avoidance (Rec. ITU-R M.1039) – Low duty cycle – Brief message duration (Rec. ITU-R M.1185)	Combination: – Low output power density – Brief message duration – Low data rate – Filtering at satellite – Geographical separation
Fixed and mobile (137-138 MHz) (400.15-401 MHz)	Ground level pfd per RR S5.208	Ground level pfd per RR S5.208
Meteorological satellites (137-138 MHz) (400.15-401 MHz)	Assignment separation	Combination: – Low pfd at ground level – Cross polarization discrimination – Adaptive filter at satellite
Space operations Space research (137-138 MHz)	Channel avoidance	Combination: – Low pfd – Cross polarization discrimination
Space research (400.15-401 MHz)	Channel avoidance	Combination: – Low pfd – Cross polarization discrimination
Meteorological aids (400.15-401 MHz)	Channel avoidance	Combination: – Low pfd – Cross polarization discrimination

The constraints on existing allocations are reflected in the footnotes to the allocations, and in the Annex 1 to Appendix S5. These have evolved to their present form since WARC-92, and now reflect a balance with regard to sharing criteria among the primary services concerned.

These constraints have served to provide a basis for implementing non-GSO MSS systems in these bands and at the same time provide protection to other space and terrestrial services. Therefore in respect to the constraints of the MSS in existing allocations below 1 GHz, no further modifications are needed.

NOC CAN/24/18

S9.11A *e)* for a station for which the requirement to coordinate is included in a footnote of the Table of Frequency Allocations referring to this provision:

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

APPENDIX S5

ANNEX 1

1 Coordination thresholds for sharing between MSS (space-to-Earth) and terrestrial services in the same frequency bands and between non-GSO MSS feeder links (space-to-Earth) and terrestrial services in the same frequency bands

NOC CAN/24/19

1.1.1 In the bands 137-138 MHz and 400.15-401 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to terrestrial services (except aeronautical mobile (OR) service networks operated by the administrations listed in Nos. **S5.204** and **S5.206** as of 1 November 1996) is required only if the pfd produced by this space station exceeds –125 dB(W/m^2/4 kHz) at the Earth's surface.

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

NOC CAN/24/20

1.1.2 In the band 137-138 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to the aeronautical mobile (OR) service is required only if the pfd produced by this space station at the Earth's surface exceeds:

– –125 dB(W/m^2/4 kHz) for networks for which complete Appendix **3** coordination information has been received by the Bureau prior to 1 November 1996;

– –140 dB(W/m^2/4 kHz) for networks for which complete Appendix **S4**/**3** coordination information has been received by the Bureau after 1 November 1996 for the administrations referred to in § 1.1.1 above.

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

NOC CAN/24/21

1.1.3 In the band 137-138 MHz, coordination is also required for a space station on a replacement satellite of a MSS network for which complete Appendix **3** coordination information has been received by the Bureau prior to 1 November 1996 and the pfd exceeds –125 dB(W/m^2/4 kHz) at the Earth's surface for the administrations referred to in § 1.1.1 above.

Reasons: No modifications are required to the Tables of Criteria applicable to MSS allocations for the non-GSO systems below 1 GHz as found in No. S9.11A, or to the footnotes containing constraints which apply to the pertinent allocations.

Proposals for agenda item 1.12

Agenda item 1.12: To consider the progress of studies on sharing between feeder links of non-GSO MSS networks and GSO FSS networks in the bands 19.3-19.7 GHz and 29.1-29.5 GHz, taking into account Resolution **121 (Rev.WRC-97)**.

Proposal for the modification of S5.541A and the suppression of Resolution 121

Background information

Resolution 121 requests that the ITU-R conducts a study of sharing possibilities between GSO FSS and non-GSO MSS feeder links in the bands. In response ITU-R Working Party 4A of Study Group 4 has agreed a draft new Recommendation, “Mitigation techniques to facilitate coordination in the 20/30 GHz non-GSO MSS feeder links”.

The Recommendation includes the topics of adaptive power control, high gain antennas, geographic isolation, site diversity and link balancing.

This Recommendation is considered to have covered the requirements of Resolution 121 (Rev.WRC-97) and thus satisfies the agenda.

CAN/24/22

Canada supports the CITEL Inter-American Proposals IAP/14/48 to IAP/14/49 (Document WRC2000/14, 18 January 2000).

Proposals for agenda item 1.13

Agenda item 1.13: On the basis of the results of the studies in accordance with Resolutions **130 (WRC-97)**, **131 (WRC-97)** and **538 (WRC-97)**.

Proposals for agenda item 1.13.1

Agenda item 1.13.1: To review and, if appropriate, revise the power limits appearing in Articles **S21** and **S22** in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services.

Resolution 131 (WRC-97): Power flux-density limits applicable to non-geostationary fixed-satellite service systems for protection of terrestrial services in the bands 10.7-12.75 GHz and 17.7-19.3 GHz

Background information

WRC-97 provisionally adopted pfd limits to be applied to non-GSO FSS systems operating in these bands. In the 10.7-12.75 GHz band, WRC-97 applied the existing limits to both GSO and non-GSO systems, subject to further study by the ITU-R under Resolution 131 (WRC-97). In the 17.7-19.3 GHz, WRC-97 adopted more stringent pfd limits for non-GSO FSS systems with more than 100 satellites.

Many studies were performed by ITU-R to determine the appropriate pfd limits to be applied to non-GSO FSS systems in the aforementioned bands. The intent was to find suitable pfd limits that would ensure protection of the fixed service without unduly constraining the development of either service.

The CPM-99 agreed to limits for both frequency bands.

In the 10.7-12.75 GHz range, the CPM-99 concluded that the current limits in Article S21 are sufficient to protect the FS on the basis of the assumptions used in the studies. The CPM also recommended the use of a 1-MHz reference bandwidth for non-GSO system. The conclusions of the CPM are summarized below.

The current RR Article S21 per satellite pfd limits, as defined below and as discussed more fully in draft new Recommendation ITU-R SF.[Document 4-9S/AI] (Submitted to RA-2000 for approval), are adequate for the protection of the FS in the 10.7-12.75 GHz band from aggregate interference from three assumed non-homogeneous, non-GSO FSS systems. Moreover, the contribution of GSO interference to the sharing has been shown as not being significant. Studies support and validate this conclusion. These results would remain valid if the number of non-GSO FSS systems were in the range 3 to 5.

- in the 10.7-11.7 GHz band:

$$-126 \qquad \text{dB(W/m}^2\text{) per 1 MHz for } 0° \le \delta < 5°$$

$$-126 + (\delta - 5)/2 \qquad \text{dB(W/m}^2\text{) per 1 MHz for } 5° \le \delta < 25°$$

$$-116 \qquad \text{dB(W/m}^2\text{) per 1 MHz for } 25° \le \delta < 90°$$

where δ is the angle of arrival above the horizontal plane.

- in the 11.7-12.75 GHz band:

-124	$\text{dB(W/m}^2\text{) per 1 MHz for } 0° \le \delta < 5°$
$-124 + (\delta - 5)/2$	$\text{dB(W/m}^2\text{) per 1 MHz for } 5° \le \delta < 25°$
-114	$\text{dB(W/m}^2\text{) per 1 MHz for } 25° \le \delta < 90°$

where δ is the angle of arrival above the horizontal plane.

In the 17.7-19.3 GHz range, the conclusion of the CPM was that a tightening of the original Article S21 pfd limits for non-GSO FSS with large constellations (over 50 satellites) would ensure protection of the fixed service while not unduly constraining the development of non-GSO FSS systems. The JTG conclusions were:

The following per satellite pfd limits (also described in draft new Recommendation ITU-R SF.[Document 4-9S/TEMP/94]) (Submitted to RA-2000 for approval) are adequate for the protection of the FS in the 17.7-19.3 GHz band from aggregate interference from three assumed non-homogeneous non-GSO FSS systems. Moreover, the contribution of GSO interference to the sharing has been shown as not being significant. Studies support and validate this conclusion. These results would remain valid if the number of non-GSO FSS systems were in the range 3 to 5.

$-115 - \text{X}$	$\text{dB(W/m}^2\text{) per MHz for } 0° \le \delta < 5°$
$-115 - \text{X} + ((10 + \text{X})/20)(\delta - 5)/2$	$\text{dB(W/m}^2\text{) per MHz for } 5° \le \delta < 25°$
-105	$\text{dB(W/m}^2\text{) per MHz for } 25° \le \delta < 90°$

where δ is the angle of arrival above the horizontal plane and X is defined as a function of the number of satellites in the non-GSO FSS constellation, N, as follows:

–	for N ≤ 50	$X = 0$	(dB)
–	for 50 < N ≤ 288	$X = \frac{5}{119}(N - 50)$	(dB)
–	for N > 288	$X = \frac{1}{69}(N + 402)$	(dB)

The scaling function, X, was developed on the basis of non-GSO FSS constellations with 96, 288 and 840 satellites. Further simulations with different non-GSO FSS constellations comprising a wide range in the number of satellites (63, 126, 189, 252, and 504 satellites) and using the conservative pfd mask simulation method have confirmed the adequacy of this scaling function.

Further studies by some CITEL Administrations have shown that the interference levels obtained using the simple pfd mask methodologies used in the ITU-R studies are higher than those obtained using a more realistic modeling of the pfd entries. CITEL Administrations support the above pfd limits while noting that because of the operational characteristics of the non-GSO networks, interference margins will be present.

The objective is to ensure that the pfd limits in the bands 10.7-12.75 GHz and 17.8-19.3 GHz will provide adequate protection of the terrestrial services while not unduly constraining the design of non-GSO FSS networks. Since the studies conducted in ITU-R indicate that both objectives have been achieved with the masks proposed by the CPM, these limits should be adopted in Article S21 of the Radio Regulations.

Proposals:

1) It is proposed to retain the current S21 pfd limits in the 10.7-12.75 GHz range, but scaling to a 1-MHz reference bandwidth for non-GSO systems and remove references to further studies.

2) It is proposed to adopt the compromise S21 pfd limits in the 17.7-19.3 GHz band agreed to by the Joint Task Group 4-9-11 and remove references to further studies.

3) As a consequence, it is proposed to delete Resolution 131 (WRC-97).

4) Changes in the frequency band column of Table S21-4 referring to S5.494 and S5.496 are required because the fixed service is allocated in all countries of Region 3.

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TABLE **S21-4** *(continued)*

Frequency band	Service*	Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	**5°-25°**	**25°-90°**	
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	–150 ~~[14]~~	–150 + 0.5(δ – 5) ~~[14]~~	–140 ~~[14]~~	4 kHz
	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	–126	–126 + 0.5(δ – 5)	–116	1 MHz
11.7-12.5 GHz (Region 1) 12.5-12.75 GHz (Region 1 countries listed in Nos. **S5.494** and **S5.496**) 11.7-12.~~2~~7 GHz (Region 2) 11.7-12.~~2~~75 GHz (Region 3) ~~12.2-12.7 GHz (Region 2)~~	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	~~–148~~ ~~[15]~~ –124	~~–148 + 0.5(δ – 5)~~ ~~[15]~~ –124 + 0.5(δ – 5)	~~–138~~ ~~[15]~~ –114	~~4 kHz~~ 1 MHz
12.2-12.~~5~~75 GHz[7] (Region 3) 12.5-12.75 GHz[7] (Region 1 ~~and Region 3~~ countries listed in Nos. **S5.494** and **S5.496**)	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	–148 ~~[14]~~	–148 + 0.5(δ – 5) ~~[14]~~	–138 ~~[14]~~	4 kHz
15.43-15.63 GHz	Fixed-satellite (space-to-Earth)	–127	5°-20°: –127 20°-25°: –127 + 0.56(δ – 20)²	25°-29°: –113 29°-31°: –136.9 + 25 log (δ – 20) 31°-90°: –111	1 MHz
17.7-19.3 GHz[7, 8]	Fixed-satellite (space-to-Earth) Meteorological-satellite (space-to-Earth)	–115 [12bis] or ~~–125~~ –115 –X [12]	–115 + 0.5(δ – 5) [12bis] or ~~–125 + (δ – 5)~~ –115 – X + ((10 + X)/20) (δ – 5) [12]	–105 [12bis] or –105 [12]	1 MHz

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[12] **S21.16.6** ~~These values shall apply provisionally only to emissions of space stations on non-gostationary satellites in networks operating with a large number of satellites, that is systems operating with more than 100 satellites (see Resolution **131 (WRC-97)**).~~The function X is defined as a function of the number, N, of satellites in the non-GSO FSS constellation as follows:

– for N ≤ 50 $X = 0$ (dB)

– for 50 < N ≤ 288 $X = \frac{5}{119}(N - 50)$ (dB)

– for N > 288 $X = \frac{1}{69}(N + 402)$ (dB)

In the band 18.8-19.3 GHz, these limits apply to emissions of a space station on a non-geostationary FSS satellite for which complete coordination or notification information, as appropriate, has been received by the Radiocommunication Bureau after 17 November 1995, and which were not operational by that date.

Reasons: The CPM-99 Report maintains the original limits for non-GSO FSS systems in the band 18.8-19.3 GHz that were notified or operational prior to the end of WRC-95 per the decisions in Resolution 131 (WRC-97). In the band 17.7-18.8 GHz, the new limits would apply to all non-GSO systems irrespective of the date of receipt of information or date of bringing into operation.

ADD CAN/24/25

[12*bis*] **S21.16.6*bis*** These limits apply to emissions of a space station on a meteorological-satellite and on a geostationary FSS satellite. These limits also apply to emissions of a space station on a non-geostationary FSS satellite in the band 18.8-19.3 GHz for which complete coordination or notification information has been received by the Radiocommunication Bureau by 17 November 1995, or are in operation by that date.

Reasons: The above regulatory text (as contained in the CPM-99 Report) reflects the date-specific provisions currently in Resolution 131.

SUP CAN/24/26

[14] **S21.16.8**

SUP CAN/24/27

[15] **S21.16.9**

SUP CAN/24/28

RESOLUTION 131 (WRC-97)

Power flux-density limits applicable to non-geostationary fixed-satellite service systems for protection of terrestrial services in the bands 10.7-12.75 GHz and 17.7-19.3 GHz

Reasons: The provisional pfd limits in Table S21-4 are replaced with the values that, as a result of extensive ITU-R studies, were agreed by CPM-99.

ADD[12*bis*] S21.16.6*bis*, and a corresponding change in MOD[12] S21.16.6, specify the dates of application of the pfd limits in conformance with the dates established in Resolution 131 (WRC-97). Footnotes S21.16.8, S21.16.9, and Resolution 131 are no longer required.

Proposals for agenda item 1.13.2

Agenda item 1.13.2: To consider the inclusion in other frequency bands of similar limits in Articles **S21** and **S22**, or other regulatory approaches to be applied in relation to sharing situations.

CAN/24/29

There have been no technical studies carried out in frequency bands other than those considered under agenda item 1.13.1. Consequently, there should not be any limits adopted in Article S22 for frequency bands other than those identified in Resolutions 130 (WRC-97) and 538 (WRC-97) per agenda item 1.13.1.

Proposals for agenda item 1.14

Agenda item 1.14: To review the results of the studies on the feasibility of implementing non-GSO MSS feeder links in the 15.43-15.63 GHz in accordance with Resolution **123 (WRC-97)**.

Proposal for Resolution 123 (Implementing feeder links of non-geostationary satellite networks in the mobile-satellite service in the band 15.43-15.63 GHz (space-to-Earth))

Resolution 123 (WRC-97) "Feasibility of implementing feeder links of non-geostationary satellite networks in the mobile-satellite service in the band 15.43-15.63 GHz (space-to-Earth) while taking into account the protection of the radio astronomy service, the Earth exploration-satellite (passive) service and the space research (passive) service in the band 15.35-15.4 GHz"

Background information

Studies conducted subject to Resolution 123 (WRC-97) dealt with two aspects:

1) Need for the allocation to non-GSO MSS feeder links in the band 15.43-15.63 GHz (space-to-Earth).

2) Feasibility of implementing non-GSO MSS feeder links in the band 15.43-15.63 GHz (space-to-Earth) regarding protection of radio astronomy (RAS), Earth exploration-satellite (EESS) (passive) and space research (SRS) (passive) services operating in the band 15.35-15.4 GHz.

ITU-R studies have concluded that the space-to-Earth operation of non-GSO MSS feeder links in parts of the 15.43-15.63 GHz band is quite difficult and sometimes impossible, due to technical limitations that would have to be imposed on the feeder links.

The ITU-R studies complied with the provisions of Resolution 123 (WRC-97) and hence covered all issues related to agenda item 1.14. Taking into account that Resolution 123 (WRC-97) has attained its objectives and aims, it would be appropriate to suppress it.

The results of the studies, as reported in the CPM-99 Report, showed that it should be feasible to implement the existing non-GSO MSS feeder downlinks in the band 15.43-15.63 GHz taking into account the protection requirements for RAS and other passive services in this band. Providing that the existing non-GSO MSS feeder downlinks systems planning to use this band can provide the required protection to the passive services, the ITU-R studies did not identify any additional technical or operational disadvantages with respect to the existing systems.

The CPM-99 Report also concludes that, for future non-GSO MSS systems using the space-to-Earth allocation at 15.43-15.63 GHz, substantial mitigation techniques would be required to adequately protect the RAS from harmful interference.

The technical studies also concluded that, because of high levels of suppression of out-of-band emissions required, use of the band 15.43-15.63 GHz for space-to-Earth feeder links should not extend beyond non-GSO MSS satellite networks for which advanced publication information has been received by the Radiocommunication Bureau prior to WRC-2000.

Common CITEL proposals were developed to reflect this point of view.

MOD CAN/24/30

Canada supports the CITEL Inter-American Proposals IAP/14/50 to IAP/14/52
(Document WRC2000/14, 18 January 2000).

Proposals for agenda item 1.15.3

Agenda item 1.15.3: To consider the status of allocations to services other than the radionavigation-satellite service (Nos. **S5.355** and **S5.359**) in the band 1 559-1 610 MHz.

Canada encourages any administration to remove their name from footnotes S5.355 and S5.359.

Reasons: The CPM-99 Report concludes that in order to protect present and future RNSS applications in this band, the use of the fixed service in the band 1 559-1 610 MHz is not recommended. This is based on the studies conducted within the ITU-R showing some harmful co-frequency interference; it also recognizes the extensive use of RNSS and the rapid expansion of all its uses, including aeronautical and marine safety-of-life navigation.

Proposals for agenda item 1.17

Agenda item 1.17: To consider possible worldwide allocation for the earth exploration-satellite (passive) and space research (passive) services in the band 18.6-18.8 GHz, taking into account the results of the ITU-R studies.

Proposal for Earth exploration-satellite (passive) and the space research (passive) services in the band 18.6-18.8 GHz on a primary basis in Regions 1 and 3

Background information

At present, the allocations for the Earth exploration-satellite (passive) and the space research (passive) services in the band 18.6-18.8 GHz are on a primary basis in Region 2, and on a secondary basis in Regions 1 and 3.

These secondary allocations must be upgraded to primary status if the long-term ability to obtain environmental data with passive spaceborne sensors is to be preserved. Compatibility between the passive sensors and the fixed and fixed-satellite services requires adoption of constraints on the parameters of the fixed and fixed-satellite systems that use the band.

A pfd limit of –95 dBW/m^2 in a reference bandwidth of 200 MHz on geostationary systems in the fixed-satellite service will enable passive sensors to perform their mission if measurements are restricted to portions of the sensor orbit where the sensor is moving away from the equator while taking sensor data over land masses.

Similarly, limiting the power delivered to any antenna of a station in the fixed service measured across the band 18.6-18.8 GHz to not exceed 0 dBW in 200 MHz along with an antenna pattern complying with Recommendation ITU-R F.699-4 will enable sharing with the fixed service.

CAN/24/31

Canada supports the CITEL Inter-American Proposals IAP/14/53 to IAP/14/56 (Document WRC2000/14, 18 January 2000).

Proposals for agenda item 1.18

Agenda item 1.18: To consider the use of new digital technology for the maritime mobile service in the band 156-174 MHz and consequential revision of Appendix **18/S18**, taking into account Resolution **342 (WRC-97)**.

Proposal to modify Appendix S18 and Resolution 342

Background information

Appendix S18 of the ITU Radio Regulations defines the channels of the maritime mobile service. These channels support a variety of functions including "Distress, Safety and Calling: public correspondence, inter-ship, ship/shore/ship, port operations and ship movement". The maritime mobile service frequency band, 156-174 MHz, (effectively 156-162 MHz in the Americas due to previous domestic regulatory actions), supports maritime communications worldwide.

Working Party 8B and the CPM studied this agenda item and determined that the status of the ITU-R studies indicate that revisions of Appendix S18 to introduce new digital technologies is not possible at this conference. However, it is possible to take action to address the issue of congestion. With the rapidly increasing use of the VHF maritime mobile band, particularly for data communications, increased congestion and mutual interference is being experienced which, among others, has resulted in unacceptable degradation of the distress and safety related function for which this band is utilized. Unless action is taken this situation will only worsen as usage continues to grow.

At WRC-97, CITEL proposed simplex use of duplex channels for Appendix S18. This was approved for a few specific public correspondence channels only, channels 18 and 82-86. Note *m)* to Appendix S18 should be modified to add more channels for simplex use. This will allow for more efficient use of Appendix S18 channels and provide flexibility for administrations to meet their immediate requirements, while maintaining compatibility with the vast number of ships and pleasure craft now using the band in accordance with Appendix S18.

Working Party 8B and the CPM recommend modifications to Appendix S18 to provide administrations with further flexibility to use the channels of Appendix S18 in a simplex mode if required. This would allow the use of duplex channels in Appendix S18 in a simplex mode and would increase the number of available channels. The cost of the change would be minimal and administrations would be able to quickly address certain local problems of congestion. Furthermore, the conference could consider permitting, subject to non-interference and no protection, the use of some of these channels or sub-bands created by the conversion of duplex channels to simplex channels for the initial testing and possible future introduction of new technologies, subject to non-operational use. This would necessarily be subject to special arrangement between interested or affected administrations.

Canada along with the other CITEL Administrations propose to modify Note *m)* to allow simplex use of duplex channels for the remainder of the channels not already identified as simplex. The addition of a new Note [*z)*] is also proposed to allow the use of the simplex channels per Note *m)* for the testing and development of new technologies on a non-operational basis, subject to special arrangements between affected or interested administrations.

In addition, Canada proposes to modify Resolution 342 to continue the study of one or more new interoperable technologies for the maritime mobile service.

CAN/24/32

Canada supports the CITEL Inter-American Proposals IAP/14/57 to IAP/14/73 (Document WRC2000/14, 18 January 2000).

Proposals for agenda item 2

Agenda item 2: To examine the revised ITU-R recommendations incorporated by reference in the Radio Regulations in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution **27 (Rev.WRC-97)**.

Proposals to modify Resolution 27 (Rev.WRC-97) and Resolution 28 (WRC-95)

Background information

Certain provisions of the Radio Regulations make specific reference to ITU-R Recommendations. As the ITU-R Recommendations are updated, it is necessary to determine if such references should be continued, suppressed, or updated citing the revised version of the applicable ITU-R Recommendation.

Although the principle of Incorporation by Reference is widely supported by ITU members, its implementation in practice leads to various difficulties. It is important that administrations are aware of which recommendations could be candidates for incorporation by reference into the Radio Regulations. Also, administrations need to know of any ITU-R Recommendations currently incorporated by reference, which are being (or have been) revised during the current study period. Administrations would benefit greatly by being advised of such recommendations well in advance of a WRC. Therefore, a mechanism for the early identification should be established.

In order to allow administrations as much time as possible to consult their experts and to consider the implications of updating references in the Radio Regulations, to reflect changes to Recommendations which are currently incorporated by reference, the approach outlined in 1) below is proposed. Similarly, to facilitate the work of administrations in their preparation for the possible introduction of new instances where Recommendations may be incorporated by reference into the Radio Regulations, the approach outlined in 2) below is proposed.

1) Rather than have only the Radiocommunication Assembly (RA) communicate to the WRC a list of the ITU-R Recommendations currently incorporated by reference in the Radio Regulations which have been revised and approved during the elapsed study period, the Director of the Radiocommunication Bureau should provide a report to the Conference Preparatory Meeting. This report would also include a listing of those ITU-R Recommendations currently incorporated by reference which are being revised in preparation for the RA. This report would be for information only and would not confer any special status on the Recommendations listed.

2) If a Recommendation is not currently incorporated by reference into the Radio Regulations, it could only be considered for incorporation by reference if it is in response to a WRC agenda item.

MOD CAN/24/33

RESOLUTION 27 (Rev.WRC-~~97~~2000)

References to ITU-R and ITU-T Recommendations in the Radio Regulations

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that the principles of incorporation by reference were adopted by the WRC-95 and have been revised by this Conference (see Annex 1 to this Resolution);

b) that there are provisions of the Radio Regulations which employ mandatory incorporation by reference but fail to make explicit reference to the ITU-R or ITU-T Recommendations incorporated;

c) that the 199~~7~~9 Conference Preparatory Meeting (CPM-~~97~~99) for this Conference urged administrations to give further consideration to the status of material incorporated by reference:

– using the initial assessment provided by the Radiocommunication Bureau in the CPM Report and the set of principles given in Annex 1 to this Resolution;

– noting that mandatory references shall be explicit and use the appropriate regulatory language;

– taking into account the factors set out in Annex 2 to this Resolution;

d) that the Director of the Radiocommunication Bureau has drawn up a list (see Annex 1 to the CPM Report to this Conference) of the provisions of the Radio Regulations using incorporation by reference, which provides an initial assessment of the status of each reference and forms the basis for the work on appropriate referencing, examples of which are contained in Annex 3 to this Resolution;

e) that the Bureau has drawn up a list, contained in Annex 4 to this Resolution, of the ITU-R Recommendations to which explicit reference is made in the Radio Regulations,

resolves

that ITU-R and ITU-T Recommendations incorporated or proposed for incorporation by reference in the provisions of the Radio Regulations be identified and examined at WRC-~~99~~[03], with a view to establishing the correct method of reference in accordance with the principles set out in Annex 1 to this Resolution and taking into account the factors listed in Annex 2 to this Resolution, in order to complete the simplification of the Radio Regulations in respect of incorporation by reference,

further resolves

that, in the case of ITU-R Recommendations which are not currently referenced in the Radio Regulations, only those Recommendations which are in response to a WRC agenda item can be considered for incorporation by reference,

instructs the Director of the Radiocommunication Bureau

to arrange for a review of the provisions of the Radio Regulations containing references to ITU-R or ITU-T Recommendations and propose suitable recommendations to the CPM-~~99~~[02] for inclusion in its Report to WRC-~~99~~[03], using the list of provisions contained in Annex 3 to this Resolution together with the guidance contained in Annexes 1 and 2 to this Resolution, and taking into account the list of ITU-R Recommendations contained in Annex 4 to this Resolution,

urges administrations

to use the CPM Report to WRC-~~99~~[03] in order to prepare their proposals on incorporation by reference to that Conference.

ANNEX 1 TO RESOLUTION 27 (Rev.WRC-~~97~~2000)

Principles of incorporation by reference

1 Where references are non-mandatory, it is not necessary to establish specific conditions in applying the texts quoted. In such cases, reference could, for example, be made to “the latest version” of a Recommendation.

2 Mandatory references to Resolutions or Recommendations of a world radiocommunication conference (WRC) are acceptable without restriction, since such texts will have been agreed by a WRC.

3 Where mandatory references are suggested, and the relevant texts are brief, the referenced material should be incorporated in the body of the Radio Regulations.

4 If, on a case-by-case basis, it is decided to incorporate material by reference on a mandatory basis, then the following provisions shall apply:

4.1 the referenced text shall have the same treaty status as the Radio Regulations themselves;

4.2 the reference must be explicit, specifying the specific part of the text (if appropriate) and the version or issue number;

4.3 the referenced text must be adopted by the Plenary of a competent WRC, but should not be part of the Final Acts;

4.4 all texts incorporated by reference must be readily available, by being published in a separate volume;

4.5 if, between WRCs, a referenced text (e.g. an ITU-R Recommendation) is updated, the reference in the Radio Regulations shall continue to apply to the original version until such time as a competent WRC agrees to incorporate the new version of the reference. The mechanism for considering such a step is given in Resolution **28 (Rev.WRC-~~95~~2000)**.

ANNEX 2 TO RESOLUTION 27 (Rev.WRC-~~97~~2000)

Factors to be considered for the further application of incorporation by reference

In reviewing the provisions of the Radio Regulations employing references to other texts, administrations and study groups should address the following factors:

1 whether each reference is of mandatory~~, i.e. incorporated by reference,~~ or non-mandatory character;

2 whether in existing non-mandatory references, or mandatory references which are determined to be of non-mandatory character, appropriate linking language is used, e.g. the words “should” or “may”;

3 whether in existing mandatory references, or other types of reference which are determined to be of mandatory character, clear mandatory linking language is used, e.g. the word “shall”;

4 whether the incorporated ITU-R or ITU-T Recommendation(s) are explicitly identified;

5 where referenced ITU-R or ITU-T Recommendations are not explicitly identified, determine which ones should be identified;

6 whether text incorporated from ITU-R or ITU-T Recommendations should be placed directly in the Radio Regulations instead of using incorporation by reference;

7 if the ITU-R or ITU-T Recommendation to be incorporated is, as a whole, unsuitable as treaty status text, whether to limit the reference to those portions of the ITU-R or ITU-T Recommendation which are of a suitable nature or to place the mandatory portion directly in the Radio Regulations.

Reasons: To clarify that, in the case of ITU-R Recommendations which are not currently referenced in the Radio Regulations, only those Recommendations which are in response to a WRC agenda item can be considered for incorporation by reference. Also, minor consequential editorial changes have also been identified.

MOD CAN/24/34

RESOLUTION 28 (Rev.WRC-~~95~~2000)

Revision of references to ITU-R Recommendations incorporated by reference in the Radio Regulations

The World Radiocommunication Conference (~~Geneva, 1995~~Istanbul, 2000),

considering

a) that the Voluntary Group of Experts on simplification of the Radio Regulations (VGE) proposed the transfer of certain texts of the Radio Regulations to other documents, especially to ITU-R Recommendations, using the incorporation by reference procedure;

b) that, in some cases, the provisions of the Radio Regulations imply an obligation on Member States ‡ to conform to the criteria or specifications incorporated by reference;

c) that references to incorporated texts shall be explicit and shall refer to a precisely identified provision;

d) that, taking into account the rapid evolution of technology, ITU-R may revise the Recommendations incorporated by reference at short intervals;

e) that revised and approved Recommendations will not have the same legal force as the initial Recommendations, incorporated by reference until a competent world radiocommunication conference has so decided;

f) that it would be desirable to ensure, in the cases provided for in the Radio Regulations, that the provisions reflect the most recent technical developments,

noting

that Member States would benefit greatly from being advised, as early as possible, of which Recommendations have been revised and approved during the study period,

resolves

1 that each Radiocommunication Assembly shall communicate to the following world radiocommunication conference a list of the ITU-R Recommendations incorporated by reference in the Radio Regulations which have been revised and approved during the elapsed study period;

2 that, on this basis, the WRC shall examine those revised Recommendations, and decide whether or not to update the corresponding references in the Radio Regulations;

3 that, if the WRC decides not to update the corresponding references, ITU-R shall continue publishing the ITU-R Recommendations currently referenced in the Radio Regulations;

4 that WRCs shall place the examination of Recommendations in conformity with *resolves* 1 and *resolves* 2 of this Resolution on the agenda of future WRCs,

further resolves

5 to instruct the Director of the Radiocommunication Bureau to report to the CPM immediately preceding the WRC those ITU-R Recommendations already incorporated by reference in the Radio Regulations which have been revised and approved since the previous WRC, or which may be revised in time for the Radiocommunication Assembly;

6 that, in the case of ITU-R Recommendations which are not currently referenced in the Radio Regulations, only those Recommendations which are in response to a WRC agenda item can be considered for incorporation by reference,

urges administrations

to participate actively in the work of the Radiocommunication Study Groups and the Radiocommunication Assembly in the revision of those Recommendations to which mandatory references are made in the Radio Regulations.

Reasons: To establish a procedure to advise administrations, well in advance of a WRC, of those ITU-R Recommendations already incorporated by reference in the Radio Regulations which have been revised and approved since the previous WRC, or which may be revised in time for the Radiocommunication Assembly. Also to clarify that, in the case of ITU-R Recommendations which are not currently referenced in the Radio Regulations, only those Recommendations which are in response to a WRC agenda item can be considered for incorporation by reference. Minor consequential editorial changes have also been identified.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to
Document 25-E
17 April 2000
Original: English

PLENARY MEETING

Morocco (Kingdom of)

COMMON ARAB PROPOSALS FOR THE
WORK OF THE CONFERENCE

(This document was prepared under the auspices of the League of Arab States and is presented by the Kingdom of Morocco on behalf of the Members of the League of Arab States)

1 **Modify** the title of Document WRC2000/25 as presented above.

2 **Renumber** Proposals Nos. MRC/25/1 to MRC/25/93 to ARB/25/1 to ARB/25/93.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 25-E
25 February 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Morocco (Kingdom of)

(ARAB COUNTRIES COMMON PROPOSALS
FOR THE WORK OF THE CONFERENCE)

IMT-2000

(Agenda item 1.6.1)

The development of standards for a global mobile communication system (IMT-2000) is certainly an important achievement of ITU in actions taken for fulfilling its purposes. For IMT-2000 to start operating to the benefit of the public in general, WRC-2000 has a duty to identify frequency bands to be used by its terrestrial and space components.

Concerning the terrestrial component, the Arab Administrations concur with the conclusion relating to the identified bands amounting to a total of 230 MHz, i.e.

1 885-2 025 MHz;

2 110-2 200 MHz.

This amount of spectrum is considered appropriate for satisfying the main requirements of IMT-2000. It is recognized however, that there may be situations requiring identification of additional spectrum amounting to a total of 160 MHz. Requirements of IMT-2000 have been derived from studies mainly based on the success of cellular systems all over the world. These forecasts will depend greatly on the operating conditions as they may be defined by appropriate organs in ITU. For this reason it is proposed that WRC-2000 limits its decision to:

a) confirming the 230 MHz;

b) listing bands among which a future WRC may identify those to be used by IMT-2000 on the basis of the results of the operation of IMT-2000.

In order not to delay greatly the availability of these additional bands to IMT-2000, administrations should already be informed that the bands to be used by IMT-2000 among those identified in b) above shall be used by IMT-2000 after the year 2010 or at earlier date if agreed among the administrations concerned.

Concerning the satellite component, raises a series of questions that need to be addressed before bands are identified:

- some bands are allocated in the MSS with limitations by footnotes making the allocation practically secondary in some countries until 2005;
- in some bands allocated to the MSS such as 1 525-1 559 MHz/1 626.5-1 660.5 MHz and 1 610-1 626.5 MHz/2 483.5-2 500 MHz the number of existing or planned systems is such that identifying them for IMT-2000 will impose severe constraints on systems using or intending to use these bands;
- the operation of the satellite component within a global system requires agreement of a regulatory character on the operation conditions of IMT-2000. That agreement needs to be studied in the relevant ITU body.

Identification of bands for the satellite component is complex since it requires technical considerations as well as regulatory ones for which a type of agreement such as the GMPCS MoU developed under the auspices of ITU or the GSM MoU developed on a regional basis. Consequently the Conference is requested to take account of the above considerations when approaching that identification and to enter no modification to the bands listed in the precedent paragraph.

EARTH STATIONS OF THE FIXED-SATELLITE SERVICE ON BOARD VESSELS

(Agenda item 1.8)

Proposals have been made to WRC-97 and others to WRC-2000 tending to authorize earth stations in the fixed-satellite service to be operated on board vessels. Such use is not in conformity with the definition of the fixed-satellite service. In addition this operation raises many difficulties to our administrations, among which:

– the frequency bands proposed to be used for such operation are heavily used by the fixed service within the Arab countries and significant growth is expected in the future. Consequently the potential of causing severe interference to many of these systems is highly probable;

– the proposals referred to above all consider that the potential interference may be avoided by means of an appropriate coordination distance. While in the FSS the location of an earth station is known to the minutes of longitude and latitude, administrations that may suffer interference from a vessel has no mean to precisely locate the vessel.

Even in cases where the vessel can be located, the elimination of interference will require a time period which is incompatible with the economical operation of the terrestrial system affected.

The coordination procedure is complex and requires mobilization of significant human and financial resources and there is no reason that our administrations be faced to bearing these unpredictable costs for an operation in which they are not concerned.

Moreover, the number of vessels bearing earth stations may be such that the terrestrial administration will be obliged to conduct a number of coordination incompatible with its human and financial resources.

For the reasons listed above and other reasons, Arab Administrations object to the adoption by the Conference in any form of provisions authorizing the use of FSS earth stations on board vessels. Should, however, the Conference decide to adopt any action authorizing that use that authorization shall take account of the above concerns. In addition such vessels shall operate in the territorial waters only under a license to be delivered by the concerned authorities. In order to alleviate the cost required for the coordination, the administration responsible of the concerned vessel shall bear the cost of that coordination.

NON-GSO FSS IN THE PLANNED BANDS

(Agenda item 1.13)

Use of non-GSO systems in the planned bands is governed by footnotes S5.441, S5.484A, S5.487A and S5.516, Resolutions 130, 131 and 538. The procedures to be applied by these systems are described in the above Resolutions. The above procedures are interpreted as affording protection of the Plans of Appendices S30, S30A and S30B however this protection is not clearly stated. Irrespective of the limitations that may be imposed on these systems, it is considered essential that the protection of the Plans be stated in the footnotes permitting that use.

MOD MRC/25/1

S5.441 The use of the bands 4 500-4 800 MHz (space-to-Earth), 6 725-7 025 MHz (Earth-to-space) by the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by non-geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Resolution **130 (WRC-97)**. Administrations intending to develop such systems shall take appropriate steps to ensure that assignments appearing in the Plans of Appendices **S30**, **S30A** and **S30B** will be fully protected. Non-geostationary FSS systems in the above bands shall be operated in such a way that any harmful interference that may occur during their operation shall be rapidly eliminated.

MOD MRC/25/2

S5.484A The use of the bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 13.75-14.5 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), 29.5-30 GHz (Earth-to-space) by non-geostationary- and geostationary-satellite systems in the fixed-satellite service is subject to the provisions of Resolution **130 (WRC-97)**. The use of the band 17.8-18.1 GHz (space-to-Earth) by non-geostationary fixed-satellite service systems is also subject to the provisions of Resolution **538 (WRC-97)**. Administrations intending to develop such systems shall take appropriate steps to ensure that assignments appearing in the Plans of Appendices **S30**, **S30A** and **S30B** will be fully protected. Non-geostationary FSS systems in the above bands shall be operated in such a way that any harmful interference that may occur during their operation shall be rapidly eliminated.

MOD MRC/25/3

S5.487A *Additional allocation:* in Region 1, the band 11.7-12.5 GHz, in Region 2, the band 12.2-12.7 GHz and, in Region 3, the band 11.7-12.2 GHz, are also allocated to the fixed-satellite service (space-to-Earth) on a primary basis, limited to non-geostationary systems and subject to the provisions of Resolution **538 (WRC-97)**. Administrations intending to develop such systems shall take appropriate steps to ensure that assignments appearing in the Plans of Appendices **S30**, **S30A** and **S30B** will be fully protected. Non-geostationary FSS systems in the above bands shall be operated in such a way that any harmful interference that may occur during their operation shall be rapidly eliminated.

MOD MRC/25/4

S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2 by non-geostationary-satellite systems in the fixed-satellite service is subject to the provisions of Resolution **538 (WRC-97)**. Administrations intending to develop such systems shall take appropriate steps to ensure that assignments appearing in the Plans of Appendices **S30**, **S30A** and **S30B** will be fully protected. Non-geostationary FSS systems in the above bands shall be operated in such a way that any harmful interference that may occur during their operation shall be rapidly eliminated.

APPENDICES S30 AND S30A

(Agenda items 1.19, 1.19*bis*)

(Proposals in this document are limited to Appendix S30. If adopted, they have to be reflected in similar modifications to Appendix S30A.)

I Introduction

1 It is now for more than 80 years that the international community is regulating the use of the frequency spectrum through the International Radio Regulations that is part of the Basic Instruments of the International Telecommunication Union. Each time part of that spectrum become usable thanks to technological advances, the Radio Regulations was adapted to the requirements of the services using that part of the spectrum. The more a frequency band becomes heavily used the more stringent and complex are the provisions regulating its use. All the procedures developed in this continuous adaptation of the Radio Regulations to the requirements of radio services were based, and continue to be based on the equality of rights to access spectrum by all ITU Members. Since 1947 frequencies assigned by administrations to their stations are afforded a status through their notification to the International Frequency Registration Board (IFRB) and their recording in the Master International Frequency Register (MIFR). That status depended and continues to depend on the date of receipt of notifications by the IFRB the functions of which were split in 1992 between the Radio Regulations Board (RRB) and the Radiocommunication Bureau (BR). This priority of dates is expressed as the basis of "the first come, first served" approach. Different ITU conferences considered possibility of replacing this priority of date by other approaches permitting an ITU Member to access the spectrum, at any time, and to acquire the same rights as precedent users. Planning, sometimes called as "*a priori* planning", was the only possible alternative approach.

2 Proposals to ITU conferences tending to plan any frequency band were systematically opposed by big users of that band, arguing that planning is not an efficient use of the spectrum. Arab delegations in these conferences always joined its efforts to those of other developing countries supporting these proposals. It is with the same spirit that this delegation to WRC-2000 will make every effort to ensure strict application of the principles contained in the Constitution/Convention relating to the cooperation, the equality of rights in accessing the orbit/spectrum and their efficient use as well as the principles adopted by WRC-97 in its Resolution 532. Equitable access to the frequency spectrum and the orbits is for us more important than any information or commercial services provided through huge investments by private sector of other countries. Some may consider that the guarantee of access by planning is against the efficient use of spectrum, we are convinced that appropriate procedures associated to a plan will eliminate or at least greatly reduce that apparent contradiction. It is with this view that the proposals contained in this document have been prepared.

II ITU planning systems

3 Since 1947 several world or regional plans have been adopted by world or regional radiocommunication conferences. Some of them continue to be successfully applied, like the maritime and aeronautical plans. The only one that could not be adopted despite 50 years of attempts is the plan for the HF broadcasting (HFBC). When a plan is not prepared with appropriate criteria and when it is not adapted to its economical development it becomes rapidly obsolete. It was the case of the Plan of Regions 1 and 3 contained in Appendix S30. If its revision is approached

by including in the Plan any requirement, the ITU will be faced to the same problem as that of HFBC and the revision of the Plan will be impossible.

3.1 Maritime and aeronautical communications which involve the security of persons and goods were the first to require the adoption of plans, to this effect ITU adopted:

- an allotment[1] plan for the maritime service in the HF bands is contained in Appendix S25 and lists frequencies to be used in specified maritime zones;
- two allotment plans for the aeronautical mobile service in the HF bands for official traffic (OR) and for commercial traffic (R) are contained respectively in Appendices S26 and S27 which list frequencies to be used in specified aeronautical routes or zones.

3.2 Broadcasting was the only radio service for which the former Société des Nations (SDN) adopted a treaty containing some basic deontology rules to be applied by a country when broadcasting over the territory of another country. Very few countries ratified it. Before the Second World War, ITU tried, without success, to convert the principles of that treaty into a plan for the Low Frequencies (LF) and Medium Frequencies (MF) broadcasting. Broadcasting in the high frequency bands or decametric bands (HFBC) played a so important strategic role during World War II that it become evident to develop it as an international broadcasting system permitting a country to broadcast, at long distances, over the territories of other countries without need for any agreement. It was therefore necessary to develop a plan for the use of HFBC in order to avoid mutual interferences. From 1947 to 1997 several attempts were made to reach an agreement on a plan. After several years of meetings it becomes evident that planning under the required conditions (several world coverage for some countries together with the requirements of small users) was not possible and WRC-97 adopted Article S12 with improved procedures. When revising Appendix S30, it will be very useful to keep in mind the reasons for which the HFBC could not be planned, among which:

- the requirements submitted by ITU Members, these requirements increased each time a WARC increased the bands allocated to HFBC to resolve the spectrum shortage experienced by a previous conference; and
- the reluctance of a number of countries to ratify a treaty in which their respective territories are covered by transmissions of other countries without any minimal rules governing their content.

3.3 Several regional plans have been developed for the broadcasting and the maritime mobile services in the LF, MF, VHF and UHF bands. These plans are not part of the Radio Regulations they are binding only on the countries of the region concerned within the framework of Regional Agreements. They are all based on national coverage and no subregional system is authorized in these plans.

3.4 The first significant allocation of frequency bands to space services was made by WARC-71. These allocations could be agreed upon only when a compromise package was accepted for the broadcasting-satellite service. The package consisted in three parts:

[1] **S1.17** *allotment* (of a radio frequency or radio frequency channel)*:* Entry of a designated frequency channel in an agreed plan, adopted by a competent conference, for use by one or more administrations for a terrestrial or space *radiocommunication service* in one or more identified countries or geographical areas and under specified conditions.

- the planning, “stations in the broadcasting-satellite service shall be established and operated in accordance with agreements and associated plans” (*resolves* 1 of Resolution 507);
- a provisional procedure, “during the period before the entry into force of such agreements and associated plans the administrations and the Radiocommunication Bureau shall apply the procedure contained in Resolution 33”, (*resolves* 2 of Resolution 507);
- avoidance of overlaps, “In devising the characteristics of a space station in the broadcasting-satellite service, all technical means available shall be used to reduce, to the maximum, the radiation over the territory of other countries unless an agreement has been previously reached with such countries.” (S23.13)

On the basis of these allocations, WARC SAT-77 adopted the Plan contained in Appendix S30 for the broadcasting-satellite service in Regions 1 and 3. WARC Orb-88 adopted the feeder-link Plan in the fixed-satellite service contained in Appendix S30A.

3.5 The 1977 Plan was developed for national coverage with five channels for countries in Region 1 and 4 channels for countries in Region 3. A limited number of subregional systems formally accepted by the countries concerned were entered in the Plan by the 1977 Conference. They are considered as having been included in the Plan on behalf of the administrations concerned.

The procedure associated by WARC SAT-77 to the Appendix 30 Plan, for its modification, are similar to those of the Radio Regulations for the coordination of fixed-satellite systems. They are based among others on the approach of “no reply = agreement”, which have been transposed to the broadcasting satellite service in Appendix S30, without taking fully account of the legal character of the Plan as part of a treaty. That approach may be acceptable for the fixed-satellite service since the result of the coordination procedure is the recording in the MIFR, giving right to “international recognition”. It is not acceptable for a plan since, when an assignment enters in the Plan, it gives right to “international protection”, all ITU Members are bound by the treaty to protect that assignment irrespective of its content.

The limited number of channels per beam contained in Appendix S30 could not allow the economical development of satellite systems in conformity with the Plan. Taking account of the limited number of multi-administrations systems appearing in the Plan, the IFRB adopted a Rule of Procedure extending to Appendix 30 the approach of Article 11 (now S9) relating to the application of the coordination procedure by an administration “ acting on behalf of a group of named administrations” (see Rule relating to § 4.3.5). Some administrations used that opportunity to communicate to the Bureau hundreds of systems with subregional coverage, without the agreement of the countries concerned, many of these systems occupy the whole planned band. Some of these systems which have gone through the Article 4 procedure of Appendix 30 (mainly thanks to the “no reply = agreement”) have been entered in the Plan by WRC-97 without due regard to the legal implications of that action.

3.6 Provision S23.13 (former RR2674) stipulate that “In devising the characteristics of a space station in the broadcasting-satellite service, all technical means available shall be used to reduce, to the maximum, the radiation over the territory of other countries unless an agreement has been previously reached with such countries.” This provision was adopted by WARC-71 when the satellite antenna technology did not permit shaped beams. Even today, with sophisticated technology of shaped beams the overlap cannot be totally avoided. Considering the number of modifications of Appendix S30 to include sub-regional systems, it becomes necessary to distinguish between the unavoidable overlap and the intentional coverage. Annex to this document contains extracts from the RRB Rules of Procedure relating to the application of provisions of Articles S9 and S11 of the Radio Regulations to the service area. To apply S23.13 for the broadcasting-satellite service, the RRB adopted a rule extending to the "no comment = agreement" and subsequently replaced that by a rule similar to the content of Annex 1 to this document, excluding the territory of an objecting administration from the service area of the proposed system while that territory should be excluded from the coverage area to take account of the specific character of the broadcasting-satellite service and the required agreement under S23.13. Considering that the procedure of Article 4 shall start several years before the bringing into use, proposed systems are in the early stages of devise and the exclusion of territories from the coverage area should be possible in the majority of cases.

3.7 The more recent plan is the allotment plan for the fixed-satellite service in the C and ku bands adopted by WARC Orb-88. It is contained in Appendix 30B and consists of:

- Part A containing the allotments;
- Part B containing networks of existing systems; and
- List of Assignments to be associated with the Plan (see Article 5 of Appendix S30B):
  - *a)* assignments derived from allotments in Part A of the Plan;
  - *b)* assignments relating to existing systems in Part B of the Plan;
  - *c)* assignments resulting from the introduction of subregional systems;
  - *d)* assignments relating to additional uses.

As each allotment in the Plan of Appendix S30B benefits of the whole of the planned bands, the only possible modification of the Plan is limited to new ITU Members through a procedure contained in Article 7. The procedures of Appendix S30B are contained in its Article 6, they are very complex and consist of:

- Procedure for conversion of an allotment into an assignment (Section I). To each allotment is associated a set of Generalized Parameters. An assignment derived from an allotment will have more detailed characteristics and is recorded in a list.
- Procedure for the introduction of a subregional system (Section II) a subregional system is defined in Article 2 as "a satellite system created by agreement among neighbouring countries Member States of the ITU or their authorized telecommunications operating agencies and intended to provide domestic or subregional services within the geographical areas of the countries concerned." § 6.39 stipulates "All or part of the national allotments used by the subregional system shall be suspended for the period of operation of this subregional system unless it can be used in a way that does not affect allotments in the Plan or assignments made in accordance with the procedures associated with the Plan."
- Supplementary provisions applicable to additional uses in the planned bands (Section III). The procedure of this section is to be used when an administration:
  - – has a requirement whose characteristics differ from those used for the development of Part A of the Plan;
  - – intends to use a suspended allotment;
  - – intends to participate in a subregional system without suspending its allotments.

3.8 Experience gained from these planning exercises may be very useful for the revision of Appendices S30 and S30A:

- all these plans were adopted by “Service Conferences” which no longer exist in the revised Constitution/Convention. Some of these conferences were convened in two sessions. None of them, even those held in two sessions could resolve all the difficulties;
- all broadcasting plans are limited to national coverage. The subregional systems appearing in Appendix S30B were adopted by the planning conference, they did not enter the Plan through the application of a procedure;
- if real need exists for additional use of spectrum for some administrations, a frozen plan may lead these administrations to act in contravention with the Radio Regulations. Appendix S30B resolved this problem by authorizing additional uses for the duration of life of the satellite system. A similar approach can be applied when revising Appendix S30;
- when the procedures are not clear enough and do not consider practical situations they become open to interpretations.

III Proposed planning approach

4 In its Resolution 532, WRC-97 resolved that “WRC-99 should consider the results of the above studies and, if the conclusion is that such replanning is feasible, initiate an appropriate revision for completion no later than 2001”. The Inter-conference Representative Group (IRG) and the Group of Technical Experts (GTE) set up by WRC-97 in its Resolution 532 have carried out, with the assistance of the Bureau, a series of planning exercises. One of these planning exercises, communicated to the fifth meeting of the IRG, indicates that a plan is feasible on the basis of 10 contiguous channels amounting to a total spectrum of 400 MHz per coverage area in Region 1 and 12 contiguous channels amounting for 500 MHz per coverage area in Region 3. That exercise contained existing systems as defined in principle 3 of Resolution 532. **Consequently the replanning is feasible.**

The date limit for adopting a plan was the subject of difficult negotiations in WRC-97 and the year 2001 was adopted as a compromise. In this respect, WRC-97 adopted the following decisions:

a) the revision of the plan shall be initiated by WRC-99;

b) the revision shall be completed no later than 2001; and

c) Resolution 722 recommending an agenda for WRC-01 in which no reference is made to the revision of Appendices S30 and S30A.

This means that WRC-97 is referring in its Resolution 532 to a conference to be convened between WRC-99 and WRC-01. It was to that Conference that the Council was referring as “the next conference”. Such a conference is not allowed by the Constitution/Convention[2]. In addition, Resolution PLEN/9 of Minneapolis-98 fixing the program of conferences and meetings does not contain any radio conference other than the periodical ones i.e. WRC-2000 and WRC-02/03. If we

[2] The Constitution/Convention adopted the 1992 APP contained two periodical conferences: the Plenipotentiary Conferences (every four years) and World Radiocommunication Conferences (every two years). Kyoto-94 adopted a new provision permitting the convening of an extraordinary plenipotentiary conference. No similar provision exists for WRCs.

consider the number of systems communicated to ITU since WRC-95 we expect the communication of a greater number of systems prior to 2003 and the planning will be impossible to effect. **Consequently WRC-2000 is the only conference where Appendices S30 and S30A can be revised.**

During IRG-5 several additional studies have been requested. Some of these requests are reasonable and would led to positive results, others are only intended to indicate that the planning should be delayed until these studies are completed or until the difficulties identified by these studies are resolved. It is to be noted in this respect that the more the planning is delayed the more the number of cases difficult to resolve will increase The Arab Administrations are of the view that no conference, irrespective of its duration, will be able to resolve all the difficulties. For this reason they propose a dynamic planning based on the adoption by WRC-2000 of a Plan as follows:

a) The planning exercise communicated by the Bureau to the Conference on the basis of the decisions of IRG shall be considered as a draft Plan to be adopted by WRC-2000. The limited time available to the Conference will not permit it to enter in that draft Plan all the required modifications. Unresolved difficulties should be identified by the Conference as requiring further examination.

b) The Plan adopted by WRC-2000 should be limited to national coverage with 10 channels per beam in Region 1 and 12 channels per beam in Region 3.

c) Modifications of the Plan shall be limited to change of the orbital locations and entries for new ITU Members.

d) Additional uses such as use of characteristics increasing probability of harmful interference or requiring more protection, use of additional channels for national coverage, and use of subregional systems shall be entered in a list annexed to the MIFR. An entry in this list shall be made for a period of [15] years of operation and shall lapse if it is not brought into use within eight years following the first communication to the Bureau. Entries in this list shall be taken into account in any modification of the Region 1 and 3 Plan, in any modification of Region 2 Plan, in the processing of any additional use and in any coordination of a fixed-satellite system in Regions 2 and 3.

e) Systems which have been included in the planning exercise in application of principle 3 of Resolution 532 and channels, in addition to the 10 or 12 channels for which the procedure of Article 4 was successfully completed, shall be entered in the above list. Other similar systems which have not been included in the planning exercise shall be examined from the viewpoint of their compatibility with the Plan and, where appropriate, the plan will be modified in consultation with the administrations concerned shall be entered in the list.

f) IRG should be continued after WRC-2000, with the following mandate and the assistance of the Bureau:

- to review the systems having applied successfully Article 4 of Appendix S30 with the view to include them in the list annexed to the MIFR;
- in so doing, the IRG may, in consultation with the administrations concerned, modify the orbital location of those entries in the Plan and in the list annexed to the MIFR for which due diligence information was not communicated to the Bureau;
- to examine, without priority of dates, those systems communicated to the Bureau by the last day of the Conference with the view to include as many of the requested channels and orbital locations within the framework of equitable

access and avoidance of monopolization (a draft resolution will be prepared to propose more details on a manner to apply this indent);

– to report the results of these examinations, including unresolved cases, to WRC-02(03) for their consideration.

This approach is formulated in modifications to Articles 1 to 5 of Appendix S30. Similar proposals for applying the proposed planning approach to Appendix S30A will be contained in another document.

MRC/25/5

The Plan for Regions 1 and 3 resulting from the revision of Appendix **S30** shall not exceed the following number of channels per coverage area:

– 10 channels in a continuous band of 400 MHz for each country of Region 1; and

– 12 channels in a continuous band of 500 MHz for each country of Region 3.

5 Arab Administrations are convinced that the above amount of spectrum is the minimum amount of spectrum required by principle 1 of Resolution 532. At the same time it leaves enough spectrum for future additional requirements in accordance with principle 5 of the same Resolution. Taking account of the number additional uses being processed by the Bureau and possible future candidates, it will not be possible to include all of them in the Plan. Apart from the legal problems, and compatibility problems additional difficulties are generates by the existence of systems brought into use before completion of the coordination procedures. Some order is needed in respect to all these additional uses. They can be taken into consideration only through new procedures to be developed.

6 The above difficulties lead to a major question. When a Member State disagrees to the coverage of its territory by the satellite system of another Member State, can it ratify a treaty that contains that system or which will contain it through the application of a procedure? What is the actual effect of objections by that country if its territory remains in the coverage area even if it is excluded from the service area? These questions need to be considered together with the abnormal widely accepted situation in which the fixed-satellite service offers dozens of satellites providing direct-to-home (DTH) broadcasting, without being subjected to any constraint similar to S23.13, while at the same time the broadcasting-satellite service is subjected to that provision.

To free the broadcasting-satellite service from S23.13 means that that service will be similar to HFBC and this can in no way be accepted. It is therefore proposed to examine practical solutions that:

• guarantee the equitable access to the spectrum/orbit by all countries providing each of them of the same amount of spectrum in the Plan; and

• authorize, for a defined period of time, the use of additional spectrum for national or subregional coverage in a list annexed to the MIFR without the need to enter them formally in the Plan;

• achieve this balanced approach by limiting modification of the Plan to the change of the orbital location and to entries for new countries as indicated in the following proposal.

MRC/25/6

The procedures associated to the Plan for Regions 1 and 3 resulting from the revision of Appendix S30 shall provide for:

- modification of the Plan limited to the change of the orbital location and the addition of entries for new ITU Members;
- the use, for a defined period of time, of additional channels for national or subregional coverage.

ARTICLE 1

General definitions

1 For the purposes of this Appendix the following terms shall have the meanings defined below:

1.1 *1977 Conference:* World Administrative Radio Conference for the Planning of the Broadcasting-Satellite Service in the Frequency Bands 11.7-12.2 GHz (in Regions 2 and 3) and 11.7-12.5 GHz (in Region 1), called in short World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977.

1.2 *1983 Conference:* Regional Administrative Radio Conference for the Planning in Region 2 of the Broadcasting-Satellite Service in the Frequency Band 12.2-12.7 GHz and Associated Feeder Links in the Frequency Band 17.3-17.8 GHz, called in short Regional Administrative Conference for the Planning of the Broadcasting-Satellite Service in Region 2 (RARC Sat-R2), Geneva, 1983.

1.3 *1985 Conference:* First Session of the Word Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing It, Geneva, 1985, called in short WARC Orb-85.

ADD MRC/25/7

1.3A *2000 Conference:* World Radiocommunication Conference (Istanbul, 2000) called in short WRC-2000.

Reasons: In case it is considered appropriate to retain the list of all conferences having modified this Appendix.

NOC MRC/25/8

1.4 *Regions 1 and 3 Plan:* The Plan for the Broadcasting-Satellite Service in the Frequency Bands 11.7-12.2 GHz in Region 3 and 11.7-12.5 GHz in Region 1 contained in this Appendix, together with any modifications resulting from the successful application of the procedures of Article 4 of this Appendix.

NOC MRC/25/9

1.5 *Region 2 Plan:* The Plan for the Broadcasting-Satellite Service in the Frequency Band 12.2-12.7 GHz in Region 2 contained in this Appendix, together with any modifications resulting from the successful application of the procedures of Article 4 of this Appendix.

NOC MRC/25/10

1.6 *Frequency assignment in conformity with the Plan:* Any frequency assignment which appears in the Regions 1 and 3 Plan or the Region 2 Plan or for which the procedure of Article 4 of this Appendix has been successfully applied.

ADD MRC/25/11

1.7 *Subregional systems:* For the purpose of the application of the provisions of this Appendix, a subregional system in the Regions 1 and 3 planned bands is a broadcasting-satellite system intended to provide domestic or subregional services within the geographical areas of the countries concerned.

See Article 2 of Appendix S30B.

ADD MRC/25/12

1.8 *Additional use in Regions 1 and 3:* For the application of the provisions of this Appendix, additional uses in Regions 1 and 3 are:

a) use of the channels appearing in the Regions 1 and 3 Plan with characteristics different from those appearing in that Plan and which are capable of causing more interference or are more sensitive to interference than the corresponding entries in the Plan;

b) use of channels in addition to those appearing in the Plan;

c) participation in a subregional system.

Reasons: Several documents of the CPM, the IRG and GTE refer to either multi-administration system or subregional system. It becomes necessary to include in Appendices S30 and S30A a definition for this term.

ADD MRC/25/13

1.9 *Frequency assignment in conformity with this Appendix*: Any frequency assignment in the Regions 1 and 3 planned bands which is used or intended to be used in conformity with the provisions of this Appendix.

Reasons: Article 4 contains provisions through which additional uses listed in § 1.8 above are recorded in a list annexed to the MIFR. Some of them may receive a favourable finding and need to be qualified as being in conformity with Appendix S30.

ARTICLE 2

Frequency bands

2.1 The provisions of this Appendix apply to the broadcasting-satellite service in the frequency bands between 11.7 GHz and 12.2 GHz in Region 3, between 11.7 GHz and 12.5 GHz in Region 1 and between 12.2 GHz and 12.7 GHz in Region 2 and to the other services to which these bands are allocated in Regions 1, 2 and 3, insofar as their relationship to the broadcasting-satellite service in these bands is concerned.

ARTICLE 3

Execution of the provisions and associated Plans

3.1 The Member States in Regions 1, 2 and 3 shall adopt, for their broadcasting-satellite space stations[1] operating in the frequency bands referred to in this Appendix, the characteristics specified in the appropriate Regional Plan and the associated provisions.

3.2 The Member States shall not change the characteristics specified in the Region 1 and Region 3 Plans or in the Region 2 Plan, or bring into use assignments to broadcasting-satellite space stations or to stations in the other services to which these frequency bands are allocated, except as provided for in the Radio Regulations and the appropriate Articles and Annexes of this Appendix.

MOD MRC/25/14

[1] ~~In Region 2, s~~Such stations may also be used for transmissions in the fixed-satellite service (space-to-Earth) in accordance with No. **S5.492** of the Radio Regulations.

Reasons: WRC-97 extended the use of FSS to the three Regions.

ARTICLE 4

Procedure for modifications to the Plans

7 Proposed modifications to Article 4 are intended to go beyond a simple adaptation of the current procedures to the new Plan. Having a Plan that guaranty equitable access to the spectrum/orbit with 10 channels for each coverage area in Region 1 and 12 channels in Region 3, the purpose is to associate to that Plan procedures that makes the overall planning system of Appendix S30 flexible and dynamic by permitting the use of characteristics different from those appearing in the Plan, the use of additional channels and the development of subregional system; at the same time it avoids monopolization of the spectrum/orbit by a country or a group of countries. In this respect, proposed modifications to Article 4 are based on the following approaches:

- Limitation of modifications of the Plan to addition of entries for new ITU Members and the replacement of the orbital location of a beam by another one.
- When an assignment appearing in the Plan is used with different characteristics and does not cause more interference or require more protection, that use is not a modification of the Plan, it is recorded in the MIFR with appropriate remarks and continues to be protected through the protection of the characteristics appearing in the Plan.
- Uses that increase the occupation of the spectrum/orbit shall be examined and, where appropriate recorded in a list annexed to the MIFR. Such uses are not considered as modifications of the Plan and are limited to the duration of life of the corresponding satellites. They may concern:
  - assignments appearing in the Plan, used with characteristics different from those recorded and causing more interference or are more sensitive to interference;
  - use of additional channels;

– development of a subregional system by combining a number of assignments appearing in the Plan;

– development of a subregional system using additional channels/orbital locations.

• Avoidance of monopolization of the spectrum/orbit. Monopolization characterizes the case of a country, or a group of countries, who applied the procedures to cover several times a given geographical area, using the whole planned bands It can be avoided only by limiting the recording of their systems to their duration of life as is the case in Appendix S30B. Such uses shall not be entered in the Plan. It will also be the case of the use of characteristics different from those on the basis of which the Plan was developed when that use increases the probability of interference or require more protection than the corresponding entry in the Plan.

In so doing efforts were made to keep the provisions applicable to Region 2 unchanged.

Note by the Secretariat: The following proposals are intended to replace or modify and renumber the current text of Article 4 of Appendix S30. For clarity, new or renumbered paragraphs are shown here with the prefix "N", e.g. N4.1.

ADD MRC/25/15

Section I – Provisions applicable to Regions 1 and 3

ADD MRC/25/16

N4.1 The Plan for Regions 1 and 3 is based on national coverage from the geostationary-satellite orbit. The associated procedures contained in this Article are intended to promote long-term flexibility of the Plan by permitting administrations:

– to use their assignments appearing in the Plan with characteristics different from those appearing in the Plan[2*bis*],

– to satisfy requirements for additional uses;

– to develop subregional systems (in a balanced way among the countries in Regions 1 and 3); and

– to avoid, in that respect, monopolization of the planned bands and orbit by a country or a group of countries.

Reasons: Both WRC-95 and WRC-97 adopted in their respective resolutions a series of principles, some of them were applicable at the development stage of the Plan, others need to be incorporated in Appendix S30. Arab Administrations are of the view that such incorporation is essential for a correct application of the procedures of this Article. The avoidance of monopolization will be the subject to separate proposals, see § 3 *f)*.

ADD MRC/25/17

[2*bis*] When a provision of this Appendix refers to "characteristics appearing in the Plan" it refers to the characteristics appearing in the columns of the Plan as well as to other characteristics used for the development of the Plan.

Reasons: All characteristics used for the development of the Plan are not listed in the columns of the Plan.

ADD MRC/25/18

N4.2 When an administration of Regions 1 and 3 intends to make a modification to the Regions 1 and 3 Plan, i.e.:

a) to add a new entry in the Plan as a new ITU Member;

b) to replace the orbital location of its assignments in the Plan by another orbital location;

c) to cancel a frequency assignment from the Plan,

the procedure contained in this Article shall be applied before any notification of the frequency assignment is made to the Radiocommunication Bureau (see Article 5 of this Appendix).

Reasons: As the Plan is intended to ensure equitable access, the number of entries in the Plan for each country should not change. Other uses may be made through the procedure of this Article without being recorded in the Plan.

ADD MRC/25/19

N4.3 The procedure contained in this Article also applies when an administration of Regions 1 and 3 intends:

a) to use its frequency assignments appearing in the Plan with characteristics different from those appearing in the Plan; or

b) to use additional channels from the orbital location appearing in the Plan or from another one; or

c) to extend the service area of its assignments within its territories; or

d) to extend the service area of its assignments to cover the territory of other administrations;

e) to combine all or part of its assignments with those of other administrations in a subregional system to be operated from one of their respective orbital locations or from any other one.

Reasons: See section 7 above.

MOD MRC/25/20

~~4.1.1~~N4.4 Before an administration proposes to ~~include in the Plan, under the provisions of § 4.1 *b)*,~~use a new frequency assignment ~~to a space station or to include in the Plan new frequency assignments to a space station whose orbital position is not designated in the Plan for this administration,~~under the provisions of § N4.3 *b)* all the assignments to the service area involved should have been brought into service or have been notified to the Bureau in accordance with the relevant provisions of ~~the Plan~~this Appendix.

Reasons: Use of additional channels is not considered as a modification of the Plan.

SUP MRC/25/21

4.3 Proposed modifications to a frequency assignment in conformity with one of the Regional Plans or inclusion in that Plan of a new frequency assignment

Reasons: Consequence of the creation of new sections in Article 4.

SUP MRC/25/22

For Regions 1 and 3:

Reasons: Consequence of the creation of new sections in Article 4.

MOD MRC/25/23

~~4.3.1~~N4.5 An administration proposing ~~a modification to the characteristics of a frequency assignment in conformity with~~to modify the Regions 1 and 3 Plan~~, or the inclusion of a new frequency assignment in that Plan~~ by applying the provision of § N4.2 above or to use a frequency assignment by applying the provision of § N4.3 above, shall seek the agreement of those administrations whose services are considered to be affected, i.e.:

Reasons:

1 To cover the two possible situations, i.e. modification of the Plan and additional uses.

2 The present § 4.3.1.6 is listed among the administrations affected while it applies to all the listed cases. It is moved to be part of the heading paragraph N4.5.

MOD MRC/25/24

~~4.3.1.1~~N4.5.1 administrations of Regions 1 and 3 having a frequency assignment to a space station in the broadcasting-satellite service in the same or adjacent channel which is in conformity with the Regions 1 and 3 Plan, or in respect of which proposed modifications to that Plan in application of § N4.2 above have already been ~~published~~received by the Bureau in accordance with the provisions of § ~~4.3.5.1 or 4.3.6~~N4.11 of this Article; *or*

Reasons:

1 In all the procedures contained in the Radio Regulations it is the date of receipt by the Bureau as the starting date, not the date of publication.

2 As the reference is now to the date of receipt of information, there is no longer any need for the reference to 4.3.6.

ADD MRC/25/25

N4.5.2 administrations of Regions 1 and 3 having a frequency assignment to a space station in the broadcasting-satellite service in the same or adjacent channel which appears in the list mentioned in § N4.29.2, or in respect of which proposed use have already been received by the Bureau for publication in accordance with the provisions of § N4.11 of this Article; *or*

MOD MRC/25/26

~~4.3.1.2~~N4.5.3 administrations of Region 2 having a frequency assignment to a space station in the broadcasting-satellite service with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment, which is in conformity with the Region 2 Plan, or in respect of which proposed modifications to that Plan have already been published by the Bureau in accordance with the provisions of § ~~4.3.5.1 or 4.3.6~~N4.16 of this Article; *or*

NOTE - Normally, this provision should not refer to “published”, it should refer to “received” as indicated in MOD N4.5.1. The same situation exists in MOD N4.9.2. Replacement of the “published” by “received” should be considered in the Conference if Regions 1 and 3 on one side and Region 2 on the other side accept the same treatment.

SUP MRC/25/27

4.3.1.3

Reasons: As a result of new numbering.

MOD MRC/25/28

~~4.3.1.4~~N4.5.4 administrations having no frequency assignment in the broadcasting-satellite service in the channel concerned but in whose territory the power flux-density value exceeds the prescribed limit as a result of the proposed ~~modification~~use or having an assignment whose associated service area does not cover the whole of the territory of the administration, and in whose territory outside that service area the power flux-density from the broadcasting-satellite space station subject to this modification exceeds the prescribed limit as a result of the proposed modification; *or*

MOD MRC/25/29

~~4.3.1.5~~N4.5.5 administrations having a frequency assignment in the band 11.7-12.2 GHz in Region 2 or 12.2-12.5 GHz in Region 3 to a space station in the fixed-satellite service which is recorded in the Master International Frequency Register (Master Register) or which has been coordinated or is being coordinated under the provisions of No. **S9.7**, or those of § 7.2.1 of this Appendix;

SUP MRC/25/30

4.3.1.6

Reasons: See the above § MOD N4.5.

(MOD) MRC/25/31

~~4.3.2~~N4.6 The services of an administration are considered to be affected when the limits shown in Annex 1 are exceeded.

ADD MRC/25/32

Section II – Provisions applicable to Region 2

SUP MRC/25/33

For Region 2:

MOD MRC/25/34

~~4.1~~N4.7 When an administration of Region 2 intends to make a modification~~[2]~~ to~~ one of~~ the ~~Regional~~Region 2 Plan~~s~~, i.e.:

a) to modify the characteristics of any of its frequency assignments to a space station[3] in the broadcasting-satellite service which are shown in the ~~appropriate Regional~~Region 2 Plan, or for which the procedure in this Article has been successfully applied, whether or not the station has been brought into use; *or*

b) to include in the ~~appropriate Regional~~Region 2 Plan a new frequency assignment to a space station in the broadcasting-satellite service; *or*

c) to cancel a frequency assignment to a space station in the broadcasting-satellite service;

the following procedure shall be applied before any notification of the frequency assignment is made to the Radiocommunication Bureau (see Article 5 of this Appendix);

MOD MRC/25/35

~~4.1.1~~N4.8 Before an administration of Region 2 proposes to include in the Plan, under the provisions of § ~~4.1~~N4.7 *b)*, a new frequency assignment to a space station or to include in the Plan new frequency assignments to a space station whose orbital position is not designated in the Plan for this administration, all the assignments to the service area involved should have been brought into service or have been notified to the Bureau in accordance with the relevant provisions of the Plan.

Reasons: The notification procedure is contained in Article 5. It appears more logical not to consider the whole Appendix S30 as the Plan.

MOD MRC/25/36

~~4.3.3~~N4.9 An administration proposing a modification to the characteristics of a frequency assignment in conformity with the Region 2 Plan, or the inclusion of a new frequency assignment in that Plan, shall seek the agreement of those administrations whose services are considered to be affected, i.e.:

Reasons: See MOD N4.5.

MOD MRC/25/37

~~4.3.3.1~~N4.9.1 administrations of Region 2 having a frequency assignment in the Region 2 Plan to a space station in the broadcasting-satellite service in the same or adjacent channel which is in conformity with that Plan, or in respect of which proposed modifications to that Plan have already been published by the Bureau in accordance with the provisions of § ~~4.3.5.1 or 4.3.6~~N4.16 of this Article; *or*

MOD MRC/25/38

~~4.3.3.2~~N4.9.2 administrations of Regions 1 and 3 having a frequency assignment to a space station in the broadcasting-satellite service with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment, which is in conformity with the Regions 1 and 3 Plan, or in respect of which proposed modifications to that Plan have already been published by the Bureau in accordance with the provisions of § ~~4.3.5.1 or 4.3.6~~N4.16 of this Article; *or*

NOTE - See MOD N4.5.3.

ADD MRC/25/39

N4.9.3 administrations of Regions 1 and 3 having a frequency assignment to a space station in the broadcasting-satellite service in the same or adjacent channel which appears in the list mentioned in § N4.29.2, or in respect of which proposed use have already been received by the Bureau in accordance with the provisions of § N4.11 of this Article; *or*

MOD MRC/25/40

~~4.3.3.4~~N4.9.4 administrations having no frequency assignment in the broadcasting-satellite service in the channel concerned but in whose territory the power flux-density value exceeds the prescribed limit as a result of the proposed modification or having an assignment whose associated service area does not cover the whole of the territory of the administration, and in whose territory outside that service area the power flux-density from the broadcasting-satellite space station subject to this modification exceeds the prescribed limit as a result of the proposed modification; *or*

MOD MRC/25/41

~~4.3.3.5~~N4.9.5 administrations having a frequency assignment in the band 12.5-12.7 GHz in Region 1 or 12.2-12.7 GHz in Region 3 to a space station in the fixed-satellite service which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **S9.7** or those of § 7.2.1 of this Appendix; *or*

MOD MRC/25/42

~~4.3.3.6~~N4.9.6 administrations having a frequency assignment to a space station in the broadcasting-satellite service in the band 12.5-12.7 GHz in Region 3 with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment and which

a) is recorded in the Master Register, *or*

b) has been coordinated or is being coordinated under the provisions of ~~Resolution **33 (Rev.WRC-97)**~~Article **S9**, *or*

c) appears in a Region 3 Plan to be adopted at a future radiocommunication conference, taking account of modifications to that Plan which may be introduced in accordance with the Final Acts of the Conference;

SUP MRC/25/43

4.3.3.7

MOD MRC/25/44

~~4.3.4~~N4.10 The services of an administration are considered to be affected when the limits shown in Annex 1 are exceeded.

~~*For all Regions:*~~

ADD MRC/25/45

Section III – Provisions applicable to all Regions

MOD MRC/25/46

~~4.3.5~~N4.11 An administration intending to ~~modify characteristics in one of the Regional Plans~~apply provisions of § N4.2, § N4.3 or § N4.7 to a frequency assignment to a broadcasting-satellite station shall send to the Bureau, not earlier than five years but preferably not later than eighteen months before the date on which the assignment is to be brought into use, the relevant information listed in Annex 2.~~ Modifications to that Plan involving additions under § 4.1 *b)* shall lapse if the assignment is not brought into use by that date.~~

Reasons: The last sentence is transferred to ADD N4.29.

MOD MRC/25/47

~~4.3.5.1~~N4.12 Where as a result of the intended ~~modification~~use the limits defined in Annex 1 are not exceeded, this fact shall be indicated when submitting to the Bureau the information required by § ~~4.3.5~~N4.11.~~ The Bureau shall then publish this information in a special section of its Weekly Circular.~~

Reasons: The last sentence may be interpreted to apply to only this case. It is moved in a separate provision applicable to all cases.

MOD MRC/25/48

~~4.3.5.2~~N4.13 ~~In all other cases~~Where as a result of the intended use the limits in Annex 1 are exceeded the administration shall notify the Bureau of the names of the administrations whose agreement it considers should be sought in order to arrive at the agreement referred to in § ~~4.3.1~~N4.5 or § ~~4.3.3~~N4.9, as well as of those with which agreement has already been reached.

Reasons: Specify that the agreement in this case is limited to the application of Annex 1.

MOD MRC/25/49

~~4.3.6~~N4.14 The Bureau shall determine on the basis of Annex 1 the administrations whose frequency assignments are considered to be affected within the meaning of § ~~4.3.1~~N4.5 or § ~~4.3.3~~N4.9. ~~The Bureau shall include the names of those administrations with the information received under § 4.3.5.2 and shall publish the complete information in a special section of its Weekly Circular. The Bureau shall immediately send the results of its calculations to the administration proposing the modification to the appropriate Regional Plan.~~

Reasons: To cover all cases, modification to the Plan as well as other uses.

ADD MRC/25/50

N4.15 The Bureau shall also identify administrations which agreement is required in application of **S23.13**.

Reasons: Agreement under S23.13 is different from the agreement under Sections I or II of this Article. The need for such an agreement should be reflected in this Article. The Bureau already published this list, the proposal is intended to give a legal basis to the action by the Bureau.

ADD MRC/25/51

N4.16 The Bureau shall then publish the information received under § N4.11, § N4.12 and § N4.13 and the list of administrations identified in application of § N4.14 and § N4.15 in a special section of its Weekly Circular. The Bureau shall immediately send the results obtained from the application of § N4.14 and § N4.15 to the administration having initiated the application of the procedure of this Article.

Reasons: Results from the combination of this subject appearing in the precedent provisions.

(MOD) MRC/25/52

~~4.3.7~~N4.17 The Bureau shall send a telegram to the administrations listed in the special section of the Weekly Circular drawing their attention to the information it contains and shall send them the results of its calculations.

ADD MRC/25/53

N4.18 A frequency assignment of the Regions 1 and 3 Plan that is proposed to be used with characteristics different from those appearing in the Plan without increasing the probability of interference or requiring more protection than the corresponding entry in the Plan shall be recorded in the list mentioned in§ N4.29.2.

Reasons: The procedure of this Article may be applied by an administration for such a use more than three years before the bringing into use, it is necessary to record it somewhere. In accordance with ADD § N4.28.3 such a use will not be imposed a period of validity.

MOD MRC/25/54

~~4.3.8~~N4.19 An administration which feels that it should have been included in the list of administrations whose services are considered to be affected in application of Sections I and II of this Article may, giving the technical reasons for so doing, request the Bureau to include its name. The Bureau shall study this request on the basis of Annex 1 and shall send a copy of the request with an appropriate recommendation to the administration ~~proposing the modification to the appropriate Regional Plan~~having initiated the procedure of this Article.

Reasons:

1 To cover all cases, modification to the Plan as well as other uses.

2 To separate between an agreement under Sections I and II and an agreement under S23.13.

ADD MRC/25/55

N4.20 An administration which feels that it should have been included in the list of administrations which agreement is required under **S23.13**, may, giving the reasons for so doing, request the Bureau to include its name.

Reasons: For practical reasons the Plan is based on the use of minimal ellipses, while the technology permits the use of shaped beams. An administration should be authorized to request the notifying administration to use "all technical means available" and reduce the coverage over its territory.

SUP MRC/25/56

4.3.9

Reasons: All sections of Annex 1 refer to provisions requiring the application of the procedure of Article 4.

(MOD) MRC/25/57

~~4.3.10~~N4.21 The administration seeking agreement or the administration with which agreement is sought may request any additional technical information it considers necessary. The administrations shall inform the Bureau of such requests.

(MOD) MRC/25/58

~~4.3.11~~N4.22 Comments from administrations on the information published pursuant to § ~~4.3.6~~N4.16 should be sent either directly to the administration proposing the modification or through the Bureau. In any event the Bureau shall be informed that comments have been made.

MOD MRC/25/59

~~4.3.12~~N4.23 An administration identified in the application of Annex 1 that has not notified its comments either to the administration seeking agreement or to the Bureau within a period of four months following the date of the Weekly Circular referred to in § ~~4.3.5.1 or § 4.3.6~~N4.16 shall be understood to have agreed to the proposed ~~assignment~~use. This time limit may be extended:

- ~~by up to three months~~ for an administration that has requested additional information under § ~~4.3.10~~N4.21 by up to three months, or
- for an administration that has requested the assistance of the Bureau under § ~~4.3.20~~N4.35 by up to three months following the date at which the Bureau communicated the result of its action. ~~In the latter case the Bureau shall inform the administrations concerned of this request.~~

Reasons:

1 The reference to the administrations identified in application of Annex 1 is needed to indicate that it does not apply to S23.13.

2 The additional three months for an administration having requested the assistance of the Bureau shall start approximately from the moment that administration received the result of its request to the Bureau. Action by the Bureau may last several months, due to the backlog, and that administration would have no time to examine the action by the Bureau.

3 The last sentence is transferred to § N4.34.

MOD MRC/25/60

~~4.3.13~~N4.24 If, in seeking agreement, an administration modifies its initial proposal, it shall ~~again apply the provisions of § 4.3.5 and the consequent procedure with respect to~~seek the agreement of any other administration ~~whose services might be affected~~identified in application of Sections I or II or the provision § N4.15 as a result of modifications to the initial proposal.

Reasons: Need to specify the two types of agreement.

MOD MRC/25/61

~~4.3.14~~N4.25 If no comments have been received from administrations identified in the application of Annex 1 on the expiry of the periods specified in § ~~4.3.12~~N4.23, or if agreement has been reached with the administrations which have made such comments and with which agreement is necessary, the administration proposing the modification may continue with the appropriate procedure in Article 5 and shall inform the Bureau, indicating the final characteristics of the frequency assignment together with the names of the administrations with which agreement has been reached.

Reasons: To indicate that this provision applies only to agreement required under Annex 1.

ADD MRC/25/62

N4.26 In case an agreement is required under § N4.15 that agreement shall be considered as having been obtained only when the requested administration informs the Bureau of its acceptance of the proposed use.

Reasons: Agreement under S23.13 involves more than one ministerial department in many countries. As that agreement is not necessarily based on technical criteria, the administration defined in No. 1003 of the Constitution which is authorized to comment on the publication may then need to coordinate the matter at the national level. It has therefore to communicate by writing the result of that coordination as a commitment of the whole government of the country concerned.

MOD MRC/25/63

~~4.3.15~~N4.27 The agreement ~~of the administrations affected~~required in application of § N4.5, § N4.9 or § N4.15 may also be obtained in accordance with this Article, for a specified period.

Reasons: To include in this provision the two types of agreement.

MOD MRC/25/64

~~4.3.16~~N4.28 When the proposed modification to the appropriate Regional Plan or the use of a frequency assignment by a Regions 1 and 3 administration involves developing countries, administrations shall seek all practicable solutions conducive to the economical development of the broadcasting-satellite systems of these countries.

Reasons: To cover the case of a developing country proposing an additional use.

MOD MRC/25/65

~~4.3.17~~N4.29 The Bureau shall publish in a special section of its weekly circular the information received under § ~~4.3.14~~N4.24 and § N4.25 together with the names of any administrations with which the provisions of this Article have been successfully applied. ~~The frequency assignment concerned shall enjoy the same status as those appearing in the appropriate Regional Plan and will be considered as a frequency assignment in conformity with the Plan.~~

Reasons:

1 The last sentence of this provision is important and should appear in a separate provision.

2 In the case of Regions 1 and 3 it is proposed in the following provision to subject an entry in the Plan to a decision by a WRC, consequently this provision is not required.

ADD MRC/25/66

N4.29.1 Modifications of a plan shall be entered in the appropriate regional Plan, and shall enjoy the same status as those appearing in that Plan and will be considered as a frequency assignment in conformity with the Plan.

ADD MRC/25/67

N4.29.2 Other frequency uses in the Regions 1 and 3 planned bands shall be included in a list annexed to the Master International Frequency Register.

ADD MRC/25/68

N4.29.3 Except entries made in application of § N4.18, all other entries in the above list shall indicate a period of validity not exceeding [15] years except with the agreement of the affected administrations in application of the provision § N4.26.

ADD MRC/25/69

N4.30 Modifications to the Region 2 Plan involving additions under § N4.7 *b)* and uses of the Regions 1 and 3 bands entered in the list referred to in § N4.29.2, shall lapse if the new or modified assignment is not brought into use within 8 years following the receipt by the Bureau of the related information.

Reasons: The proposed modifications to the procedure of this Article are intended to give permanency to entries in the Plan. Presently, only additions to the Plan lapse after the 8-year period. There is no reason that the other modifications to the Plan should not lapse.

(MOD) MRC/25/70

~~4.3.18~~N4.31 When an administration proposing to modify the characteristics of a frequency assignment or to make a new frequency assignment receives notice of disagreement from an administration whose agreement it has sought, it should first endeavour to solve the problem by exploring all possible means of meeting its requirement. If the problem still cannot be solved by such means, the administration whose agreement has been sought should endeavour to overcome the difficulties as far as possible, and shall state the technical reasons for any disagreement if the administration seeking the agreement requests it to do so.

(MOD) MRC/25/71

~~4.3.19~~N4.32 If no agreement is reached between the administrations concerned, the Bureau shall carry out any study that may be requested by these administrations; the Bureau shall inform them of the result of the study and shall make such recommendations as it may be able to offer for the solution of the problem.

MOD MRC/25/72

~~4.3.20~~N4.33 An administration may at any stage in the procedure described, or before applying it, request the assistance of the Bureau, particularly in seeking the agreement of another administration. The Bureau shall inform the administrations concerned of this request.

(MOD) MRC/25/73

~~4.3.21~~N4.34 The relevant provisions of Article 5 of this Appendix shall be applied when frequency assignments are notified to the Bureau.

MOD MRC/25/74

~~4.4~~Section IV – Cancellation of frequency assignments

MOD MRC/25/75

N4.35 When a frequency assignment in conformity with one of the Regional Plans or in the list mentioned in § N4.29.2 is no longer required, whether or not as a result of a modification, the administration concerned shall immediately so inform the Bureau. The Bureau shall publish this information in a special section of its weekly circular and delete the assignment from the appropriate Regional Plan.

ADD MRC/25/76

N4.36 At the issue of the period indicated in § N4.29.3 as the date of termination of operation of an assignment, the Bureau shall, after consultation of the administration concerned, delete the assignment from the list mentioned in § N4.29.2.

MOD MRC/25/77

~~4.5~~Section V.1 – Master copy of the Plans and the list mentioned in § N4.29.2

MOD MRC/25/78

~~4.5.1~~N4.37 *a)* The Bureau shall maintain an up-to-date master copy of the Regions 1 and 3 Plan taking account of the application of the procedure specified in this Article. The Bureau shall publish a document listing the ~~amendments to be made to the Plan as a result of~~ modifications to the Plan made in accordance with the procedure in this Article.

b) The Bureau shall maintain an up-to-date master copy of the Region 2 Plan, including the overall equivalent protection margins of each assignment, taking account of the application of the procedure specified in this Article. This master copy shall contain the overall equivalent protection margins derived from the Plan as established by the 1983 Conference and those derived from all modifications to the Plan as a result of the successful completion of the modification procedure described in this Article. The Bureau shall prepare a document listing the amendments to be made to the Plan as a result of modifications made in accordance with the procedure described in this Article.

Reasons: The terms "amendments to be made" leaves the impression that, following that publication, some organ will modify the Plan which is not correct. It is for Region 2 to consider if the same change should be made to the last sentence of *b).*

SUP MRC/25/79

4.5.2

Reasons: The Plan is already contained in the Radio Regulations and is published after each WRC in a consolidated Regulations. This provision should be retained only if the publication mentioned in it replaces the publication of the original Plans every two years in the consolidated Radio Regulations.

ADD MRC/25/80

N4.38 The Bureau shall maintain an up-to-date master copy of the list mentioned in § N4.29.2 and shall publish an up-to-date version of that list in an appropriate form when justified by the circumstances.

ARTICLE 5

Notification, examination and recording in the Master International Frequency Register of frequency assignments to space stations in the broadcasting-satellite service

NOC

5.1 to **5.2.1**

NOC MRC/25/81

5.2.1 *a)*

NOC MRC/25/82

5.2.1 *b)*

MOD MRC/25/83

c) with respect to its conformity with the ~~appropriate Regional~~Region 2 Plan, however, having characteristics differing from those in the appropriate Regional Plan in one or more of the following aspects:

- use of a reduced e.i.r.p.,
- use of a reduced coverage area entirely situated within the coverage area appearing in the appropriate Regional Plan,
- use of other modulating signals in accordance with the provisions of § 3.1.3 of Annex 5,
- use of the assignment for transmission in the fixed-satellite service in accordance with No. **S5.492**,
- use of an orbital position under the conditions specified in paragraph B of Annex 7; *or*

NOC MRC/25/84

5.2.1 *d)*

ADD MRC/25/85

e) with respect to its conformity with the list mentioned in § N4.29.2 in cases covered by § N4.18.

Reasons: Assignments of Regions 1 and 3 which are recorded in the list in application of § N4.18 are similar to assignments of Region 2 referred to 5.2.1 *c)*.

ADD MRC/25/86

f) with respect to its conformity with the list mentioned in § N4.29.2 in all other cases.

MOD MRC/25/87

5.2.2 Where the Bureau reaches a favourable finding with respect to § 5.2.1 *a)* and 5.2.1 *b)*, the frequency assignment~~ of an administration~~ shall be recorded in the Master Register. The date of receipt of the notice by the Bureau shall be entered in Column 2d. In relations between administrations, all frequency assignments brought into use in conformity with the appropriate Regional Plan and recorded in the Master Register shall be considered to have the same status irrespective of the dates entered in Column 2d for such frequency assignments.

Reasons: Unnecessary.

MOD MRC/25/88

5.2.2.1 Where the Bureau reaches a favourable finding with respect to § 5.2.1 *a)* and 5.2.1 *c)* or 5.2.1 *e)*, the frequency assignment shall be recorded in the Master Register. The date of receipt of the notice by the Bureau shall be entered in Column 2d. In relations between administrations, all frequency assignments brought into use in conformity with ~~the appropriate Regional Plan and recorded in the Master Register~~this provision shall be considered to have the same status irrespective of the dates entered in Column 2d for such frequency assignments. When recording these assignments, the Bureau shall indicate by an appropriate symbol the characteristics having a value different from that appearing in the appropriate Regional Plan.

Reasons: Assignments covered by 5.2.1 *c)* have the same status as those covered by 5.2.1 *e)*.

MOD MRC/25/89

5.2.2.2 Where the Bureau reaches a favourable finding with respect to § 5.2.1 *a)* but an unfavourable finding with respect to § 5.2.1 *b)* and 5.2.1 *c)*, it shall examine the notice with respect to the successful application of the provisions of Resolution **42 (Rev.Orb-88)**. A frequency assignment for which the provisions of Resolution **42 (Rev.Orb-88)** have been successfully applied shall be recorded in the Master Register with an appropriate symbol to indicate its interim status. The date of receipt of the notice by the Bureau shall be entered in Column 2d. In relations between administrations all frequency assignments ~~brought into use following the successful application of the provisions of Resolution **42 (Rev.Orb-88)** and recorded in the Master Register~~recorded in application of this provision or the provision of § 5.2.2.3 shall be considered to have the same status irrespective of the dates entered in Column 2d for such frequency assignments.

Reasons: Assignments of Regions 1 and 3 appearing in the list and those of Region 2 having successfully applied Resolution 42 are of the same interim character and should have the same treatment.

ADD MRC/25/90

5.2.2.3 Where the Bureau reaches a favourable finding with respect to § 5.2.1 *f)* the assignment shall be recorded in the Master Register with an appropriate symbol to indicate its interim status. The date of receipt of the notice by the Bureau shall be entered in Column 2d. In relations between administrations all frequency assignments recorded in application of this provision or the provision of § 5.2.2.2 shall be considered to have the same status irrespective of the dates entered in Column 2d for such frequency assignments.

Reasons: See § 5.2.2.2. If this approach is adopted by the Conference, Resolution 519 may be cancelled.

NOC

5.2.3

MOD MRC/25/91

5.2.4 Where the Bureau reaches an unfavourable finding with respect to § 5.2.1 *a)*, 5.2.1 *b)* ~~and~~, 5.2.1 *c)*, 5.2.1 *e)* and 5.2.1 *f)*, the notice shall be returned immediately by airmail to the notifying administration with the reasons of the Bureau for this finding and with such suggestions as the Bureau may be able to offer with a view to a satisfactory solution of the problem.

MOD MRC/25/92

5.2.5 Where the notifying administration resubmits the notice and the finding of the Bureau becomes favourable with respect to the appropriate parts of § 5.2.1, the notice shall be treated as in § 5.2.2, 5.2.2.1 ~~or~~, 5.2.2.2, 5.2.2.3, as appropriate.

MOD MRC/25/93

5.2.6 If the notifying administration resubmits the notice without modification and insists on its reconsideration, and if the Bureau's finding with respect to § 5.2.1 remains unfavourable, the notice is returned to the notifying administration in accordance with § 5.2.4. In this case, the notifying administration undertakes not to bring into use the frequency assignment until the condition specified in § 5.2.5 is fulfilled. For Regions 1, 2 and 3, in the event that the Bureau has been informed of agreement to modification of the Plan for a specified period of time in accordance with ~~Article 4~~§ N4.27 or for the period of validity appearing in the list mentioned in § N4.29.2, the frequency assignment shall be recorded in the Master Register with a note indicating that the frequency assignment is valid only for the period specified. The notifying administration using the frequency assignment over a specified period shall not subsequently invoke this fact to justify the continued use of the frequency beyond the period specified unless it obtains the agreement of the administration(s) concerned.

NOC

5.2.7 to 5.3.2

ANNEX

Extract from the RRB Rules of Procedure relating to the exclusion of the territory of an administration from the service area of satellite system of the fixed-satellite service

S9.50

Comments relating to the exclusion of the territory of a country from the service area of a space station

1 When an Administration B requests the Bureau to exclude its territory from the service area of a space station of an Administration A, this raises the following questions:

– should that comment have any effect on the identification of the administrations concerned in the coordination process or on the assessment of the level of harmful interference?

– what action shall the Bureau take in respect of it?

2 The question of a request concerning the exclusion of the territory of a country from the service area of a space station can be studied at two different levels:

– the compatibility between services and stations and the related status that may be derived from the application of the procedures contained in the Radio Regulations, on one hand, and

– the principles embodied in the Preamble to the Convention and the Radio Regulations as well as in Resolution **1 (Rev.WRC-97)** in respect of the sovereign right of each country to use the frequency spectrum and the geostationary satellite orbit, on the other hand.

3 Compatibility matters are well defined in the Radio Regulations; they involve:

– power flux-density limitations which are deemed to avoid any problem of incompatibility without any recourse to coordination with terrestrial services;

– coordination between administrations using or intending to use stations of the same service or of different services sharing the same frequency band;

– examination by the Bureau of the probability of harmful interference in cases where, for one reason or another, agreement on coordination could not be reached between the administrations concerned.

4 The identification by the Bureau of administrations involved in a coordination process and the assessment of the probability of harmful interference are based on the technical characteristics notified by administrations. The extent to which a comment intended to reduce the service area of a space station may affect the application of Articles **S9** and **S11** should be considered on the basis of a distinction to be made between the “coverage area” and the “service area”. The coverage area results from limitations imposed by the design of the space station, and a certain degree of overlapping of territories of other countries not intending to participate in the system may be unavoidable. The Board understands that, in designing any space station, the administration concerned applies No. **S15.5,** which stipulates that “radiation in and reception from unnecessary directions shall be minimized by taking the maximum practical advantage of the properties of directional antennas whenever the nature of the service permits”. If an Administration B, not participating in a given satellite network, considers that the network was not designed to

minimize the overlapping which resulted in an unnecessary coverage of its territory, the Bureau can only transmit such comment to Administration A without any action from its side.

5 In relation to the sovereignty of the Administration B to authorize earth stations to be installed on its territory, the Bureau assumes that, in accordance with Resolution **1 (Rev.WRC-97),** an agreement existed between the two administrations. Administration B is entitled to react and indicate to the Bureau that such an agreement does not exist; however, the Bureau has no authority to modify a characteristic notified by Administration A without its agreement. If the latter refuses to modify the service area, the Bureau can only note this situation. (The licensing authority, irrespective of the application of the procedures of Article **S9**, remains under the responsibility of Administration B. See also comment under the Rules of Procedure concerning Resolution **1 (Rev.WRC-97)**.

6 In conclusion, when Administration B makes comments intending to exclude its territory from the service area of the space station of Administration A, the Bureau:

– shall consider such comments receivable and that it is a matter to be resolved between the administrations concerned;

– shall inform Administration A of the comments received requesting consultations between the administrations concerned (Administrations A and B) and will modify the service area only if Administration A agrees;

– shall enter a remark to indicate this situation when publishing a Special Section;

– shall consider, unless it receives a subsequent notification to the contrary, that there is no agreement between Administrations A and B under Resolution **1 (Rev.WRC-97)** for the use of the territory of Administration B by earth stations associated with the satellite network in question.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

**Document 26-E*
21 February 2000
Original: English**

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Namibia (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

REQUESTS FOR MODIFICATION OF FOOTNOTES
(WRC-2000 AGENDA ITEM 1.1)

MOD NMB/26/1

S5.322 In Region 1, in the band 862-960 MHz, stations of the broadcasting service shall be operated only in the African Broadcasting Area (see Nos. **S5.10** to **S5.13**) excluding Algeria, Egypt, Spain, Libya, Morocco, Namibia, Nigeria, South Africa, Tanzania and Zimbabwe, subject to agreement obtained under No. **S9.21**.

OR

SUP NMB/26/2

S5.322

Reasons: Namibia proposes the deletion of S5.322 as the upper limit of the broadcasting band in the African countries is 862 MHz.

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* Pursuant to Resolution 26 (Rev.WRC-97) the Secretariat notes that this contribution was received on 21 February 2000.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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22 February 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

United Kingdom of Great Britain and Northern Ireland

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.1 - Requests from administrations to delete their country footnotes or to have their country's name deleted from footnotes, if no longer required, in accordance with the limits of Resolution 26 (Rev.WRC-97)

Introduction

In Circular Letter CR/131, the Radiocommunication Bureau requests administrations to review those footnotes to the Table of Frequency Allocations (Article **S5** of the Radio Regulations) where their country names appear in order to identify any footnotes that may be reduced in scope or deleted. The need for a regular review of footnotes was established by Resolution **26** at WRC-95 and reaffirmed at WRC-97.

Proposals

The United Kingdom Administration has reviewed the footnotes and makes the following proposals in respect of those footnotes which include explicit references to the "United Kingdom":

NOC G/27/1

S5.96 In Germany, Armenia, Azerbaijan, Belarus, Denmark, Estonia, Finland, Georgia, Hungary, Ireland, Israel, Jordan, Kazakstan, Latvia, Lithuania, Malta, Moldova, Norway, Uzbekistan, Poland, Kyrgyzstan, Slovakia, the Czech Republic, the United Kingdom, Russian Federation, Sweden, Tajikistan, Turkmenistan and Ukraine, administrations may allocate up to 200 kHz to their amateur service in the bands 1 715-1 800 kHz and 1 850-2 000 kHz. However, when allocating the bands within this range to their amateur service, administrations shall, after prior consultation with administrations of neighbouring countries, take such steps as may be necessary to prevent harmful interference from their amateur service to the fixed and mobile services of other countries. The mean power of any amateur station shall not exceed 10 W.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/2

S5.162A *Additional allocation:* in Germany, Austria, Belgium, Bosnia and Herzegovina, China, Vatican, Denmark, Spain, Estonia, Finland, France, Ireland, Iceland, Italy, Latvia, The Former Yugoslav Republic of Macedonia, Liechtenstein, Lithuania, Luxembourg, Moldova, Monaco, Norway, the Netherlands, Poland, Portugal, Slovakia, the Czech Republic, the United Kingdom, Russian Federation, Sweden, Switzerland and Turkey, the band 46-68 MHz is also allocated to the radiolocation service on a secondary basis. This use is limited to the operation of wind profiler radars in accordance with Resolution **217 (WRC-97)**.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/3

S5.164 *Additional allocation:* in Albania, Germany, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Côte d'Ivoire, Denmark, Spain, Finland, France, Gabon, Greece, Ireland, Israel, Italy, Jordan, Lebanon, Libya, Liechtenstein, Luxembourg, Madagascar, Mali, Malta, Morocco, Mauritania, Monaco, Nigeria, Norway, the Netherlands, Poland, Syria, the United Kingdom, Senegal, Slovenia, Sweden, Switzerland, Swaziland, Togo, Tunisia, Turkey and Yugoslavia the band 47-68 MHz, in Romania the band 47-58 MHz and in the Czech Republic the band 66-68 MHz, are also allocated to the land mobile service on a primary basis. However, stations of the land mobile service in the countries mentioned in connection with each band referred to in this footnote shall not cause harmful interference to, or claim protection from, existing or planned broadcasting stations of countries other than those mentioned in connection with the band.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/4

S5.210 *Additional allocation:* in Austria, France, Italy, Liechtenstein, Slovakia, the Czech Republic, the United Kingdom and Switzerland, the bands 138-143.6 MHz and 143.65-144 MHz are also allocated to the space research service (space-to-Earth) on a secondary basis.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/5

S5.211 *Additional allocation:* in Germany, Saudi Arabia, Austria, Bahrain, Belgium, Bosnia and Herzegovina, Denmark, the United Arab Emirates, Spain, Finland, Greece, Ireland, Israel, Kenya, Kuwait, The Former Yugoslav Republic of Macedonia, Liechtenstein, Luxembourg, Mali, Malta, Norway, the Netherlands, Qatar, the United Kingdom, Slovenia, Somalia, Sweden, Switzerland, Tanzania, Tunisia, Turkey and Yugoslavia, the band 138-144 MHz is also allocated to the maritime mobile and land mobile services on a primary basis.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/6

S5.221 Stations of the mobile-satellite service in the band 148-149.9 MHz shall not cause harmful interference to, or claim protection from, stations of the fixed or mobile services operating in accordance with the Table of Frequency Allocations in the following countries: Albania, Algeria, Germany, Saudi Arabia, Australia, Austria, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Benin, Bosnia and Herzegovina, Brunei Darussalam, Bulgaria, Cameroon, China, Cyprus, Congo, the Republic of Korea, Croatia, Cuba, Denmark, Egypt, the United Arab Emirates, Eritrea, Spain, Estonia, Ethiopia, Finland, France, Gabon, Ghana, Greece, Guinea, Guinea Bissau, Hungary, India, the Islamic Republic of Iran, Ireland, Iceland, Israel, Italy, Jamaica, Japan, Jordan, Kazakstan, Kenya, Kuwait, Latvia, The Former Yugoslav Republic of Macedonia, Lebanon, Libya, Liechtenstein, Luxembourg, Malaysia, Mali, Malta, Mauritania, Moldova, Mongolia, Mozambique, Namibia, Norway, New Zealand, Oman, Uganda, Uzbekistan, Pakistan, Panama, Papua New Guinea, Paraguay, the Netherlands, Philippines, Poland, Portugal, Qatar, Syria, Kyrgyzstan, Slovakia, Romania, the United Kingdom, Russian Federation, Senegal, Sierra Leone, Singapore, Slovenia, Sri Lanka, South Africa, Sweden, Switzerland, Swaziland, Tanzania, Chad, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Ukraine, Viet Nam, Yemen, Yugoslavia, Zambia, and Zimbabwe.

Reasons: In order to safeguard existing services, it is imperative that the relative status of assignments in the band 148-149.9 MHz do not change. Frequency use in the United Kingdom is planned to continue on the basis of the protection afforded by the footnote to stations of the fixed or mobile services operating in accordance with the Table of Frequency Allocations.

NOC G/27/7

S5.235 *Additional allocation:* in Germany, Austria, Belgium, Denmark, Spain, Finland, France, Israel, Italy, Liechtenstein, Malta, Monaco, Norway, the Netherlands, the United Kingdom, Sweden and Switzerland, the band 174-223 MHz is also allocated to the land mobile service on a primary basis. However, the stations of the land mobile service shall not cause harmful interference to, or claim protection from, broadcasting stations, existing or planned, in countries other than those listed in this footnote.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/8

S5.269 *Different category of service:* in Australia, the United States, India, Japan and the United Kingdom, the allocation of the bands 420-430 MHz and 440-450 MHz to the radiolocation service is on a primary basis (see No. **S5.33**).

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/9

S5.296 *Additional allocation:* in Germany, Austria, Belgium, Cyprus, Denmark, Spain, Finland, France, Ireland, Israel, Italy, Libya, Malta, Morocco, Monaco, Norway, the Netherlands, Portugal, Syria, the United Kingdom, Sweden, Switzerland, Swaziland and Tunisia, the band 470-790 MHz is also allocated on a secondary basis to the land mobile service, intended for applications ancillary to broadcasting. Stations of the land mobile service in the countries listed in this footnote shall not cause harmful interference to existing or planned stations operating in accordance with the Table of Frequency Allocations in countries other than those listed in this footnote.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/10

S5.302 *Additional allocation:* in the United Kingdom, the band 590-598 MHz is also allocated to the aeronautical radionavigation service on a primary basis. All new assignments to stations in the aeronautical radionavigation service, including those transferred from the adjacent bands, shall be subject to coordination with the Administrations of the following countries: Germany, Belgium, Denmark, Spain, France, Ireland, Luxembourg, Morocco, Norway and the Netherlands.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/11

S5.314 *Additional allocation*: in Austria, Italy, Uzbekistan, the United Kingdom and Swaziland, the band 790-862 MHz is also allocated to the land mobile service on a secondary basis.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

SUP G/27/12

S5.408

Reasons: No further requirement for such use in the United Kingdom.

NOC G/27/13

S5.431 *Additional allocation:* in Germany, Israel, Nigeria and the United Kingdom, the band 3 400-3 475 MHz is also allocated to the amateur service on a secondary basis.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/14

S5.447 *Additional allocation:* in Germany, Austria, Belgium, Denmark, Spain, Finland, France, Greece, Israel, Italy, Japan, Jordan, Lebanon, Liechtenstein, Luxembourg, Malta, Morocco, Norway, Pakistan, the Netherlands, Portugal, Syria, the United Kingdom, Sweden, Switzerland and Tunisia, the band 5 150-5 250 MHz is also allocated to the mobile service, on a primary basis, subject to agreement obtained under No. **S9.21**.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/15

S5.451 *Additional allocation:* in the United Kingdom, the band 5 470-5 850 MHz is also allocated to the land mobile service on a secondary basis. The power limits specified in Nos. **S21.2**, **S21.3**, **S21.4** and **S21.5** shall apply in the band 5 725-5 850 MHz.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/16

S5.467 *Alternative allocation:* in the United Kingdom, the band 8 400-8 500 MHz is allocated to the radiolocation and space research services on a primary basis.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/17

S5.501 *Additional allocation:* in Austria, Azerbaijan, Bulgaria, Hungary, Japan, Mongolia, Kyrgyzstan, Romania, the United Kingdom, Turkmenistan and Ukraine, the band 13.4-14 GHz is also allocated to the radionavigation service on a primary basis.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/18

S5.508 *Additional allocation:* in Germany, Austria, Bosnia and Herzegovina, France, Greece, Ireland, Iceland, Italy, The Former Yugoslav Republic of Macedonia, Libya, Liechtenstein, Portugal, the United Kingdom, Slovenia, Switzerland, Turkey and Yugoslavia, the band 14.25-14.3 GHz is also allocated to the fixed service on a primary basis.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/19

S5.536B In Germany, Saudi Arabia, Austria, Belgium, Brazil, Bulgaria, China, the Republic of Korea, Denmark, Egypt, United Arab Emirates, Spain, Estonia, Finland, France, Hungary, India, Islamic Republic of Iran, Ireland, Israel, Italy, Jordan, Kenya, Kuwait, Lebanon, Libya, Liechtenstein, Lithuania, Moldova, Norway, Oman, Uganda, Pakistan, the Philippines, Poland, Portugal, Syria, Slovakia, Czech Republic, Romania, the United Kingdom, Singapore, Sweden, Switzerland, Tanzania, Turkey, Viet Nam and Zimbabwe, earth stations operating in the Earth exploration-satellite service in the band 25.5-27 GHz shall not claim protection from, or constrain the use and deployment of, stations of the fixed and mobile services.

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/20

S5.546 *Different category of service:* in Saudi Arabia, Armenia, Azerbaijan, Belarus, Bulgaria, Egypt, United Arab Emirates, Spain, Estonia, Finland, Georgia, Hungary, the Islamic Republic of Iran, Israel, Jordan, Kazakstan, Latvia, Lebanon, Moldova, Mongolia, Uzbekistan, Poland, Syria, Kyrgyzstan, Romania, the United Kingdom, Russian Federation, Tajikistan, Turkmenistan, Turkey and Ukraine, the allocation of the band 31.5-31.8 GHz to the fixed and mobile, except aeronautical mobile, services is on a primary basis (see No. **S5.33**).

Reasons: Use in the United Kingdom is planned to continue in line with the footnote.

NOC G/27/21

S5.563 *Additional allocation:* in the United Kingdom, the band 182-185 GHz is also allocated to the fixed and mobile services on a primary basis.

Reasons: The planned use of this band in the United Kingdom has not changed. The United Kingdom will review this footnote at a future world radiocommunication conference when the relevant ITU-R sharing studies have been completed.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 28-E
21 February 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Switzerland (Confederation of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

POINT 4

(in accordance with Resolution 95 (WRC-97), to review
the resolutions and recommendations of previous conferences
with a view to their possible revision, replacement or abrogation)

1 Introduction

Pursuant to Resolution 95 (WRC-97), the Director, BR presented for comment and advice an updated report (Document RAG2000-1/6) on the general review of WARC/WRC resolutions and recommendations to the Radiocommunication Advisory Group (RAG) in January 2000. With regard to Resolution 10 (WARC-79), the International Committee of the Red Cross (ICRC) introduced a document (Document RAG2000-1/24) arguing that this Resolution should be retained. The RAG meeting agreed that Resolution 10 (WARC-79) was still needed, but considered that an update of the text would be necessary in order to take into account changes in technology and terminology.

2 Proposal

It is proposed that WRC-2000 considers the updated version of Resolution 10 contained in the annex to this document.

Annex: 1

ANNEX

MOD SUI/28/1

RESOLUTION 10

Relating to the use of ~~radiotelegraph and radiotelephone links~~Wireless Two-Way Telecommunications by the ~~Red Cross, Red Crescent, and Red Lion and Sun organizations~~International Red Cross and Red Crescent Movement

The World ~~Administrative~~ Radiocommunication Conference, ~~Geneva~~(Istanbul, ~~1979~~2000),

considering

a) that the worldwide ~~relief work of~~humanitarian operations carried out by the International Red Cross~~,~~ and Red Crescent~~, and Red Lion and Sun organizations is~~ Movement - composed of the International Committee of the Red Cross, the International Federation of Red Cross and Red Crescent Societies and National Red Cross and Red Crescent Societies - are of ~~increasing~~great importance and often indispensable;

b) that in such circumstances normal communication facilities are frequently overloaded, damaged, completely interrupted or not available;

c) that it is necessary to facilitate by all possible measures the reliable intervention of these national and international organizations;

d) that rapid and independent contact is essential to the intervention of these organizations;

e) that for ~~international relief work of the Red Cross, it is necessary that the national Red Cross, Red Crescent, and Red Lion and Sun organizations be able to communicate with each other as well as with the International Committee of the Red Cross and the League of Red Cross Societies~~the efficient and safe conduct of their humanitarian operations these organizations rely heavily on wireless two-way telecommunication facilities, particularly on an extensive HF and VHF radio network,

decides to urge administrations

1 to take account of the possible needs of the International Red Cross and~~,~~ Red Crescent~~, and Red Lion and Sun organizations~~ Movement for wireless two-way telecommunication ~~by radio means~~ when normal communication facilities are interrupted or not available;

2 to assign to these organizations the minimum number of necessary working frequencies in accordance with the ~~Table of Frequency Allocations; in the case of fixed circuits between 3 MHz and 30 MHz, the frequencies shall be selected, as far as possible, adjacent to the amateur bands~~Radio Regulations;

3 to take all practicable steps to protect such ~~links~~communications from harmful interference.

____

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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27 January 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Note by the Secretary-General

RESOLUTION 80 (WRC-97) - REPORT BY THE RADIO REGULATIONS BOARD

Resolution 80 (WRC-97) instructed the Radio Regulations Board to develop Rules of Procedure to be followed in circumstances reflected in the Resolution.

A Report by the Radio Regulations Board on the action taken pursuant to the Resolution is attached for consideration by the Conference.

Yoshio UTSUMI
Secretary-General

Attachment: Report by the Radio Regulations Board

RESOLUTION 80 (WRC-97)

REPORT BY THE RADIO REGULATIONS BOARD (RRB) TO WRC-2000

Background

1 The World Radiocommunication Conference, Geneva, 1997 (WRC-97) adopted Resolution 80 (**Annex 1**). The Resolution instructed the Radio Regulations Board to develop Rules of Procedure and cited Nos. S11.30, S11.31, and S11.31.2 to be followed in examining frequency assignment notices and take into account the principles and intent of No. S0.3 of the Radio Regulations. The Rules shall be applied from a date to be decided by WRC-2000. Also, the Resolution established dates for completion of consultation with administrations and required the Board to submit a detailed report to the WRC on the action taken on the Resolution (*resolves* 3).

Steps taken by the Board

2 Pursuant to the above-mentioned requirements in the Resolution, the Board has taken a number of actions as outlined below:

2.1 After considerable discussion the Board agreed at its 11th meeting (26-30 January 1998) to adopt a “two-pronged” approach:

a) To invite administrations through a circular letter to submit ideas with respect to the Resolution so that the RRB could take these into account when developing a proposed Rule of Procedure.

b) The Board would then request that the Bureau prepare a draft Rule of Procedure based on the Board’s discussion and contributions received from administrations.

2.2 Circular Letter CR/88 of 11 February 1998 invited contributions from administrations of Member States as noted above.

2.3 The Board subsequently considered the issue further at its 12th meeting (20-24 April 1998). No proposals were submitted from administrations, therefore the Board provided guidance to the Bureau to prepare a draft Rule. This draft Rule was considered by the Board at its subsequent 13th meeting (6-14 July 1998) and it was agreed to distribute the draft Rule to administrations for comment. (With Circular Letter CR/101 of 13 July 1998) - **Annex 2**.

2.4 The Board considered the results of the consultation at its 15th meeting (1-5 March 1999). The only comments received were from the Administration of Columbia on its own behalf and on behalf of the Andean Committee of Telecommunication Authorities (CAATEL). Copies of these comments are in **Annexes 3** and **4**. There was extensive discussion by the Board on the draft Rule of Procedure and the comments received and it considered the issue again at its 16th meeting (24-28 May 1999) and 17th meeting (13-17 September 1999) respectively.

2.5 The conclusion reached by the Board was that it would not be appropriate to develop Rules of Procedure that went beyond the current proposed draft that was distributed for comments by administrations in CR/101 of 13 July 1998. The reason the Board arrived at this conclusion is that there are no provisions currently in the Radio Regulations that link the formal notification or coordination procedures with the principles stated in S0.3 of the preamble to the Regulations. However, noting the concerns implicit in Resolution 80, it has developed a possible approach for consideration by WRC-2000.

Meeting the concerns

3 The Board recognized the concerns expressed during WRC-97 that prompted the adoption of Resolution 80. These were similarly expressed by the two contributions received in response to the proposed draft Rule of Procedure on which comments were invited in Circular Letter CR/101 of 13 July 1998.

3.1 During the various deliberations of the Board it was noted that S0.3 of the Radio Regulations identified radio frequencies and the geostationary-satellite orbit as “limited natural resources”. It was noted also that, the Plenipotentiary Conference in Minneapolis (PP-98) had amended No. 196 of the Constitution (effective from 1 January 2000) to include a reference to “other orbits” in addition to the geostationary orbit. In the context of S0.3 it was observed also that the issue involved “equitable access” to both radio frequencies and the orbit “… taking into account the special needs of the developing countries and the geographical situation of particular countries”.

The criteria within S0.3 requires administrations in putting into use frequencies and usage of the GSO to take into account the need to:

- ensure rational use;
- use the resources efficiently;
- use of the minimum number of frequencies possible (economical usage);
- operate in conformity with the Radio Regulations;
- ensure equity of access by all countries;
- take into account the special needs of developing countries;
- take into account the geographical situation of other counties.

S11.31 ensures that notifications are in conformity with the RR. It is assumed that if stations are operating in conformity with the RR then the usage is rational. The criteria thus fall into two categories:

Criteria to maximize frequency/GSO availability:

- use the resources efficiently;
- use of the minimum number of frequencies possible (economical usage).

Criteria to provide access to others:

- ensure equity of access by all countries;
- take into account the special needs of developing countries;
- take into account the geographical situation of other countries.

3.2 In the context of the principles of S0.3, several members of the Board noted some difficulties likely to be experienced by administrations and in particular the administrations of developing countries.

a) The “first come first served” concept restricted and sometimes prevented access and use of certain frequency bands and orbit positions.

b) A relative disadvantage for developing countries in coordination negotiations due to various reasons such as a lack of resources and expertise.

c) Perceived differences in consistency of application of the Radio Regulations.

d) The submitting of “paper” satellites that restricted access options.

e) The growing use of the bands of the Plans of Appendices S30 and S30A by regional, multi-channel systems, which may modify the main purpose of these Plans to provide equitable access to all countries.

f) The considerable processing delays in the Radiocommunication Bureau are due to the very complex procedures required and the large number of filings submitted. These delays contribute to a coordination backlog of 18 months which could extend to three years and creates uncertain regulatory situations, additional delay in the coordination process that cannot be overcome by administrations, and the possible loss of the assignment because the allotted time is exceeded.

g) Satellite systems may already be in orbit before completion of coordination.

h) Statutory time frames, such as in S11.48, may often be insufficient for developing countries to be able to complete the regulatory requirements as well as the design, construction and launch of satellite systems.

i) No provisions for international monitoring to confirm the bringing into use of satellite networks (assignments and orbits).

Possible solution

4 Whilst noting the possible concerns outlined above, the Board considered that it could not develop Rules of Procedure that go beyond the guidance included in its proposed draft available in CR/101 of 13 July 1998. Accordingly it was considered to be necessary for other steps to be considered for possible incorporation in the Radio Regulations.

4.1 WRC-2000 is expected to consider the draft Rule of Procedure developed by the Board based on current provisions of the Radio Regulations and adopt it as a regulatory provision.

4.2 In order to assist administrations in the implementation of their satellite systems, the Conference may wish to consider adopting special provisions regarding No. S.03 for example:

ADD

S11.44*bis* Exceptionally, and in particular in the case of developing countries, an administration may request the Radio Regulations Board to grant an extension of up to a further 12 months, subject to the provisions of **S11.44B** being met, where the conditions specified under Nos. **S11.44C** to **S11.44I** are still preventing the bringing into use of any assignment of a space station of a satellite network.

ADD

S11.48*bis* Statutory time limits such as in **S11.48**, shall be extended by any periods in excess of the limits stipulated in **S9.2B** and **S9.38** that result from delays in processing in the Bureau.

4.3 The Conference may wish to develop additional procedures to address the following:

- provisions complementary to those in RR S11.44B to S11.44I covering certain difficulties that developing countries might have;
- simplification of the coordination process;
- arrangements for extended assistance, to developing countries in particular;
- use of the international monitoring system for confirmation of the use of the spectrum and any associated orbits.

ANNEX 1

RESOLUTION 80 (WRC-97)

Due diligence in applying the principles embodied in the Constitution

The World Radiocommunication Conference (Geneva, 1997),

considering

a) that Articles 12 and 44 of the Constitution (Geneva, 1992) lay down the basic principles for the use of the radio-frequency spectrum and the geostationary-satellite orbit;

b) that those principles have been incorporated in the Radio Regulations through No. **S0.3**;

c) that, in accordance with Nos. **S11.30**, **S11.31** and **S11.31.2**, notices shall be examined with respect to the provisions of the Radio Regulations, including the provision relating to the basic principles, appropriate rules of procedure being developed for the purpose,

resolves

1. to instruct the Radio Regulations Board, as a matter of urgency and within the framework of Nos. **S11.30**, **S11.31** and **S11.31.2** of the Radio Regulations, to develop the rules of procedure to be followed in examining due compliance with the principles reflected in No. **S0.3** in the process leading up to the recording of frequency assignments in the International Frequency Register. These rules shall be applied from a date to be decided by the 1999 World Radiocommunication Conference (WRC-99);

2. that the Board shall circulate the draft of these rules of procedure to administrations by 31 October 1998 with a view to receiving comments by 31 March 1999;

3. that the Board shall submit to WRC-99 a detailed report on the action taken on this Resolution.

Part A1	PREA S.03	page 1

ANNEX 2

Rules concerning the preamble to the Radio Regulations

Due diligence in applying the principles embodied in the Constitution

1 Introduction

WRC-97 in its Resolution 80 instructed the RRB to develop Rules of Procedure to be followed by the Radiocommunication Bureau (BR) when examining due compliance with the principles incorporated in the Constitution and the Radio Regulations which instruct administrations to

> *"bear in mind that radio frequencies and the geostationary-satellite orbit are limited natural resources and that they must be used rationally, efficiently and economically, in conformity with the provisions of these Regulations, so that countries or groups of countries may have equitable access to both, taking into account the special needs of the developing countries and the geographical situation of particular countries" (No. 196 of the Constitution, S0.3 of the Radio Regulations).*

These Rules of Procedure have been developed to implement that instruction. As *resolves 1* in Resolution 80 refers specifically to No. S11.31, it might be concluded that these Rules of Procedure should exclude consideration of provisions contained in Article S9 for coordination and those related to conformity with the Plans. However, as the following considerations are general, no specific distinction was found necessary.

2 Guiding principles

The whole Radio Regulations are based on the principles outlined above. They have been developed with the aim to use the radio frequencies and the GSO rationally, equitably, efficiently and economically.

The likelihood of congestion in particular frequency bands and particular arcs of the geostationary orbit has prompted Member States to deploy special means to guarantee equitable access and efficient exploitation of those limited resources. To this effect two procedural mechanisms were implemented:

- *a priori* planning to ensure equitable access to the spectrum/orbit resource; and
- coordination procedures to ensure efficiency in the use of that resource.

These mechanisms are embedded in the provisions of the Radio Regulations including the Plans appended thereto, the Regional Agreements and the Resolutions from WARCs/WRCs. This fact ensures that the BR, in applying the specific provisions related to coordination and registration of frequency assignments to stations of various terrestrial and space radiocommunication services, observes and effectively applies those principles.

Part A1	PREA S.03	page 2

3 Relevant provisions of the Radio Regulations

The provisions of the Radio Regulations that have an impact on the regulatory and technical examination of frequency assignment notices by the Radiocommunication Bureau with respect to the efficient use of and the equitable access to the usable radio-frequency spectrum and satellite orbits, can be grouped in several categories (references in bold have mandatory character):

- provisions which are setting general principles (e.g. S0.2, S0.3, S0.4, S4.1, S12A.2, S16.1);
- provisions which are setting general rules concerning the use of frequencies with a view to obtaining economy in the use of frequencies (e.g. S3.3. S3.4, S3.9, S15.1, S24.4, S24.6, S43.1, S43.2, **S43.4**, S52.69);
- provisions which are guiding the administrations in the choice of frequencies, taking into account the propagation mechanisms (e.g. S4.11, S4.12, S43.5);
- provisions which are setting the emission characteristics with the intent to contribute to the efficient use of the spectrum (e.g. S3.4, **S3.5-S3.7**, S3.9, **S4.5,** S15.9);
- provisions which specify the modulation characteristics (e.g. **S3.15**, **S5.57**, **S5.64**, **S5.79, S5.80**, **S5.218**, **S24.2**, **S52.55**);
- provisions which are setting power limits with the intent to contribute to greater reuse of frequencies or the protection of the GSO (e.g. **S5.86**, **S5.92**, S5.96, **S5.105**, **S5.106, S5.107,** S5.124**, S5.125, S5.129, S5.147, S5.152, S5.154, S5.482, S5.485, S21.3, S21.5, S21.8, S21.14, S23.7, S52.56, S52.104, S52.117, S52.127, S52.143, S52.144, S52.172, S52.184 - S52.186, S52.188, S52.219, S52.220, S52.227, S52.260**);
- provisions which are setting pfd limits with the intent to contribute to an efficient sharing between different services (e.g. **S5.311, S5.407, S21.6, S22.5** and many other provisions making reference to RS46).

4 Other relevant regulatory provisions

In the review of the provisions for coordination and notification of frequency assignments relating to space services, WRC-97 developed several new regulations.

By Resolution 49 (WRC-97) administrations are required to provide due diligence information, i.e. provide evidence that the intended use of the spectrum/orbit resource is a real project to be implemented in a certain time frame.

S11.44 now limits the time between the receipt by the Bureau of the request for advance publication of the description of a satellite network and the date of its bringing into use to five years (previously six years). This delay, during which the network is protected vis-à-vis later new networks, can be extended by two years (previously three years) if the due diligence information in accordance with Resolution 49 can be provided, the coordination is effectively under way or other specified circumstances justify an extension.

Part A1	PREA S.03	page 3

The same provisions now also clarify that it is not sufficient to bring into use only one assignment of the whole network in order to maintain the ongoing protection for all assignments in the network. Rather is each assignment now treated on its own and can thus loose its right to protection.

These new regulations thus enhance considerably the possibilities to access the spectrum/orbit resources in that they eliminate the obligation to protect unreal projects.

5 Conclusions

In its examinations, the BR shall continue to take account of those provisions which have mandatory character. As in the past, non-conformity with such provisions will result in an unfavourable finding.

The BR shall remind administrations, when appropriate and in an economical way, of those provisions dealing with the rational, efficient and economical use of the spectrum/orbit resource which are of a general nature, are addressed to administrations, do not have a mandatory character and consequently cannot be taken into account in the examinations of the BR.

ANNEX 3

Santa Fe de Bogotá, 19 January 1999

From:	Ministry of Communications, Colombia
To:	Mr V. Timofeev, Chairman, Radio Regulations Board
References:	Resolution 80 (WRC-97) Circular Letter CR/101

Dear Mr Chairman and members of the Board,

The Administration of Colombia hereby informs you that it has received the above-mentioned circular-letter in which the Board submits for the Members' consideration draft Rules of Procedure for implementation of the provisions contained in No. S0.3 of the Radio Regulations, in fulfilment of the task given to the Board by the 1997 World Radiocommunication Conference (WRC-97) in *resolves* 2 of Resolution 80.

Our Administration, having carefully studied Annex 2 to Circular Letter CR/101, concerning due diligence in applying the principles embodied in the Constitution, hereby submits the following comments for your consideration.

1 Colombia considers that the aforementioned annex does not constitute a set of Rules of Procedure which will ensure due compliance with the principles reflected in No. S0.3 in the process leading up to the recording of frequency assignments in the International Frequency Register.

Thus, this Administration is of the opinion that the proposal submitted to the Union's membership for consideration does not fulfil the task set by WRC-97, as it does not establish or identify the Rules of Procedure required for effective due diligence in applying the principles embodied in the Constitution.

2 Given that the last WRC devoted particular attention to the urgent need to endow the ITU Radio Regulations with Rules of Procedure that will ensure due compliance with No. S0.3, the proposal should necessarily comprise a prescriptive text setting out the necessary procedural provisions, as was approved by the Member States.

3 A list of the provisions in force that could be related to the subject is certainly a point of departure for carrying out the task set in Resolution 80 (WRC-97), but it can hardly constitute the requisite instrument for ensuring, guaranteeing and rendering truly effective the observance and application of the basic principles governing the use of the radio-frequency spectrum and the geostationary-satellite orbit.

For, if it did, there would have been no need for Resolution 80 to hand down clear instructions for the formulation of the Rules of Procedure required for due compliance with the provisions of No. S0.3, there would have been no point in the Conference's adopting the resolution, and there would be no need to revise the procedure in force for the use of frequencies and the geostationary-satellite orbit.

4 The Administration of Colombia therefore considers that while Annex 2 may be regarded as an approach put forward by the Board, in that it contains those provisions of the Radio Regulations applicable to such principles, it is not adequate to satisfy the decisions adopted by the

world radiocommunication conference, at which the Members of the Union implicitly recognized the insufficiency of the existing regulations and the need to introduce new provisions for the purpose.

5 Acceptance of the Board's conclusion, to the effect that BR should continue, as hitherto, to comply with the existing provisions, would not only fail to provide the recommended legislative solution, but would also imply disregarding the Union's clear instructions and requirements on the subject.

6 Since the substance of the principles set forth in No. S0.3 goes much further than simply calling upon administrations to observe those principles, it is imperative that the Board should prepare and develop rules that truly and effectively enable BR to examine notices from the viewpoint of S0.3, so that all countries or groups of countries may enjoy equitable access to the geostationary-satellite orbit, taking into account the special needs of the developing countries and the geographical situation of particular countries.

7 A brief study of the radio-frequency and geostationary-satellite orbit notification and registration procedures applied hitherto, following the rules that supposedly, in the Board's view, are sufficient to guarantee such equitable access, clearly reveals that the results achieved hardly fulfil the objective of the principles laid down by the Union.

8 It is difficult to fathom why the Board proposes that the Radiocommunication Bureau be instructed to continue its examinations without taking account of the instructions given in Resolution 80.

9 Colombia also fails to understand how the lack of contributions from administrations can serve as justification for dispensing the Board of its duty under Resolution 80; as a body of experts, the Board should take all the necessary measures to ensure that the task handed down by the Conference is executed, and collaborate with administrations to this end.

In the light of the above, the Administration of Colombia hereby expresses its opposition to the Board's approach to the effect that the provisions relating to the rational, efficient and economic use of the spectrum/orbit resource cannot be taken into account in the Bureau's examinations, and respectfully requests the Board to proceed with implementation of the task handed down in Resolution 80 (WRC-97) by preparing the requested Rules of Procedure for submission to the Members of the Union for consideration.

Since it is the Board which has the capability and expertise to draw up such Rules and, for that very reason, was given the task by the Conference, the first important step would be for it to prepare a draft, for subsequent submission to administrations requesting them to send in contributions and comments. The Board's inversion of the logical order of that process has had the practical consequence of making it impossible for administrations to present their comments, let alone contributions, precisely because in order to do so they require the expertise and experience which are lacking, particularly in the developing countries, which are those most interested in the adoption of the measures in question.

Colombia therefore wishes to request the Board, in the first instance, to develop a draft of the Rules of Procedure, so that, in fulfilment of its duties, it may then proceed with consultations, the presentation of reports and the receipt of comments, based on which it may prepare the final version of the said draft Rules.

Yours faithfully,

Claudia de Francisco
Minister of Communications

ANNEX 4

Santa Fe de Bogotá, 28 January 1999

From:	Ministry of Communications, Colombia
To:	Chairman of RRB
Our Ref.:	0095
Subject:	Resolution 80 (WRC-97) Circular Letter CR/101

For the attention of the Chairman and members of RRB

Dear Sirs,

The Andean Committee of Telecommunication Authorities (CAATEL) held its seventh Extraordinary Meeting from 20 to 22 January 1999 in Cartagena de Indias, Colombia.

One of the items on the agenda concerned the Rules of Procedure for application of the principles embodied in the Constitution - Resolution 80 (WRC-97), in respect of which the Andean Committee of Telecommunication Authorities adopted Resolution CAATEL VII - EX-46.

In accordance with its Article 5, I hereby submit to you a copy of that Resolution.

Yours faithfully,

Claudia de Francisco
President of CAATEL

Annex: as mentioned.

RESOLUTION CAATEL VII - EX-46

The Andean Committee of Telecommunication Authorities (CAATEL)

considering

1. that the World Radiocommunication Conference (WRC-97), in its Resolution 80, instructed the Radio Regulations Board, as a matter of urgency, to develop the rules of procedure to be followed in examining due compliance with the principles reflected in No. S0.3 of the Radio Regulations in the process leading up to the recording of frequency assignments in the International Frequency Register;

2. that WRC-97 instructed the Board to circulate the draft of those rules of procedure to administrations by 31 October 1998 with a view to receiving comments by 31 March 1999;

3. that the Chairman of the Radio Regulations Board, by Circularm letter CR/101 of 13 July 1998, circulated the document entitled "Rules concerning the Preamble to the Radio Regulations - Due diligence in applying the principles embodied in the Constitution", containing the following conclusion: "In its examinations, the BR shall continue to take account of those provisions which have mandatory character. As in the past, non-conformity with such provisions will result in an unfavourable finding. The BR shall remind administrations, when appropriate and in an economical way, of those provisions dealing with the rational, efficient and economical use of the spectrum/orbit resource which are of a general nature, are addressed to administrations, do not have a mandatory character and consequently cannot be taken into account in the examinations of the BR";

4. that the aforementioned document and its conclusions do not constitute the draft rules of procedure enabling BR to examine due compliance with the principles reflected in No. S0.3 of the Radio Regulations;

5. that the rules of procedure for application of Article 44 of the ITU Constitution and of No. S0.3 of the Radio Regulations should be geared towards guaranteeing equitable access to the geostationary-satellite orbit and associated frequencies, taking into account the special needs of the developing countries and the geographical situation of particular countries,

resolves

ARTICLE 1. To make known its disagreement with the view expressed by the Radio Regulations Board in Annex 2 to Circular Letter CR/101, to the effect that provisions dealing with the rational, efficient and economical use of the spectrum/orbit resource cannot be taken into account in the examinations of BR. Such disagreement is based on the fact that, under the terms of No. 78 of the Constitution (Geneva, 1992), the functions of the Radiocommunication Sector are to fulfil the purposes of the Union "by ensuring the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including those using the geostationary-satellite orbit", and, that one of the functions of the Radio Regulations Board is specifically "the performance of any additional duties, concerned with the assignment and utilization of frequencies, as indicated in No. 78 of this Constitution". It is thus clear that both the Board and BR, as well as the entire Radiocommunication Sector, have an obligation to ensure that their actions are geared towards guaranteeing the rational, efficient and economical use of the spectrum/orbit resource.

ARTICLE 2. To request the Radio Regulations Board to develop the rules of procedure for examination of due compliance with the principles reflected in No. S0.3 of the Radio Regulations in the process leading up to the recording of frequency assignments, as it was instructed to do by the World Radiocommunication Conference in Resolution 80 (WRC-97).

ARTICLE 3. To remind the Board that the rules of procedure to be developed should provide adequate provisions which, in line with the principle of equitable use of the geostationary orbit, guarantee to administrations that do not have access to orbital positions their right to use the geostationary orbit.

ARTICLE 4. To approach Consultative Committee III of CITEL with a view to ensuring that the work being done in preparation for the 2000 World Radiocommunication Conference (WRC-2000) includes the study and follow up of the subject of due compliance with the relevant authorities.

ARTICLE 5. To request the President of CAATEL to submit this Resolution to the Radio Regulations Board and to Standing Consultative Committee III of the Inter-American Telecommunication Commission (CITEL) on behalf of the Administrations of the member countries of the Andean Community; namely Bolivia, Colombia, Ecuador, Peru and Venezuela.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to
Document 30-E
18 May 2000
Original: English

COMMITTEE 5

Uzbekistan (Republic of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

Pages 5 and 6 (English version), delete point 6.1.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Document 30-E*
6 March 2000
Original: Russian

PLENARY MEETING

Uzbekistan (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

* Pursuant to Resolution 26 (Rev.WRC-97), the Secretariat notes that this contribution was received on 25 February 2000.

Position of the Republic of Uzbekistan on WRC-2000 agenda item 1.1

Agenda item 1.1 - Requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution 26 (Rev.WRC-97)

1 The Republic of Uzbekistan requests that Uzbekistan's name be deleted from footnotes S5.152, S5.154 and S5.387 in Article S5 of the Radio Regulations (ITU, 1998 edition):

MOD UZB/30/1

S5.152 *Additional allocation:* in Armenia, Azerbaijan, China, Côte d'Ivoire, Georgia, the Islamic Republic of Iran, Kazakstan, Moldova, ~~Uzbekistan,~~ Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the band 14 250-14 350 kHz is also allocated to the fixed service on a primary basis. Stations of the fixed service shall not use a radiated power exceeding 24 dBW.

MOD UZB/30/2

S5.154 *Additional allocation:* in Armenia, Azerbaijan, Georgia, Kazakstan, Moldova, ~~Uzbekistan,~~ Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the band 18 068-18 168 kHz is also allocated to the fixed service on a primary basis for use within their boundaries, with a peak envelope power not exceeding 1 kW.

MOD UZB/30/3

S5.387 *Additional allocation:* in Armenia, Azerbaijan, Belarus, Georgia, Kazakstan, Mali, Mongolia, ~~Uzbekistan,~~ Kyrgyzstan, Slovakia, the Czech Republic, Romania, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the band 1 770-1 790 MHz is also allocated to the meteorological-satellite service on a primary basis, subject to agreement obtained under No. **S9.21**.

Remark - It is proposed to the administrations listed in footnotes S5.152 and S5.154 that they support Uzbekistan's proposal, and that the footnotes in question be deleted.

NOC

2 The Republic of Uzbekistan requests that Uzbekistan's name be retained in the following footnotes in Article S5 of the Radio Regulations (ITU, 1998 edition):

S5.56, S5.87A, S5.93, S5.96, S5.99, S5.133, S5.139, S5.155, S5.155A, S5.163, S5.175, S5.177, S5.201, S5.202, S5.206, S5.221, S5.262, S5.277, S5.290, S5.312, S5.314, S5.323, S5.359, S5.382, S5.422, S5.454, S5.455, S5.469, S5.473, S5.483, S5.546 and S5.550.

3 The Republic of Uzbekistan requests that Uzbekistan's name be inserted in footnote S5.481 to the Table of Frequency Allocations (Article S5 of the ITU Radio Regulations, Geneva, 1998):

MOD UZB/30/4

S5.481 *Additional allocation:* in Germany, Angola, China, Ecuador, Spain, Japan, Morocco, Nigeria, Oman, Uzbekistan, Democratic People's Republic of Korea, Sweden, Tanzania and Thailand, the band 10.45-10.5 GHz is also allocated to the fixed and mobile services on a primary basis.

4 The Republic of Uzbekistan, on the basis of actual use of the radio-frequency spectrum in Uzbekistan, requests the addition of new footnotes to the Table of Frequency Allocations (Article S5 of the ITU Radio Regulations, Geneva, 1998):

ADD UZB/30/5

S5.69A *Additional allocation*: In Uzbekistan, the band 190-255 kHz is also allocated to the aeronautical radionavigation service on a primary basis.

ADD UZB/30/6

S5.94A *Additional allocation*: In Uzbekistan, the bands 2 170-2 173.5 kHz, 2 190.5-2 194 kHz, 2 625-2 650 kHz, 4 063-4 438 kHz, 6 200-6 525 kHz, 8 195-8 815 kHz, 12 230-13 200 kHz, 16 360-17 410 kHz, 18 780-18 900 kHz, 19 680-19 800 kHz, 22 000-22 855 kHz, 25 070-25 210 kHz and 26 100-26 175 kHz are also allocated to the fixed and land mobile services on a primary basis.

ADD UZB/30/7

S5.127A *Additional allocation*: In Uzbekistan, the bands 4 000-4 063 kHz and 8 100-8 195 kHz are also allocated to the land mobile service on a primary basis.

ADD UZB/30/8

S5.133A *Additional allocation*: In Uzbekistan, the bands 5 480-5 680 kHz and 6 685-6 765 kHz are also allocated to the fixed service on a primary basis.

ADD UZB/30/9

S5.146A *Different category of service*: In Uzbekistan, the allocation of the band 10 150-11 175 kHz to the mobile, except aeronautical mobile (R), service is on a primary basis.

ADD UZB/30/10

S5.158 *Additional allocation*: In Uzbekistan, the band 25 550-25 670 kHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

ADD UZB/30/11

S5.195 *Additional allocation*: In Uzbekistan, the bands 108-117.975 MHz, 137-137.025 MHz, 137.025-137.137 MHz, 137.175-137.825 MHz, 137.825-138 MHz and 146-148 MHz are also allocated to the aeronautical mobile (OR) service on a primary basis. In assigning frequencies to stations of the aeronautical mobile (OR) service, account shall be taken of the frequencies assigned to stations in the aeronautical mobile (R) service.

ADD UZB/30/12

S5.253 *Different category of service*: In Uzbekistan, the allocation of the band 267-272 MHz to the space operation (space-to-Earth) service is on a primary basis.

ADD UZB/30/13

S5.277A *Additional allocation*: In Uzbekistan, the band 430-440 MHz is also allocated to the mobile, except aeronautical mobile, service on a primary basis.

ADD UZB/30/14

S5.375A *Additional allocation*: In Uzbekistan, the band 1 645.5-1 646.5 MHz is also allocated to the fixed service on a primary basis.

ADD UZB/30/15

S5.387A *Additional allocation*: In Uzbekistan, the band 1 770-1 794 MHz (centre frequency: 1 782 MHz) is also used by the meteorological aids service (radars and radiosondes) on a primary basis. Stations of other services to which this band is allocated shall not cause harmful interference to the meteorological aids service.

ADD UZB/30/16

S5.416A *Additional allocation*: In Uzbekistan, the band 2 500-2 700 MHz is also allocated to the broadcasting service on a primary basis.

ADD UZB/30/17

S5.450A *Different category of service*: In Uzbekistan, the allocation of the band 5 470-5 650 MHz to the radiolocation service is on a primary basis.

5 The Republic of Uzbekistan proposes amendments to the following footnotes to the Table of Frequency Allocations (Article S5 of the ITU Radio Regulations, Geneva, 1998):

MOD UZB/30/18

S5.262 *Additional allocation:* in Saudi Arabia, Armenia, Azerbaijan, Bahrain, Belarus, Bosnia and Herzegovina, Bulgaria, Colombia, Costa Rica, Cuba, Egypt, the United Arab Emirates, Ecuador, Estonia, Georgia, Hungary, Indonesia, the Islamic Republic of Iran, Iraq, Israel, Jordan, Kazakstan, Kuwait, Liberia, Malaysia, Moldova, Nigeria, Uzbekistan, Pakistan, the Philippines, Qatar, Syria, Kyrgyzstan, Slovakia, Romania, Russian Federation, Singapore, Somalia, Sri Lanka, Tajikistan, Turkmenistan, Ukraine and Yugoslavia, the band 400.~~05~~15-401 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

335.4-410 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
400.05-400.15	STANDARD FREQUENCY AND TIME SIGNAL-SATELLITE (400.1 MHz) S5.261 ~~S5.262~~	

Reasons: Modification of the frequency band to 400.15-401 MHz will safeguard the standard frequency and time signal-satellite service against potential unwanted interference from other services. Limitation of the use of that band by mobile services is necessary in order to protect the services to which the bands in question are allocated.

MOD UZB/30/19

S5.359 *Additional allocation:* in Germany, Saudi Arabia, Armenia, Austria, Azerbaijan, Belarus, Benin, Bulgaria, Cameroon, Spain, France, Gabon, Georgia, Greece, Guinea, Guinea-Bissau, Hungary, Jordan, Kazakstan, Kuwait, Latvia, Libya, Mali, Mauritania, Moldova, Mongolia, Nigeria, Uganda, Uzbekistan, Pakistan, Poland, Syria, Kyrgyzstan, the Democratic People's Republic of Korea, Romania, Russian Federation, Senegal, Swaziland, Tajikistan, Tanzania, Turkmenistan, Ukraine, Zambia and Zimbabwe the bands 1 550-1 645.5 MHz and 1 646.5-1 660 MHz are also allocated to the fixed service on a primary basis. Stations of the fixed service shall not cause harmful interference to operation of the radionavigation-satellite service (space-to-Earth). Administrations are urged to make all practicable efforts to avoid the implementation of new fixed-service stations in the bands 1 550-1 555 MHz, 1 610-1 645.5 MHz and 1 646.5-1 660 MHz.

Reasons: In accordance with ICAO Recommendation 1/4 on incompatibility of use of the radionavigation-satellite service and fixed services in the frequency band 1 559-1 610 MHz.

In order to ensure protection of the radionavigation-satellite service from interference caused by fixed services which are allowed to operate in the band in question on a primary basis.

MOD UZB/30/20

S5.565 The frequency band above 275~~-400~~ GHz may be used by administrations for experimentation with, and development of, various active and passive services. In ~~this~~the bands listed below, a need has been identified for the following spectral line measurements for passive services:

– radio astronomy service: ~~278-280 GHz and 343-348 GHz~~275-323 GHz, 327-371 GHz, 388-424 GHz, 426-442 GHz, 453-510 GHz, 623-711 GHz and 795-909 GHz (these bands are used and will be used in the future for radio observatories);

– Earth exploration-satellite service (passive) and space research service (passive): 275-277 GHz, ~~300-302 GHz, 324-326 GHz, 345-347 GHz,~~ 294-306 GHz, 316-334 GHz, 342-349 GHz, 363-365 GHz, ~~and~~ ~~379-381 GHz~~371-389 GHz, 416-434 GHz, 442-444 GHz, 496-506 GHz, 546-568 GHz, 624-629 GHz, 634-654 GHz, 659-661 GHz, 684-692 GHz, 730-732 GHz, 851-853 GHz and 951-956 GHz.

Future research in this largely unexplored spectral region may yield additional spectral lines and continuum bands of interest to the passive services. Administrations are urged to take all practicable steps to protect these passive services from harmful interference~~ until the next competent world radiocommunication conference~~.

MOD UZB/30/21

6 The Republic of Uzbekistan proposes the following modifications to the Table of Frequency Allocations (Section IV, Article S5 of the Radio Regulations).

6.1 In the band 1 613.8-1 626.5 MHz, modify the category of the mobile-satellite service (space-to-Earth) to primary for all Regions.

1 610-1 660 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 613.8-1 626.5 MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION ~~Mobile-satellite~~MOBILE-SATELLITE (space-to-Earth) S5.341 S5.355 S5.359 S5.363 S5.364 S5.365 S5.366 S5.367 S5.368 S5.369 S5.371 S5.372	**1 613.8-1 626.5** MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) S5.341 S5.364 S5.365 S5.366 S5.367 S5.368 S5.370 S5.372	**1 613.8-1 626.5** MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION Mobile-satellite (space-to-Earth) Radiodetermination-satellite (Earth-to-space) S5.341 S5.355 S5.359 S5.364 S5.365 S5.366 S5.367 S5.368 S5.369 S5.372

Reasons: To create equal conditions for both directions of communication (space-to-Earth and Earth-to-space) in the mobile-satellite service (global mobile personal communications systems by satellite).

6.2 Review footnote S5.120 “For the use of the bands allocated to the amateur service at 3.5 MHz, 7.0 MHz, 10.1 MHz, 14.0 MHz, 18.068 MHz, 21.0 MHz, 24.89 MHz and 144 MHz in the event of natural disasters, see Resolution **640***”, in the light of the abrogation of Resolution 640 at WRC-97.

6.3

MOD UZB/30/22

S5.413 In the design of systems in the broadcasting-satellite service in the bands between 2 5~~00~~20 MHz and 2 6~~90~~70 MHz, administrations are urged to take all necessary steps to protect the radio astronomy service in the band 2 690-2 700 MHz.

Reasons: The bands 2 500-2 520 MHz and 2 670-2 690 MHz for all the Regions are not allocated to the broadcasting-satellite service and there is no reference to this footnote in the table.

Position of the Republic of Uzbekistan on WRC-2000 agenda items 1.2-1.20

Agenda item 1.2 - To finalize remaining issues in the review of Appendix S3 to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation 66 (Rev.WRC-97) and the decisions of WRC-97 on adoption of new values, due to take effect at a future time, of spurious emissions for space services

Uzbekistan supports the results of the ITU-R studies on additions and modifications to Appendix S3, while keeping the same values for spurious emission limits for the transmitters of different services and applications.

Agenda item 1.3 - To consider the results of ITU-R studies in respect of Appendix S7/28 on the method for the determination of the coordination area around an earth station in frequency bands shared among space services and terrestrial radiocommunication services, and take the appropriate decisions to revise this Appendix

Uzbekistan supports adoption of the improved method of calculating coordination areas around earth stations developed by ITU-R, but nevertheless considers that the methodology in question must not lead to any significant increase in coordination areas calling for additional coordination by interested administrations, and that further studies need to be carried out within ITU-R on the application of the methodology. Furthermore, WRC-2000 should instruct ITU-R to develop a single software program for the calculation of coordination areas around earth stations in order to unify and simplify the coordination process.

Agenda item 1.4 - To consider issues concerning allocations and regulatory aspects related to Resolutions 126 (WRC-97), 128 (WRC-97), 129 (WRC-97), 133 (WRC-97), 134 (WRC-97) and 726 (WRC-97)

Uzbekistan:

- supports the use of the frequency bands 31.8-33.4 GHz, 37-39.5 GHz, 40.5-42.5 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz by high-density systems in the fixed service, subject to solution of the procedural questions relating to sharing with other services;
- does not object to allocation to the FSS (space-to-Earth) of the band 40.5-42.5 GHz on condition that pfd limits are set to protect the radio astronomy service in the band 42.5-43.5 GHz and criteria are introduced to ensure the protection of terrestrial services.

Furthermore, Uzbekistan considers that a definition of “high-density fixed service” is required.

Agenda item 1.5 - To consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution 122 (WRC-97)

Uzbekistan proposes at the present time not to support an additional frequency band allocation for high altitude platform stations in the fixed service and to extend the time-frame in Resolution 122 (WRC-97) to the next WRC (WRC-03), since additional studies are required within ITU-R on sharing with other systems as well as an analysis of practical operation in frequency bands already allocated.

Agenda item 1.6 - Issues related to IMT-2000:

1.6.1 - Review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

Uzbekistan supports the studies carried out by ITU-R, but believes that the adoption of a decision on the allocation of additional frequency bands should not be considered before 2003, on the basis of practical experience with the operation of IMT-2000 systems in existing allocations under No. S5.388, and this footnote and Resolution 212 should be maintained as they stand.

1.6.2 - Identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000

Uzbekistan supports ITU-R’s conclusion that multimode terminal operation and worldwide roaming is possible without a global control channel.

Agenda item 1.7 - Review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting operational, distress and safety communications, taking into account Resolution 346 (WRC-97)

Uzbekistan supports proposals relating to protection of the frequencies allocated to the aeronautical mobile (R) service from interference. It considers that there are no bases for re-allocating HF bands between the aeronautical mobile (R) and maritime mobile services, and supports the introduction of additional procedures designed to protect frequencies used for distress and safety communications.

Agenda item 1.8 - To consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands

Uzbekistan objects to the use of FSS stations on board vessels in the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz, considering that it is first necessary to develop appropriate regulatory and technical procedures to protect the operation and development of fixed service stations.

Agenda item 1.9 - To take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service (MSS) in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions 213 (Rev.WRC-95) and 220 (WRC-97)

Uzbekistan considers that the global navigation satellite system must enjoy protection, as a safety-of-life service. Therefore, the frequency band 1 559-1 610 MHz should be completely free of any non-radionavigation systems. Accordingly, we oppose any allocation of 1 559-1 567 MHz for the mobile-satellite service and are in favour of the deletion of Resolution 220 (WRC-97).

Since studies have not demonstrated the feasibility of allocating a portion of the 1 350-1 525 MHz band for the mobile-satellite service (space-to-Earth), it is proposed that the Radio Regulations remain unchanged in respect of that band.

Agenda item 1.10 - To consider results of ITU-R studies carried out in accordance with Resolution 218 (WRC-97) and take appropriate action on this subject

Uzbekistan supports ITU-R’s studies for accommodating the global maritime distress and safety system (GMDSS) and aeronautical mobile-satellite (R) service systems, and on broadening the list of communications belonging to the category of distress and safety signals.

Agenda item 1.11 - To consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions 214 (Rev.WRC-97) and 219 (WRC-97)

Uzbekistan proposes that the existing allocation for non-GSO MSS below 1 GHz should not be modified and that new allocations for this service should not be adopted in that band.

It is proposed not to modify the allocation of the band 405-406 MHz, and to delete Resolution 219 (WRC-97), in order to leave this band for the meteorological aids service and protect existing systems in adjacent frequency bands.

Agenda item 1.12 - To consider the progress of studies on sharing between feeder links of non-GSO MSS networks and GSO FSS networks in the bands 19.3-19.7 GHz and 29.1-29.5 GHz, taking into account Resolution 121 (Rev.WRC-97)

Uzbekistan supports the results of studies carried out by ITU-R. Resolution 121 (Rev.WRC-97) may be deleted.

Agenda item 1.13 - On the basis of the results of the studies in accordance with Resolutions 130 (WRC-97), 131 (WRC-97) and 538 (WRC-97):

1.13.1 - To review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

1.13.2 - To consider the inclusion in other frequency bands of similar limits in Articles S21 and S22, or other regulatory approaches to be applied in relation to sharing situations

Uzbekistan supports the results of ITU-R studies on the allocation of frequency bands for the development of non-geostationary FSS networks, subject to guaranteeing protection for geostationary FSS and BSS networks and networks in the fixed service.

Agenda item 1.14 - To review the results of the studies on the feasibility of implementing non-GSO MSS feeder links in the 15.43-15.63 GHz in accordance with Resolution 123 (WRC-97)

Uzbekistan supports use of the frequency band 15.43-15.63 GHz by non-GSO MSS feeder links, subject to limiting the number of systems operating in this band to those in respect of which information is received by ITU-R by the end of WRC-2000, and setting a limit on the pfd from such systems in the band 15.35-15.4 GHz in order to protect radio astronomy.

Agenda item 1.15 - Issues related to the radionavigation-satellite service

1.15.2 - To consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the bands 1 215-1 260 MHz and 1 559-1 610 MHz

Uzbekistan supports allocation of the frequency bands 1 215-1 260 MHz and 1 559-1 610 MHz to the radionavigation-satellite service (space-to-space).

1.15.3 - To consider the status of allocations to services other than the radionavigation-satellite service (Nos. S5.355 and S5.359) in the band 1 559-1 610 MHz

Uzbekistan considers that the radionavigation-satellite service should enjoy sufficient protection and, therefore, the fixed service should be removed from the frequency band 1 559-1 610 MHz. A two-stage approach is proposed: granting primary status until 2005 and secondary status until 2015, followed by deletion of the FS allocation after 2015.

Agenda item 1.16 - To consider allocation of frequency bands above 71 GHz to the Earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution 723 (WRC-97)

Uzbekistan supports the proposal to allocate frequencies above 71 GHz on a worldwide basis.

Agenda item 1.17 - To consider possible worldwide allocation for the Earth exploration-satellite (passive) and space research (passive) services in the band 18.6-18.8 GHz, taking into account the results of the ITU-R studies

Uzbekistan supports the 18.6-18.8 GHz allocation for passive Earth exploration-satellite and space research services on a primary basis subject to the introduction of criteria enabling sharing with FS and FSS.

Agenda item 1.18 - To consider the use of new digital technology for the maritime mobile service in the band 156-174 MHz and consequential revision of Appendix 18/S18, taking into account Resolution 342 (WRC-97)

Uzbekistan supports amendments to the Radio Regulations aimed at introducing and developing digital technologies in the maritime mobile service in the band 156-174 MHz, and the continuation of studies on the subject within ITU-R.

Agenda item 1.19 - To consider the report of the Inter-Conference Representative Group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system

Uzbekistan supports the ITU-R studies and securing the implementation of the provisions of Resolution 532 (WRC-97), in particular the provision for each country of no less than ten (10) analogue channels and implementation of the principles laid down in Annex 1.

Agenda item 1.19*bis* - In accordance with Article S14, to consider objections expressed by administrations with respect to the Radio Regulations Board's Rules of Procedure relating to the application of RR No. 2674/S23.13 in order for the Bureau to modify its findings in accordance with the conclusions of the Conference

Uzbekistan supports the proposals to extend the Rules of Procedure also to networks notified before the stipulated date (18 November 1995) if they were not brought into service by that date.

Agenda item 1.20 - To consider the issues related to the application of Nos. S9.8, S9.9 and S9.17 and the corresponding parts of Appendix S5 with respect to Appendices S30 and S30A, with a view to possible deletion of Articles 6 and 7 of Appendices S30 and S30A, also taking into consideration Recommendation 35 (WRC-95)

Uzbekistan supports inclusion of the provisions of Articles 6 and 7 of Appendices S30 and S30A in the overall Article S9 of the Radio Regulations, regulating the coordination procedure for all remaining services, in order to facilitate the task of the administrations and the Bureau.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 31-E
25 February 2000
Original: Spanish

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Cuba

PROPOSALS FOR THE WORK OF THE CONFERENCE

Introduction

The Administration of Cuba has great pleasure in submitting its proposals to the World Radiocommunication Conference (WRC-2000) and once again confirms that its delegation is prepared to make strenuous efforts, together with the other delegations attending the Conference, to obtain results that will enable the various issues comprising the Conference agenda to be resolved for the benefit of ITU and its entire membership.

In drawing up its proposals, the Administration of Cuba has taken into account a number of elements that constitute a balance which it sees as important to achieving results geared to meeting the various needs to be addressed by the Conference. These elements include the following:

- ensuring the efficiency and reliability of communications that are associated with the safety of human life and property;
- paying special attention to aspects related to environmental protection through the use of radiocommunication systems;
- facilitating equal access by all countries to the “radio spectrum” as a natural resource, bearing in mind their different needs in the light of their specific characteristics and current stage of development;
- ensuring rational, efficient and economical use of the radio-frequency spectrum;
- giving special consideration to the needs of developing countries, bearing in mind that radiocommunications may be of vital importance to the development of their telecommunication networks and services;
- allowing for the development and use of new technologies by facilitating the introduction of new radiocommunication services and systems;
- providing an adequate degree of protection for existing services and systems.

In preparing its proposals, the Administration of Cuba has also taken into account the latest results of the technical studies conducted in ITU-R and the CPM-99 Report.

CONTENTS

Item 1.2: Appendix S3 to the Radio Regulations

In considering Appendix S3 and Recommendation 66 (Rev.WRC-97), the Administration of Cuba has taken into account the ITU-R studies concerning Recommendation ITU-R SM.329-7, as well as § 7.1 of the CPM Report, and agrees that the appropriate amendments should be made to Appendix S3 in order to transform the spurious emission limits currently shown as design objectives for space services into regulatory limits.

We also consider it necessary to avoid amateur earth stations having to comply with more stringent spurious emission limits than amateur stations operating in the same frequency bands, and to exempt from limits space stations intended for operation in deep space, whose spurious emissions are undetectable, in both cases avoiding the unnecessary expense of complying with limits that are not required.

Lastly, we consider it appropriate to make the relevant amendments concerning spurious emission limits for radar systems in order to make it clear that such limits apply only under Section II and to establish that the limits are based on radiated emissions and should not be measured at the transmission line.

On the basis of the foregoing, Cuba submits the following proposal:

APPENDIX S3

Table of maximum permitted spurious emission power levels

Section I – Spurious emission limits for transmitters installed on or before 1 January 2003 (valid until 1 January 2012)

MOD CUB/31/1

6 ~~The measurement methods for radar systems should be guided by Recommendation ITU-R M.1177. For those radar systems for which acceptable methods of measurement do not exist,~~Radar systems are exempt from spurious emission limits under this section. In all cases, the lowest practicable power of spurious emission should be achieved.

Reasons: To make it clear that spurious emission limits do not apply to radar systems under this section.

Section II – Spurious emission limits for transmitters installed after 1 January 2003 and for all transmitters after 1 January 2012

MOD CUB/31/2

8 Guidance regarding the methods of measuring spurious emissions is given in the most recent version of Recommendation ITU-R SM.329. The e.i.r.p. method specified in that Recommendation should be used when it is not possible to measure the power supplied to the antenna transmission line, or where it is advisable in view of the antenna attenuation characteristics at the spurious emission frequencies. Additionally, the e.i.r.p. method may need some modification for special cases, e.g. beam-forming radars.

Reasons: To take account of antenna attenuation characteristics at spurious emission frequencies.

ADD CUB/31/3

11*bis* As an emitted signal becomes more and more narrow (to the limiting case of an unmodulated carrier with theoretical necessary bandwidth of zero), the application of the term “necessary bandwidth” as used in determining the region where spurious emission limits apply to space services, becomes more and more difficult. In the limit, ±250% of necessary bandwidth (generally recognized as establishing the region beyond which spurious emissions are defined), approaches zero. Beacon and other unmodulated signals, such as those used in uplink and downlink circuits in the control and tracking of satellites, are examples of cases where it is difficult to apply, in a practical manner, the term “necessary bandwidth” in determining where out-of-band emissions end, and spurious emissions begin. Pending further studies and definitive action by a future world radiocommunication conference, to specify the region where spurious emission limits apply for transmitters using amplifiers to transmit essentially an unmodulated signal (or a signal with very small bandwidth), the amplifier bandwidth is taken to be the necessary bandwidth (in calculating the regions where spurious emissions will apply).

Reasons: To adequately recognize the case of very narrow-band and unmodulated signals.

ADD CUB/31/4

11*ter* For satellites employing more than one transponder, and when considering the limits for spurious emission as indicated by § 11 to Appendix **S3**, spurious emissions from one transponder may fall on a frequency at which a companion, second transponder is transmitting or in the guardband between two transponders. In these situations, if it can be demonstrated that the level of spurious emission from the first transponder is well exceeded by fundamental emissions from a second transponder transmitting from the same satellite into the same service area, or by its out-of-band emissions into the guardband, then the limits of Appendix **S3** should not apply to those spurious emissions.

Reasons: To avoid unnecessary design and operational requirements for adjacent transponders in the same transmitting satellite.

MOD CUB/31/5

TABLE II

Attenuation values used to calculate maximum permitted spurious emission power levels for use with radio equipment

Service category in accordance with Article S1, or equipment type[15]	**Attenuation (dB) below the power supplied to the antenna transmission line**
All services except those services quoted below:	43 + 10 log (*P*), or 70 dBc, whichever is less stringent
Space services (earth stations) [10, ~~14~~16]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Space services (space stations) [10, ~~14~~17]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Radiodetermination[14]	43 + 10 log (*PEP*), or 60 dB, whichever is less stringent

TABLE II (*end*)

Service category in accordance with Article S1, or equipment type[15]	**Attenuation (dB) below the power supplied to the antenna transmission line**
Broadcast television[11]	46 + 10 log (*P*), or 60 dBc, whichever is less stringent, without exceeding the absolute mean power level of 1 mW for VHF stations or 12 mW for UHF stations. However, greater attenuation may be necessary on a case by case basis.
Broadcast FM	46 + 10 log (*P*), or 70 dBc, whichever is less stringent; the absolute mean power level of 1 mW should not be exceeded
Broadcasting at MF/HF	50 dBc; the absolute mean power level of 50 mW should not be exceeded
SSB from mobile stations[12]	43 dB below *PEP*
Amateur services operating below 30 MHz (including with SSB)[~~12~~16]	43 + 10 log (*PEP*), or 50 dB, whichever is less stringent
Services operating below 30 MHz, except space, radiodetermination, broadcast, those using SSB from mobile stations, and amateur[12]	43 + 10 log (*X*), or 60 dBc, whichever is less stringent, where *X* = *PEP* for SSB modulation, and *X* = *P* for other modulation
Low-power device radio equipment[13]	56 + 10 log (*P*), or 40 dBc, whichever is less stringent
Emergency position-indicating radio beacon Emergency locator transmitter Personal location beacon Search and rescue transponder Ship emergency, lifeboat and survival craft transmitters Land, aeronautical or maritime transmitters when used in emergency	No limit

MOD CUB/31/6

14 ~~These values are "design objectives". This note will not be applicable after WRC-99.~~ Radiodetermination (radar) system spurious emission attenuation (dB) shall be determined for radiated emission levels, not at the antenna transmission line. The measurement methods for determining the radiated spurious emission levels from the radar systems should be guided by Recommendation ITU-R M.1177.

Reasons: To take account of antenna attenuation characteristics at spurious emission frequencies.

ADD CUB/31/7

[16] Amateur earth stations operating at frequencies below 30 MHz are included in the service category “Amateur services operating below 30 MHz (including with SSB)”.

ADD CUB/31/8

[17] Space stations intended to operate in deep space (defined in **S1.177**) are exempt from spurious emission limits.

Reasons: To avoid unnecessary limits.

Item 1.3: Revision of Appendix S7/28

The Administration of Cuba has examined the ITU-R studies on Appendix S7, particularly Recommendation ITU-R P.620-4 and the draft new Recommendation in Document 1/1004, and has noted the objectives, which allow determination of the coordination area in frequency bands between 100 MHz and 105 GHz and provide for a single consolidated recommendation covering all methods for determining coordination areas.

In considering the procedure for the revision of Appendix S7, Cuba has studied the various options set out in the CPM Report and has reached the conclusion that the option identified in the report as “Method 3” offers the best solution to this issue, since it proposes a regulatory text based on the Recommendation for incorporation in the Radio Regulations. This would enable the language of the Recommendation to be modified in order to give it regulatory status, and at the same time would preclude any possibility of interpretation or any doubt as to its binding nature.

Furthermore, the adoption of a procedure based on a resolution having the format of Resolution 60 would provide a mechanism for updating the system parameter values to be considered without affecting the binding nature of the text, any proposed amendments being submitted for consideration to and, as the case may be, adoption by a WRC for incorporation in the text of the Regulations.

CUB/31/9

Replace the text of Appendix S7 with text based on Recommendation ITU-R SM.[Document 1/1004] and create a mechanism, by means of a new resolution to replace Resolution 60, for updating the system parameter values, when such updating is deemed necessary, through the inclusion of an extraordinary item on the agenda of a WRC.

Item 1.4: High-density fixed services (Resolutions 126 (WRC-97), 133 (WRC-97) and 726 (WRC-97))

Having considered the issue of frequency allocations for high-density fixed services (HDFS), Cuba attaches importance to the identification of bands that provide the best possibilities for the use of HDFS systems in developing countries, having particular regard to propagation characteristics in tropical areas with high rain precipitation rates resulting in high levels of radio path loss - hence the importance of being able to have access to adequate frequency bands where constraints on the operation of such systems under the above-mentioned conditions are not excessive.

A study of the existing allocations in the Table of Frequency Allocations has shown the bands 31.8-33.4 GHz and 37-40 GHz as being the most appropriate for these purposes.

In examining the studies on Resolution 126 (WRC-97), the Administration of Cuba considered the CPM Report and noted that, although HDFS applications in the 31.8-33.4 GHz band have to share with the radionavigation, space research and inter-satellite services, the general situation in the band is certainly favourable to the development of HDFS systems, bearing in mind that, to date, the radionavigation service in this band is used by only one administration, which implies a low volume of use of the service (in § 6.1.1.2 of the CPM Report a maximum of 80 airborne radars are identified). It can therefore be considered that frequency coordination would not be difficult with administrations close to the territory of the administration using such systems or to areas where their use is authorized. Moreover, the application of certain mitigation techniques could substantially reduce the apparent sharing difficulties.

In view of the small radar population in this band, it might be worthwhile to envisage establishing characteristics, to be taken into account for future systems to be operated in the band, which facilitate sharing. In this connection, Cuba proposes that future radar equipment in this band should use pulse coding circuitry, as suggested in § 6.1.1.3.2 of the CPM Report.

As regards sharing with the inter-satellite service, which shares the 32-33 GHz band, the CPM Report concludes that such sharing is feasible if adequate limits are established for the pfd produced at the surface of the Earth by space station emissions. An important point in this connection is that, since no system is thus far operational in the band in question, such limits can be established without the risk of imposing restrictions on a system already in operation.

Lastly, as regards sharing with the space research service, Cuba proposes the adoption of a limit for the pfd produced at the Earth's surface identical to that established for the same service in the band 37-38 GHz.

With regard to the studies concerning Resolution 133 (WRC-97), Cuba concurs with the conclusion in § 6.1.2.3 of the CPM Report that "FS systems in this band should be accommodated for HDFS usage".

MOD CUB/31/10

29.9-34~~,~~.2 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
31.8-32	FIXED ~~S5.547A~~ RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) S5.547 S5.547B S5.548 ADD S5.547F	
32-32.3	FIXED ~~S5.547A~~ INTER-SATELLITE RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) S5.547 S5.547C S5.548 ADD S5.547F	
32.3-33	FIXED ~~S5.547A~~ INTER-SATELLITE RADIONAVIGATION S5.547 S5.547D S5.548 ADD S5.547F	
33-33.4	FIXED ~~S5.547A~~ RADIONAVIGATION MOD S5.547 S5.547E ADD S5.547F	

SUP CUB/31/11

S5.547A

Reasons: No longer necessary.

MOD CUB/31/12

S5.547 The bands 31.8-33.4 GHz, 37-40 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are available for high-density applications in the fixed service ~~(see Resolution **726 (WRC-97)**)~~. Administrations shall take account of such utilization when considering use of these bands.

Reasons: It has been demonstrated that the use of HDFS in these bands is both feasible and appropriate. Furthermore, it would not appear necessary to continue the studies, and Resolution 726 (WRC-97) could therefore be deleted were the additional text proposed for S5.547 to be adopted.

SUP CUB/31/13

RESOLUTION 726 (WRC-97)

Frequency bands above 30 GHz available for high-density applications in the fixed service

Reasons: No longer necessary.

ADD CUB/31/14

S5.547F Radar equipment introduced in the band 31.8-33.4 GHz after 1 January 2002 should use pulse coding circuitry. Administrations using airborne radars in the band 31.8-33.4 GHz, outside their national boundary, are urged to take all practicably feasible measures to protect the radiocommunication services of other administrations operating in accordance with the Table of Frequency Allocations.

Reasons: Cuba proposes that use of the band 31.8-33.4 GHz for HDFS systems should commence, given that the studies have shown sharing between the different services allocated in the band to be feasible if appropriate measures, including prior frequency coordination, are applied. Special consideration has been given to § 6.1.1.3.2 of the CPM Report, which refers to technical and operational measures that the radionavigation service might adopt to facilitate such sharing.

SUP CUB/31/15

RESOLUTION 126 (WRC-97)

Use of the frequency band 31.8-33.4 GHz for high-density systems in the fixed service

Reasons: No longer necessary - the studies show that use of HDFS in this band is feasible.

MOD CUB/31/16

TABLE **S21-4** *(end)*

Frequency band	**Service***	**Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane**			**Reference bandwidth**
		0°-5°	**5°-25°**	**25°-90°**	
31.0-31.3 GHz 34.7-35.2 GHz (space-to-Earth transmissions referred to in No. **S5.550** on the territories of countries listed in No. **S5.549**) ~~37.0-40.5 GHz~~	~~Fixed-satellite~~ Mobile-satellite Space research	–115 [10]	–115 + 0.5(δ – 5) [10]	–105 [10]	1 MHz
32-33 GHz	Inter-satellite	–135	–135 + 0.5(δ – 5)	–125	1 MHz
31.8-32.3 GHz 37-40 GHz	Fixed-satellite Space research Satellites in non-geostationary orbit	–120	–120 + 3(δ – 5)/4	–105	1 MHz
37-40 GHz	Fixed-satellite Space research Satellites in non-geostationary orbit	–125	–125 + (δ – 5)	–105	1 MHz

Reasons: To adjust the limits for pfd at the surface of the Earth produced by space radiocommunication services sharing the bands 31.8-33 GHz and 37-40 GHz with the fixed service, taking into account high-density applications.

SUP CUB/31/17

RESOLUTION 133 (WRC-97)

Sharing between the fixed service and other services in the band 37-40 GHz

Reasons: No longer necessary.

Item 1.5: Issues related to high altitude platform stations (HAPS)

The Administration of Cuba has noted the studies carried out in connection with the deployment of high altitude platform stations and considers that they require an additional period before any conclusions can be reached. In particular, attention should be paid to the application of mitigation techniques in view of the sharing difficulties between HAPS systems and other services using the bands 47.2-47.5 GHz and 47.9-48.2 GHz.

Cuba has also looked into the feasibility of extending the application of HAPS to frequency bands below 47 GHz, identifying the 18-32 GHz range in particular. This too requires further study.

On the basis of the foregoing, Cuba submits the following proposals to the Conference.

CUB/31/18

Maintain unchanged the current provisions of the Radio Regulations concerning the use of HAPS and extend the studies indicated in Resolution 122 (WRC-97), submitting their results to the next WRC for review.

CUB/31/19

Request ITU-R to conduct studies into the feasibility of identifying additional frequency bands for HAPS in the 18-32 GHz range, taking account of sharing with other radiocommunication services allocated in these bands.

Reasons: To maintain unchanged the current provisions on the use of HAPS pending further studies on sharing with other services, and to consider accelerating studies into the feasibility of identifying additional spectrum for HAPS in the 18-32 GHz range.

Item 1.6.1: Spectrum and regulatory issues in the context of IMT-2000

When considering the matter of identification of the necessary spectrum for the terrestrial component of IMT-2000, the Administration of Cuba began by drawing up a set of guidelines for selecting appropriate frequency bands, which are summed up below:

– select bands which can be used globally or whose characteristics are such as to make their future evolution feasible, with a view to universal use to the maximum extent possible;

– keep to a minimum the designation of non-contiguous spectrum segments in order to ensure that the industry can develop simple equipment which facilitates universal use of the frequency bands concerned and allows maximum economies of scale in marketing;

– take account of the current development of second-generation systems and provide the conditions for their ongoing evolution towards IMT-2000;

– take into account the needs of the other radiocommunication services to which the bands in question are allocated, select those bands that will involve the least impact for those services and take steps to ensure their future development.

The Administration of Cuba has worked on the basis of the above guidelines. Although it has been unable to identify an additional band for use by IMT-2000 in the short term and on a global scale, it has considered a combined proposal which includes the identification in a new footnote of the bands 806-960 MHz and 1 710-1 885 MHz for future evolution towards IMT-2000, taking into account their current use by second-generation systems.

In evaluating this proposal, Cuba considered the advantage, in the case of the band 1 710-1 885 MHz, of using a band contiguous with those already existing in the Radio Regulations. Although the band is already widely used by second-generation mobile services in many countries where, in many cases, their evolution will be possible only in the medium and long term, it does offer the possibility of harmonizing frequency plans with the current use for duplex separation. In other countries, however, where the fixed service is the main user of this band, it is feasible to continue using it and, as the need is identified, to begin introducing IMT-2000 by reorganizing frequency plans for the fixed service, providing, where necessary, for its ordered migration to other segments of the spectrum.

Cuba further considers that the band 806-960 MHz is the continuation of a set of bands that are widely used by second-generation systems, which immediately makes them natural candidates for evolution towards IMT-2000 systems. However, the existence of several different frequency plans for these systems calls for different types of treatment, and their evolution may in many cases be expected to extend over the long term.

These bands should be identified with a view to future development and maximum possible harmonization of the corresponding frequency plans, and to allowing every country, regardless of the region in which it is located, to select the bands best suited to its future needs for development in these systems.

It must also be borne in mind that these bands could be of great use for IMT-2000 applications in developing countries: the possibility of coverage using broader cells means that such systems can be used in part as a supplement to fixed networks in fixed wireless access applications, enabling the spectrum to be used efficiently and economically for the provision of services in locations with few users and where propagation is difficult, as well as to remote users and isolated areas.

On the basis of the foregoing, Cuba also proposes modifying the allocation to the mobile service in the band 902-928 MHz for Region 2 in order to make the same spectrum available to the three Regions, thereby allowing individual administrations maximum flexibility in choosing the future development of their services in these bands with a view to satisfying IMT-2000 requirements.

An important aspect of this proposal is that it would also increase the possibilities for administrations in the Region that so decide to use current second-generation systems such as GSM-900 to meet pressing mobile service development needs without having to resort to the use of bands already envisaged for the initial implementation of IMT-2000 worldwide.

Cuba also proposes modifying Resolution 212 (Rev.WRC-97) in order to align it with the above proposals for the identification of new bands and to bring it up to date, taking account of the need to pursue the task of identifying additional spectrum for global use by IMT-2000.

One final aspect of this proposal which was considered in the context of adjustments to the Table of Frequency Allocations under this agenda item concerns a new allocation to the fixed service in frequency bands where there is the appropriate technology, able to meet many of the requirements currently accommodated in bands in the 1-3 GHz range in a considerable number of countries in the region, the objective being to avoid congestion in these bands and keep them, to the maximum extent possible, for future use by mobile services and, where essential, to make available sufficient spectrum for the orderly transfer of services that use segments identified nationally for the development of IMT-2000 systems once the country proposes introducing them. To that end, Cuba proposes primary allocation of the band 10-10.45 GHz to the fixed and mobile services in Region 2, taking into account the needs of tropical countries in the region, where the use of higher frequencies for the development of the technologies currently using this band is subject to additional constraints due to the corresponding propagation characteristics.

MOD CUB/31/20

470-890 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="6">470-790
BROADCASTING

S5.149 S5.291A S5.294 S5.296 S5.300 S5.302 S5.304 S5.306 S5.311 S5.312</td><td>470-512
BROADCASTING
Fixed
Mobile
S5.292 S5.293</td><td rowspan="2">470-585
FIXED
MOBILE
BROADCASTING

S5.291 S5.298</td></tr>
<tr><td rowspan="2">512-608
BROADCASTING
S5.297</td></tr>
<tr><td rowspan="2">585-610
FIXED
MOBILE
BROADCASTING
RADIONAVIGATION
S5.149 S5.305 S5.306 S5.307</td></tr>
<tr><td rowspan="2">608-614
RADIO ASTRONOMY
Mobile-satellite except aeronautical mobile-satellite (Earth-to-space)</td></tr>
<tr><td rowspan="5">610-890
FIXED
MOBILE
BROADCASTING

S5.149 S5.305 S5.306 S5.307 S5.311 S5.320 <u>ADD S5.321A</u></td></tr>
<tr><td rowspan="2">614-806
BROADCASTING
Fixed
Mobile

S5.293 S5.309 S5.311</td></tr>
<tr><td rowspan="2">790-862
FIXED
BROADCASTING
S5.312 S5.314 S5.315 S5.316 S5.319 S5.321 <u>ADD S5.321A</u></td></tr>
<tr><td rowspan="2">806-890
FIXED
MOBILE
BROADCASTING

S5.317 S5.318 <u>ADD S5.321A</u></td></tr>
<tr><td>862-890
FIXED
MOBILE except aeronautical mobile
BROADCASTING S5.322

S5.319 S5.323 <u>ADD S5.321A</u></td></tr>
</table>

MOD CUB/31/21

890-1 350 MHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td rowspan="3">890-942
FIXED
MOBILE except aeronautical mobile
BROADCASTING S5.322
Radiolocation

S5.323 ADD S5.321A</td><td>890-902
FIXED
MOBILE except aeronautical mobile
Radiolocation
S5.318 S5.325 ADD S5.321A</td><td rowspan="3">890-942
FIXED
MOBILE
BROADCASTING
Radiolocation

S5.327 ADD S5.321A</td></tr>
<tr><td>902-928
FIXED
MOBILE except aeronautical mobile
Amateur
~~Mobile except aeronautical mobile~~
Radiolocation
S5.150 S5.325 ~~S5.326~~
ADD S5.321A</td></tr>
<tr><td>928-942
FIXED
MOBILE except aeronautical mobile
Radiolocation
S5.325 ADD S5.321A</td></tr>
<tr><td>942-960
FIXED
MOBILE except aeronautical mobile
BROADCASTING S5.322
S5.323 ADD S5.321A</td><td>942-960
FIXED
MOBILE

ADD S5.321A</td><td>942-960
FIXED
MOBILE
BROADCASTING
S5.320 ADD S5.321A</td></tr>
</table>

ADD CUB/31/22

S5.321A In the bands 806-960 MHz and 1 710-1 885 MHz, mobile services are operated whose long-term evolution to International Mobile Telecommunications-2000 (IMT-2000) is envisaged. Such use does not preclude the use of these bands by other services to which they are allocated. For the implementation of IMT-2000 in these bands, see Resolution **212 (Rev.WRC-2000)**.

Reasons: To establish provisions which take into account the future development of existing second-generation systems with a view to allowing, to the greatest possible extent, for harmonization of the bands for long-term use by IMT-2000.

To modify the allocation to the mobile service in Region 2 in the band 902-928 MHz, with the aim of facilitating the future development of IMT-2000 systems and allowing its use in order to meet the shorter-term needs of second-generation systems, also bearing in mind the advantages offered by those bands for the implementation of mobile services in developing countries and the extension of those services in combination with fixed wireless access applications.

SUP CUB/31/23

S5.326

Reasons: Not necessary owing to the proposed change of category for the allocation to the mobile service except aeronautical mobile service in the band 902-928 MHz in Region 2.

MOD CUB/31/24

1 710-2 170 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 710-1 930	FIXED MOBILE S5.380 S5.149 ADD S5.321A S5.341 S5.385 S5.386 S5.387 MOD S5.388	
1 930-1 970 FIXED MOBILE MOD S5.388	**1 930-1 970** FIXED MOBILE Mobile-satellite (Earth-to-space) MOD S5.388	**1 930-1 970** FIXED MOBILE MOD S5.388
1 970-1 980	FIXED MOBILE MOD S5.388	
1 980-2 010	FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) MOD S5.388 S5.389A S5.389B S5.389F	
2 010-2 025 FIXED MOBILE MOD S5.388	**2 010-2 025** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) MOD S5.388 S5.389C S5.389D S5.389E S5.390	**2 010-2 025** FIXED MOBILE MOD S5.388
2 025-2 110	SPACE OPERATION (Earth-to-space) (space-to-space) EARTH EXPLORATION-SATELLITE (Earth-to-space) (space-to-space) FIXED MOBILE S5.391 SPACE RESEARCH (Earth-to-space) (space-to-space) S5.392	
2 110-2 120	FIXED MOBILE SPACE RESEARCH (deep space) (Earth-to-space) MOD S5.388	
2 120-2 160 FIXED MOBILE MOD S5.388	**2 120-2 160** FIXED MOBILE Mobile-satellite (space-to-Earth) MOD S5.388	**2 120-2 160** FIXED MOBILE MOD S5.388
2 160-2 170 FIXED MOBILE MOD S5.388 S5.392A	**2 160-2 170** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) MOD S5.388 S5.389C S5.389D S5.389E S5.390	**2 160-2 170** FIXED MOBILE MOD S5.388

MOD CUB/31/25

2 170-2 520 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 170-2 200	FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) MOD S5.388 S5.389A S5.389F S5.392A	

MOD CUB/31/26

S5.388 The bands 1 885-2 025 MHz and 2 110-2 200 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of these bands by other services to which they are allocated. ~~The bands should be made available for~~For the implementation of IMT-2000 in ~~accordance with~~these bands, see Resolution **212 (Rev.WRC-~~97~~2000)**.

Reasons: To modify Resolution 212 in accordance with the proposals for the identification of new frequency bands for IMT-2000, while avoiding the possible interpretation of S5.388 as currently formulated as an obligation to make the bands in question available to IMT-2000 by a particular date.

NOC CUB/31/27

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 700-2 900	AERONAUTICAL RADIONAVIGATION S5.337 Radiolocation S5.423 S5.424	

Reasons: To maintain the allocation for aeronautical radionavigation and radiolocation, in particular for ground-based radars used for meteorological purposes in accordance with footnote S5.423, these being of particular importance in this band, where they can be used for the detection and monitoring of meteorological phenomena over large distances and with great precision. They therefore perform an essential function in the early detection of many such phenomena, providing an invaluable contribution to the safeguarding of human life in regions of the world which are prone to the occurrence of natural disasters such as hurricanes, tropical cyclones and heavy precipitation.

MOD CUB/31/28

10-11.7 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
10-10.45 FIXED MOBILE RADIOLOCATION Amateur S5.479	**10-10.45** RADIOLOCATION Amateur FIXED MOBILE S5.479 ~~S5.480~~	**10-10.45** FIXED MOBILE RADIOLOCATION Amateur S5.479

Reasons: To allocate the fixed and mobile services in Region 2 on a primary basis, making available the spectrum necessary to be able to develop, and where necessary transfer, the fixed services currently operating in bands in the 1-3 GHz range, thereby making these bands available for the development of mobile services. This proposal is, moreover, in conformity with the provisions contained in Recommendation 34 (WRC-95) in respect of harmonizing utilization of the spectrum by developing worldwide allocations.

SUP CUB/31/29

S5.480

Reasons: This footnote is rendered unnecessary by the proposed allocation in the Table.

MOD CUB/31/30

RESOLUTION 212 (Rev.WRC-~~97~~2000)

Implementation of International Mobile Telecommunications-2000 (IMT-2000)*[*]

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that ITU-R has recommended the 1-3 GHz and surrounding bands as the most suitable for IMT-2000;

b) that ITU-R has ~~recommended approximately 60 MHz for use by personal stations and approximately 170 MHz for use by mobile stations~~identified maximum values for the anticipated spectrum needs of the terrestrial component taking into account the geographical areas where traffic is the highest;

c) that ITU-R has recognized that space techniques are an integral part of IMT-2000;

d) that~~, in No. **S5.388**, this Conference has identified~~ bands to accommodate this ~~future~~ service~~,~~ on a worldwide basis are identified in No. **S5.388**;

e) that the most recent studies conclude that the bands identified in No. **S5.388** are insufficient to accommodate the medium- and long-term requirements of IMT-2000 in those areas where the traffic is the highest;

f) that frequency bands currently used by other mobile services whose evolution to IMT-2000 in envisaged in the long term are identified in No. **S5.321A**,

considering further

~~*a)*~~ that ITU-R has ~~not completed its studies regarding duplexing methods, modulation techniques, channelling arrangements, signalling or communication protocols;~~completed its development of recommendations containing specifications for the IMT-2000 radio interface,

~~*b)* that no worldwide intersystem numbering plan currently exists that would facilitate worldwide roaming,~~

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[*] IMT-2000 was previously known as Future Public Land Mobile Telecommunication Systems (FPLMTS).

noting

a) that the implementation of the terrestrial component of IMT-2000 in the bands 1 885-2 025 MHz and 2 110-2 200 MHz is expected to commence around the year 2000, subject to market and technical considerations;

b) that, in addition to the above, it is envisaged that the bands 806-960 MHz and 1 710-1 885 MHz will be used by those administrations wishing to implement IMT-2000, bearing in mind the long-term evolution of second generation systems which utilize frequencies in those bands;

~~b~~c) that the availability of the satellite component of IMT-2000 in the bands 1 980-2 010 MHz and 2 170-2 200 MHz simultaneously with the terrestrial component of IMT-2000 ~~in the bands identified in No. **S5.388**~~ would improve the overall implementation and the attractiveness of IMT-2000 to both developed and developing countries,

invites administrations

a) to give due consideration to the accommodation of other services currently operating in these bands when implementing IMT-2000~~,~~;

b) to consider also the possibilities for harmonizing the spectrum currently used by second-generation systems in the bands identified in No. **S5.321A** when planning the process for the evolution of those systems to IMT-2000,

invites ITU-R

to continue its studies with a view to developing suitable and acceptable technical characteristics for IMT-2000, including identification of the additional spectrum required, that will facilitate worldwide use and roaming, and ensure that IMT-2000 can also meet the telecommunication needs of the developing countries and rural areas,

invites ITU-T

a) to complete its studies of signalling and communication protocols;

b) to develop a common worldwide intersystem numbering plan and associated network capabilities that will facilitate worldwide roaming,

resolves

that administrations which implement IMT-2000:

a) should make the necessary frequencies, in the bands identified herein, available for ~~system~~ development of the system according to their requirements;

b) should use those frequencies when implementing IMT-2000 ~~is implemented~~;

c) should use the relevant international technical characteristics, as identified by ITU-R and ITU-T Recommendations.

Reasons: To update Resolution 212 and take measures in accordance with the proposal to identify candidate bands for evolution to IMT-2000, specifically the band 1 710-1 885 MHz for possible long-term global application of IMT-2000, and the band 806-960 MHz, in accordance with the proposed addition of No. S5.321A, taking into account the spectrum segments within this frequency range that are currently used by second-generation systems, with the aim of facilitating, to the maximum extent possible, the process of harmonizing the future use of this spectrum.

Item 1.6.2: Global radio control channel for IMT-2000

With regard to the question of identifying a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000, and in the light of the latest ITU-R studies which conclude that the operation of such terminals and worldwide roaming of IMT-2000 are possible without a specific global control channel, the Administration of Cuba submits the following proposal:

CUB/31/31

WRC-2000 has decided to take no action to identify a specific global radio control channel.

Reasons: Not necessary.

Item 1.7: Use of the HF bands by the maritime and aeronautical services

The Administration of Cuba recognizes that harmful interference in the HF bands allocated for distress and safety communications in the aeronautical mobile (R) and maritime mobile services has increased, particularly in certain parts of the world, owing to unauthorized and indiscriminate use of these bands.

ITU-R studies on appropriate interference mitigation techniques are not yet complete and, in particular, there is a need to address in greater depth the consequences for ship and aircraft operations of introducing such techniques, which may require modifications to existing facilities, including equipment installed relatively recently on ships to comply with the GMDSS. This may mean new investments by administrations and shipping companies and it would also be necessary to introduce modifications to the Radio Regulations. Consequently, solving the problem would involve additional costs for the services affected by the interference, as the adoption of mitigation techniques by victim receivers would not eliminate the source of the interference, particularly in the case of emissions from unlicensed transmitters which are difficult to locate and control.

Furthermore, the aeronautical mobile (R) frequencies 3 023 kHz and 5 680 kHz have been allocated for use by the aeronautical and mobile maritime services and manned space vehicles in search and rescue operations. In addition, all the frequencies in the HF bands allocated exclusively to the aeronautical mobile (R) service are used for communications relating to safety pursuant to No. S43.1. Unauthorized use by other services is on the increase, causing serious degradation in communications relating to safety, and is in breach of the requirements of the Radio Regulations, particularly the provisions of Appendix S27.

Cuba is in favour of introducing changes to Article S15 in order to include the reference to Appendix S27, since Article S15 refers only to Article S31 and Appendix S13, designed principally for the maritime services. However, it considers that Appendix S27 should remain unchanged, since this spectrum should be maintained for new high-frequency digital communications for data links. Should it prove necessary, the review of Appendix S27 will be carried out by a later WRC taking account of the results of the ICAO and ITU-R studies.

For the foregoing reasons, Cuba's proposal to WRC endorses all measures designed to eliminate all unauthorized use of the frequencies allocated to the aeronautical mobile (R) service between 2 850 kHz and 22 000 kHz.

ARTICLE S15

Interferences

Section I – Interference from Radio Stations

MOD CUB/31/32

S15.8 § 4 Special consideration shall be given to avoiding interference on distress and safety frequencies and those related to distress and safety identified in Appendix **S13** and to safety and regularity of flight identified in Appendix **S27**.

Reasons: To include the frequencies in Appendix S27 which are related to safety and regularity of flight under Article S43.

Section VI – Procedure in a case of harmful interference

MOD CUB/31/33

S15.28 § 20 Recognizing that transmissions on the distress and safety frequencies and those related to safety and regularity of flight (see Article **S31** and Appendi~~x~~ces **S13** and **S27**) require absolute international protection and that the elimination of harmful interference to such transmissions is imperative, administrations undertake to act immediately when their attention is drawn to any such harmful interference.

Reasons: To increase the provisions for the protection of frequencies related to safety and regularity of flight included in Appendix S27.

In considering Resolution 346 (WRC-97), the Administration of Cuba took into account the fact that some HF distress and safety frequencies allocated to the maritime service are also used for routine international calling, which can cause interference in distress and safety communications where the caller fails to comply with No. S52.224 which requires that before transmitting on the carrier frequencies 4 125 kHz, 6 215 kHz, 8 291 kHz, 12 290 kHz or 16 420 kHz a station shall listen on the frequency for a reasonable period to make sure that no distress traffic is being sent. Stations in distress are exempt from this requirement, but their calls are not included among the causes of interference in distress communications under way when a new distress call is launched.

Cuba considers that, for the time being, there is no need to introduce any modification for the purpose of dividing existing distress and security channels into two separate frequencies. Distress and safety frequencies should therefore remain unchanged, continuing to be used for non-safety calling. Accordingly, no modification of distress procedures is necessary; it would suffice to request administrations to ensure strict compliance with No. S52.224 of the Radio Regulations.

NOC CUB/31/34

S52.224 § 99 1) Before transmitting on the carrier frequencies 4 125 kHz, 6 215 kHz, 8 291 kHz, 12 290 kHz or 16 420 kHz a station shall listen on the frequency for a reasonable period to make sure that no distress traffic is being sent (see Recommendation ITU-R M.1171).

Reasons: This provision should be maintained. Cuba considers that no further provisions in this respect are necessary.

Item 1.8: Earth stations located on board vessels in the bands 4/6 GHz

Having considered this agenda item, Cuba has reached the conclusion that WRC-2000 should introduce no changes to the current use of the bands 3 700-4 200 MHz and 5 925-6 425 MHz, in view of the following considerations.

The use of earth stations on board vessels is the main feature defining the maritime mobile-satellite service (see the definition in No. S1.29). There is no doubt that this service is provided in duly regulated frequency bands where issues of coordination between earth stations and other radiocommunication services are not complex and where equipment characteristics are clearly defined. They also involve the use of GMDSS distress communications, which is undoubtedly the most important aspect of the whole field of maritime telecommunications and therefore warrants a special legal regime and regulatory treatment.

It follows that any change or variation in the regulatory environment of maritime communications, particularly where the high seas are concerned, requires a very detailed analysis which must take account of the many different factors that have a decisive influence on the regulatory regime applied by administrations in respect of the radiocommunication facilities under their jurisdiction and the services using them.

In addition to the legal complexities of carrying out maritime communications via satellite networks registered internationally in the fixed-satellite service, this agenda item addresses the complex issue of availability for such communications in the bands 4/6 GHz, which are widely used in all regions for the development of the fixed service, and in which some systems constitute the main communication axes in the national networks of a considerable number of countries.

The sharing of these bands between the fixed service and the fixed-satellite service is based on a balance which has been well sustained over the years and has enabled both services to use the spectrum very efficiently without the imposition of restrictions curbing their development. The sharing is based on limitation of the pfd at the surface of the Earth produced by space station emissions corresponding to an acceptable level of interference for virtually all possible networks in the fixed service. The situation could be improved by avoiding directions that intercept the geostationary orbit in the case of fixed-station antennas of high-sensitivity networks, and by coordinating earth stations and terrestrial stations in accordance with Appendix S7.

Since coordination with earth stations on board vessels on the high seas is extremely complicated and would not appear to be practicable, the option considered consists of establishing a minimum distance from any coastal territory from which earth stations on board vessels could operate. However, preliminary studies to date have not reached a definitive value for the distance. It would therefore be premature to take any decision before completing more detailed studies to ensure the protection of important existing and planned fixed service systems in the 6 GHz band. Moreover, there is lack of clarity as to the mechanisms for ensuring strict observance of the minimum distance, which would mean suspension of communications by the vessels in question.

It has been argued that procedures should be established to allow rapid interaction with ships equipped with earth stations, or with the responsible administrations, in order to eliminate immediately any non-compliance with restrictions resulting in harmful interference in the fixed-service networks of another administration. Whether this could be applied in practice, however, appears doubtful, particularly in developing countries, which would need to have a complex structure for the purpose, including a monitoring network enabling them to identify unlawful emissions as soon as they occurred in the above-mentioned frequency band. In practice, most of them lack this resource.

NOC CUB/31/35

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
3 600-4 200 FIXED FIXED-SATELLITE (space-to-Earth) Mobile	**3 700-4 200** FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	

NOC CUB/31/36

5 830-7 550 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 925-6 700	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.149 S5.440 S5.458	

Reasons: To maintain unchanged the bands 3 700-4 200 MHz and 5 925-6 425 MHz.

ADD CUB/31/37

RESOLUTION AAA

Use of the bands 3 700-4 200 MHz and 5 925-6 425 MHz for communications with earth stations located on board vessels

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that there is a demand for global wideband satellite communication services on vessels;

b) that the technology exists that would permit the use of earth stations on board vessels in the bands 3 700-4 200 MHz and 5 925-6 425 MHz;

c) that the above-mentioned bands are shared with equal rights by the fixed-satellite service and terrestrial services;

d) that earth stations on board vessels have the potential to cause unacceptable interference to the fixed and mobile service systems in the band 5 925-6 425 MHz;

e) that fixed and mobile service systems have the potential to cause interference to earth stations on board vessels in the 3 700-4 200 MHz band,

noting

a) that, at present, earth stations on board vessels can operate in fixed-satellite service networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz only under No. **S4.4** of the Radio Regulations;

b) that operation within the territorial sea is at the discretion of the administration with territorial authority, in which case the relevant procedures of that administration will apply;

c) that operation of earth stations on vessels from specified fixed points at locations outside the territorial sea but for which an administration has territorial jurisdiction is fully within the FSS,

recognizing

the need for further studies on this subject,

requests ITU-R

1 to continue studies on the regulatory, technical and operational aspects of the use of earth stations on board vessels in bands shared by the FSS with terrestrial services;

2 in conducting such studies, to place particular emphasis on aspects related to ensuring the protection of terrestrial service networks without imposing on them any additional restrictions whatsoever,

urges administrations

to participate actively in the above-mentioned studies by submitting contributions to ITU-R,

resolves

to invite WRC-02/03 to review the results of the above-mentioned studies with a view to determining whether it is feasible for earth stations on board vessels to use part of the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz and, if so, to make the necessary regulatory arrangements,

requests the Secretary-General

to bring this Resolution to the attention of the International Maritime Organization (IMO).

Reasons: To take steps allowing for fuller examination of this question through studies on its technical, regulatory and operational aspects, taking into account the need to ensure not only the protection but also the unrestricted development of terrestrial services sharing bands with earth stations on board vessels.

WRC-02/03 is requested to review the results of these studies and to reach a conclusion on the basis thereof as to whether it is feasible to use earth stations on board vessels in these frequency bands and, in the event of an affirmative conclusion, to prepare appropriate regulatory provisions to that end.

Item 1.9: MSS in the 1 559-1 567 MHz frequency range

The band 1 559-1 610 MHz has been allocated on a primary basis to the aeronautical radionavigation service and the radionavigation-satellite service. Currently the two components of the GNSS, namely the GLONASS and the GPS, operate in this band. The GNSS has been chosen as the basic technology for navigation with ICAO’s CNS/ATM systems.

On the basis of the CPM Report, the Administration of Cuba considers that any sharing of this band with other systems may produce harmful interference in the aeronautical services which are crucial for safety.

It is essential that, in future, the entire band assigned to the GNSS (1 559-1 610 MHz) should remain free from interference from non-aeronautical sources, so as to be able to ensure the introduction of new RNSS applications in the band 1 559-1 567 MHz. Cuba therefore considers that no new allocations should be made to the MSS in the band 1 559-1 567 MHz.

MOD CUB/31/38

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 559-1 610	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) ADD S5.353A S5.341 S5.355 S5.359 S5.363	

Reasons: No allocations should be made to the MSS in the band 1 559-1 657 MHz.

SUP CUB/31/39

RESOLUTION 220 (WRC-97)

Studies to consider the feasibility of use of a portion of the band 1559-1610 MHz by the mobile-satellite service (space-to-Earth)

Reasons: The studies on this subject have reached the conclusion that sharing in the band 1 559-1 567 MHz is not feasible.

Item 1.10: Use by the MSS of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz

The Administration of Cuba has considered the results of the ITU-R studies concerning Resolution 218 (WRC-97) and the protection requirements for distress and safety communications and communications related to safety and regularity of flight.

It took into account the fact that concerns were expressed at WRC-97 concerning generic allocation to the MSS in connection with a series of technical and operational points affecting the aeronautical and maritime mobile-satellite services in respect of the need to ensure sufficient spectrum access when necessary. Concern was therefore expressed about the feasibility of pre-emption between the various networks.

Notwithstanding the foregoing, WRC-97 agreed on generic allocation to the MSS in the band 1.5/1.6 GHz and established No. S5.353A for the distress, urgency and safety communications of the GMDSS and No. S5.357A for the AMS(R)S with the intention of providing priority access to the AMS(R)S in the future when the spectrum is coordinated. However, the CPM Report notes that the complexity and cost of implementing intra-system prioritization and pre-emption between different types of MES standard designations is greater than within one standard designation, and that further studies are therefore required to define the technical and operational requirements that will satisfy the needs of the AMS(R)S/GMDSS, together with studies on the alternative of implementing a system that could use spectrum flexibly between different MSS networks.

In Cuba's view, it is necessary to accelerate the ITU-R studies on the feasibility and definition of mechanisms for facilitating the implementation of intra-system prioritization and pre-emption, with the participation of ICAO, IMO, interested administrations and MSS operators. In this connection, it notes the results of the ICAO studies, which conclude that the future spectrum needs of the AMS(R)S for safety purposes will be 10.8 MHz in 2010 and 18 MHz beyond that date.

In view of the foregoing, Cuba is in favour of implementing measures that ensure prioritization and pre-emption for urgency and safety communications of the GMDSS and aeronautical communications with priority 1 to 6 under Article S44 of the Radio Regulations, in accordance with Nos. S5.353A and S5.357A.

CUB/31/40

Adopt measures that ensure the necessary spectrum access for future AMS(R)S communications and establish appropriate technical provisions and standards in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz, in order to ensure that GMDSS communications and aeronautical communications in Categories 1 to 6 under Article S44 have priority and immediate access at all times.

Item 1.11: Non-geostationary mobile-satellite service below 1 GHz

In considering the restrictions on existing allocations to the mobile-satellite service in frequencies below 1 GHz, Cuba reached the view that they should be maintained so as to continue providing adequate protection to the other services sharing frequency bands below 1 GHz with the mobile-satellite service and to allow unrestricted growth of these services in the future.

As regards additional allocations to the mobile-satellite service in frequencies below 1 GHz, no appropriate bands have been identified for this purpose. Furthermore, Cuba considers that the studies indicated in Resolution 219 (WRC-97) have been concluded and that the resolution should therefore be discontinued. On this issue in particular, Cuba agrees fully with the statement in the CPM Report that co-channel sharing between MSS systems using narrow-band modulation techniques and the MetAids service in the band 401-406 MHz is not feasible. It also agrees with the conclusion that transition of the MetAids service out of the band 405-406 MHz is not feasible. It therefore proposes that no change should be made to existing allocations, in view of the importance of MetAids in this frequency band, particularly for developing countries, bearing in mind that any transition to higher bands would involve a significant increase in the costs of new radiosondes, which would hamper the development of meteorological service programmes in many developing countries.

In view of the foregoing, Cuba submits the following proposals to the Conference:

NOC CUB/31/41

S5.219 The use of the band 148-149.9 MHz by the mobile-satellite service is subject to coordination under No. **S9.11A**. The mobile-satellite service shall not constrain the development and use of the fixed, mobile and space operation services in the band 148-149.9 MHz.

NOC CUB/31/42

S5.221 Stations of the mobile-satellite service in the band 148-149.9 MHz shall not cause harmful interference to, or claim protection from, stations of the fixed or mobile services operating in accordance with the Table of Frequency Allocations in the following countries: Albania, Algeria, Germany, Saudi Arabia, Australia, Austria, Bahrain, Bangladesh, Barbados, Belarus, Belgium, Benin, Bosnia and Herzegovina, Brunei Darussalam, Bulgaria, Cameroon, China, Cyprus, Congo, the Republic of Korea, Croatia, Cuba, Denmark, Egypt, the United Arab Emirates, Eritrea, Spain, Estonia, Ethiopia, Finland, France, Gabon, Ghana, Greece, Guinea, Guinea Bissau, Hungary, India, the Islamic Republic of Iran, Ireland, Iceland, Israel, Italy, Jamaica, Japan, Jordan, Kazakstan, Kenya, Kuwait, Latvia, The Former Yugoslav Republic of Macedonia, Lebanon, Libya, Liechtenstein, Luxembourg, Malaysia, Mali, Malta, Mauritania, Moldova, Mongolia, Mozambique, Namibia, Norway, New Zealand, Oman, Uganda, Uzbekistan, Pakistan, Panama, Papua New Guinea, Paraguay, the Netherlands, Philippines, Poland, Portugal, Qatar, Syria, Kyrgyzstan, Slovakia, Romania, the United Kingdom, Russian Federation, Senegal, Sierra Leone, Singapore, Slovenia, Sri Lanka, South Africa, Sweden, Switzerland, Swaziland, Tanzania, Chad, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Ukraine, Viet Nam, Yemen, Yugoslavia, Zambia, and Zimbabwe.

Reasons: To maintain mobile-satellite service stations in the band 148-149.9 MHz as secondary to stations of the fixed and mobile services operating in accordance with the Table of Frequency Allocations in the countries listed, and to maintain the provision that the mobile-satellite service shall not constrain the development and use of the fixed and mobile services.

NOC CUB/31/43

S5.254 The bands 235-322 MHz and 335.4-399.9 MHz may be used by the mobile-satellite service, subject to agreement obtained under No. **S9.21**, on condition that stations in this service do not cause harmful interference to those of other services operating or planned to be operated in accordance with the Table of Frequency Allocations.

Reasons: To maintain stations of the mobile-satellite service in the bands 235-322 MHz and 335.4-399.9 MHz as secondary to stations of the fixed and mobile services operating in accordance with the Table.

NOC CUB/31/44

S5.286B The use of the band 454-455 MHz in the countries listed in No. **S5.286D**, 455-456 MHz and 459-460 MHz in Region 2, and 454-456 MHz and 459-460 MHz in the countries listed in No. **S5.286E**, by stations in the mobile-satellite service, shall not cause harmful interference to, or claim protection from, stations of the fixed or mobile services operating in accordance with the Table of Frequency Allocations.

NOC CUB/31/45

S5.286C The use of the band 454-455 MHz in the countries listed in No. **S5.286D**, 455-456 MHz and 459-460 MHz in Region 2, and 454-456 MHz and 459-460 MHz in the countries listed in No. **S5.286E**, by stations in the mobile-satellite service, shall not constrain the development and use of the fixed and mobile services operating in accordance with the Table of Frequency Allocations.

Reasons: To maintain stations of the mobile-satellite service allocated in the bands 454-455 MHz in the countries listed in Nos. S5.286D and S5.286E, and 455-456 MHz and 459-460 MHz in Region 2 and in the countries listed in No. S5.286E, as secondary to stations of the fixed and mobile services operating in accordance with the Table, and to maintain the provision that the mobile-satellite service shall not constrain the development and use of the fixed and mobile services.

NOC

APPENDIX S5

ANNEX 1

NOC

1.1 Below 1 GHz*

NOC CUB/31/46

1.1.1 In the bands 137-138 MHz and 400.15-401 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to terrestrial services (except aeronautical mobile (OR) service networks operated by the administrations listed in Nos. **S5.204** and **S5.206** as of 1 November 1996) is required only if the pfd produced by this space station exceeds –125 dB (W/m^2/4 kHz) at the Earth's surface.

NOC CUB/31/47

1.1.2 In the band 137-138 MHz, coordination of a space station of the MSS (space-to-Earth) with respect to the aeronautical mobile (OR) service is required only if the pfd produced by this space station at the Earth's surface exceeds:

– –125 dB (W/m^2/4 kHz) for networks for which complete Appendix **3** coordination information has been received by the Bureau prior to 1 November 1996;

– –140 dB (W/m^2/4 kHz) for networks for which complete Appendix **S4**/**3** coordination information has been received by the Bureau after 1 November 1996 for the administrations referred to in § 1.1.1 above.

NOC CUB/31/48

1.1.3 In the band 137-138 MHz, coordination is also required for a space station on a replacement satellite of a MSS network for which complete Appendix **3** coordination information has been received by the Bureau prior to 1 November 1996 and the pfd exceeds –125 dB(W/m^2/4 kHz) at the Earth's surface for the administrations referred to in § 1.1.1 above.

Reasons: The existing provisions are considered adequate for sharing by the mobile-satellite service and terrestrial services, and particularly for the protection of the aeronautical mobile (OR) service.

NOC CUB/31/49

335.4-410 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
403-406	METEOROLOGICAL AIDS Fixed Mobile except aeronautical mobile	

Reasons: This band should be maintained to ensure continued development of the meteorological aids service, especially radiosonde systems, which are particularly important in this band for developing countries.

SUP CUB/31/50

RESOLUTION 219 (WRC-97)

Studies relating to consideration of the allocation to the non-geostationary mobile-satellite service in the meteorological aids band 405-406 MHz and the impact on primary services allocated in the adjacent bands

Reasons: The studies referred to in Resolution 219 (WRC-97) are considered to have been completed. ITU-R has carried out studies taking account of sharing between the MSS and the meteorological aids service, use of the band for the meteorological aids, Earth exploration-satellite and meteorological-satellite services, and the repercussions of spurious emissions in this band on the COSPAS-SARSAT system and the radio astronomy service. On the basis of these studies, CPM-99 concluded that in the near future operation of the MSS in the band 405-406 MHz will not be considered feasible.

Item 1.13: Proposals for revision of the power flux-density limits appearing in Article S21 and Resolution 131 (WRC-97)

Cuba has considered the revision of Article S21 with a view to adjusting the established values for the power flux-density limits at the surface of the Earth produced by emissions from non-GSO FSS space stations, in order to protect stations in the fixed service.

In its analysis it took into account the results of the ITU-R studies and of the CPM Report, and reached the conclusion that the power flux-density limits reflected in the Report constitute adequate values for protecting fixed-service systems in the frequency bands between 10.7-12.75 GHz and 17.7-19.3 GHz. Cuba therefore proposes to the Conference that Article S21 should be amended accordingly in order to reflect these values.

The proposal for amendment of Article S21 includes a corresponding modification to the band 11.7-12.2 GHz for Region 2, with a view to having power flux-density limits that allow protection of fixed-service stations vis-à-vis emissions from GSO FSS space stations operating in this frequency band in Region 2 in accordance with No. S5.488 of the Radio Regulations (see proposals CUB/31/55 and CUB/31/66).

Lastly, in addressing the revision of Article S21, Cuba notes that No. S21.7, which concerns the power limits applicable to terrestrial stations in the case of trans-horizon systems, refers to the 1 970-2 010 MHz band, yet the segment between 1 970 and 1 980 MHz is not allocated to space services in the Table of Frequency Allocations in Article S5 of the Radio Regulations. It concludes that this is a misinterpretation requiring the appropriate modification, to which end it submits proposal CUB/31/51 below to the Conference.

MOD CUB/31/51

S21.7 5) Transhorizon systems in the 1 700-1 710 MHz, ~~1 970~~1 980-2 010 MHz, 2 025-2 110 MHz and 2 200-2 290 MHz bands may exceed the limits given in Nos. **S21.3** and **S21.5**, but the provisions of Nos. **S21.2** and **S21.4** should be observed. Considering the difficult sharing conditions with other services, administrations are urged to keep the number of transhorizon systems in these bands to a minimum.

Reasons: The band 1 970-1 980 MHz is not allocated to space services in the Table of Frequency Allocations of the Radio Regulations.

MOD CUB/31/52

TABLE **S21-4** *(continued)*

Frequency band	Service*	Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane 0°-5°	5°-25°	25°-90°	Reference bandwidth
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	–150 ~~[14]~~	–150 + 0.5(δ – 5) ~~[14]~~	–140 ~~[14]~~	4 kHz

ADD CUB/31/53

Frequency band	Service*	0°-5°	5°-25°	25°-90°	Reference bandwidth
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	–126	–126 + 0.5(δ – 5)	–116	1 MHz

MOD CUB/31/54

Frequency band	Service*	0°-5°	5°-25°	25°-90°	Reference bandwidth
11.7-12.5 GHz (Region 1) 11.7-12.~~2~~7 GHz (Region 2) 11.7-12.~~2~~75 GHz (Region 3) ~~12.2-12.7 GHz (Region 2)~~ 12.5-12.75 GHz (Region 1 countries listed in Nos. **S5.494** and **S5.496**)	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	~~–148 [15]~~ –124	~~–148 + 0.5(δ – 5) [15]~~ –124 + 0.5(δ – 5)	~~–138 [15]~~ –114	~~4 kHz~~ 1 MHz

MOD CUB/31/55

Frequency band	Service*	0°-5°	5°-25°	25°-90°	Reference bandwidth
11.7-12.2 GHz[7] (Region 2) 12.2-12.~~5~~7 GHz[7] (Region 3) 12.~~5~~2-12.75 GHz[7] (Region 1 ~~and Region 3~~ countries listed in Nos. **S5.494** and **S5.496**)	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	–148 ~~[14]~~	–148 + 0.5(δ – 5) ~~[14]~~	–138 ~~[14]~~	4 kHz

NOC CUB/31/56

Frequency band	Service*	0°-5°	5°-25°	25°-90°	Reference bandwidth
15.43-15.63 GHz	Fixed-satellite (space-to-Earth)	–127	5°-20°: –127 20°-25°: –127 + 0.56(δ – 20)²	25°-29°: –113 29°-31°: –136.9 + 25 log (δ – 20) 31°-90°: –111	1 MHz

MOD CUB/31/57

17.7-19.3 GHz[7, 8]	Fixed-satellite (space-to-Earth) Meteorological-satellite (space-to-Earth)	–115[aa] or ~~–125~~ ~~[12]~~ –115 – X[12]	–115 + 0.5(δ – 5)[aa] or ~~–125 + (δ – 5)~~ –115 – X(10 + X)/20 (δ – 5)[12]	–105[aa] or –105 [12]	1 MHz

NOC CUB/31/58

19.3-19.7 GHz 22.55-23.55 GHz 24.45-24.75 GHz 25.25-27.5 GHz	Fixed-satellite (space-to-Earth) Earth exploration-satellite (space-to-Earth) Inter-satellite	–115	–115 + 0.5(δ – 5)	–105	1 MHz

MOD CUB/31/59

[12] **S21.16.6** These values shall apply provisionally only to emissions of space stations on non-geostationary satellites in networks operating with a large number of satellites, that is systems operating with more than 100 satellites (see Resolution **131 (WRC-97)**).

The function X is defined as a function of the number, N, of satellites in the non-GSO FSS constellation as follows:

– for N ≤ 50 $X = 0$ (dB)

– for 50 < N ≤ 288 $X = 5(N - 50)/119$ (dB)

– for N > 288 $X = \left(N + 402\right)/69$ (dB)

In the band 18.8-19.3 GHz, these limits apply to emissions of a space station on a non-geostationary FSS satellites for which complete coordination or notification information, as appropriate, has been received by the Radiocommunication Bureau after 17 November 1995, and which was not operational by that date.

ADD CUB/31/60

[aa] **S21.16.6*bis*** These limits apply to emissions of a space station on a meteorological-satellite and on a geostationary FSS satellite. These limits also apply to emissions of a space station on a non-geostationary FSS satellite in the bands 18.8-19.3 GHz for which complete coordination or notification information has been received by the Radiocommunication Bureau by 17 November 1995, or are in operation by that date.

NOC CUB/31/61

[13] **S21.16.7**

SUP CUB/31/62

[14] **S21.16.8**

SUP CUB/31/63

[15] **S21.16.9**

Reasons: Cuba considers that the limits proposed constitute appropriate values for providing protection to fixed service systems.

SUP CUB/31/64

RESOLUTION 131 (WRC-97)

Power flux-density limits applicable to non-geostationary fixed-satellite service systems for protection of terrestrial services in the bands 10.7-12.75 GHz and 17.7-19.3 GHz

Reasons: Cuba considers that adequate action has already been taken and that the resolution is therefore no longer necessary.

Application of RR Nos. S5.488 and S5.491

1 WRC-97 agreed to the development of non-GSO FSS systems in the band 11.7-12.2 GHz (Region 2) and 12.2-12.5 GHz (Region 3) among others. Although the current provisions of Nos. S5.488 and S5.491 limit these FSS allocations to national and subregional systems, in Cuba's view this limitation was established long before and bears no relation to the later decision to develop non-GSO FSS systems in these bands.

In view of the foregoing, Cuba considers that the necessary modifications should be made to the above footnotes in order to make it clear that the limitations do not apply to non-GSO FSS systems.

2 Another point to be considered is that the Radio Regulations Board, at its 13th meeting, revised the Rules of Procedure in respect of No. S5.488 applying to the use of the frequency band 11.7-12.2 GHz by the FSS in Region 2, noting that as a consequence of the application of the modifications introduced by WRC-97, as from 1 January 1999, fixed-service stations would no longer have protection in respect of emissions from space stations of geostationary-satellite networks.

The foregoing can be explained by the fact that, in revising No. S5.488, WRC-97 modified the text thereof by deleting the explicit reference to No. S9.21, and in modifying the provisions of Article S21, established power flux-density limits for this frequency band in Region 2, but referenced them only to emissions from non-GSO FSS space stations.

Having examined this matter, the Administration of Cuba considers it essential that WRC-2000 should address this problem so as to remedy what Cuba believes to be the result of an unintentional omission, WRC-97 having at no time intended to eliminate protection of the Region 2 fixed service systems operating in the above-mentioned frequency band.

To solve the problem, Cuba considers that the Conference should decide to establish appropriate power flux-density limits, thereby completing Table S21-4 in Section V of Article S21, as is common practice in the Radio Regulations for the protection of terrestrial services in the frequency bands which they share, on a primary basis, with the fixed-satellite service (space-to-Earth). In this connection, Recommendation ITU-R SF.385-5 establishing maximum permissible values of power flux-density to protect fixed-service systems has been revised on the grounds that the limits corresponding to the band immediately above also provide adequate protection for the fixed service in the band 11.7-12.2 GHz. The limits in question are those currently applied for emissions from non-geostationary satellites in the bands 11.7-12.7 GHz and emissions from geostationary satellites in the bands 12.2-12.75 GHz.

MOD CUB/31/65

S5.488 The use of the bands 11.7-12.2 GHz by geostationary-satellite networks in the fixed-satellite service in Region 2 and 12.2-12.7 GHz by the broadcasting-satellite service in Region 2 is limited to national and subregional systems. ~~The use of the band 11.7-12.2 GHz by the fixed-satellite service in Region 2 is subject to previous agreement between the administrations concerned and those having services, operating or planned to operate in accordance with the Table, which may be affected (see Articles **S9** and **S11**).~~ For the use of the band 12.2-12.7 GHz by the broadcasting-satellite service in Region 2, see Appendix **S30**.

Reasons: To establish power flux-density limits in Article S21 which provide adequate protection to terrestrial systems in this frequency band. This would make it unnecessary to identify the administrations whose services might be affected by FSS networks, while also making it clear that the limitation to national or subregional systems does not apply to non-GSO networks.

CUB/31/66

Adopt the following power flux-density limits to ensure the protection of terrestrial services against emissions from geostationary space stations in Region 2 in the band 11.7-12.2 GHz:

-148	dB(W/m^2)	for	$\theta \leq 5°$
$-148 + 0.5(\theta - 5)$	dB(W/m^2)	for	$5° \leq \theta \leq 25°$
-138	dB(W/m^2)	for	$25° \leq \theta \leq 90°$

Reasons: These limits, which are consistent with Recommendation ITU-R SF.358-5, are considered adequate for the protection of terrestrial services in the band 11.7-12.2 GHz. Furthermore, their establishment would allow effective sharing between terrestrial services and the GSO FSS without the need for coordination procedures and without the risk of terrestrial services, operating or planned, losing priority if an administration fails to notice in time the publication of a request for coordination under No. S9.21 in a special section of the BR Weekly Circular.

Cuba proposes including these limits in Table S21-4 (see proposal CUB/31/55), which would still allow for the application of S21.17 in order to obtain agreements with other administrations in cases where it is proposed to exceed the limits, but without the need for a coordination procedure.

MOD CUB/31/67

S5.491 *Additional allocation:* in Region 3, the band 12.2-12.5 GHz is also allocated to geostationary-satellite networks the fixed-satellite (space-to-Earth) service on a primary basis, limited to national and sub-regional systems. The power flux-density limits in Article **S21**, Table **S21-4** shall apply to this frequency band. The introduction of the service in relation to the broadcasting-satellite service in Region 1 shall follow the procedures specified in Article 7 of Appendix **S30**, with the applicable frequency band extended to cover 12.2-12.5 GHz.

Reasons: To make it clear that the limitation to national and sub-regional systems does not apply to non-GSO networks.

3 Lastly, the Administration of Cuba notes that both footnotes use the expression “limited to national and sub-regional systems” for certain allocations to space radiocommunication services, and considers that it would be appropriate that the Conference adopt a single definition establishing the precise scope of the limitation, which is essential, in Cuba’s view, for the treatment of such cases in relation to the other provisions of the Radio Regulations. This would also enable the Radio Regulations Board, by taking it into account, to establish Rules of Procedure that are applicable to all cases equally.

On the basis of the foregoing, Cuba proposes that the Conference adopt the following proposal:

CUB/31/68

Where a footnote to the Table, concerning an allocation to a space radiocommunication service, indicates that its use is limited to national and sub-regional systems, unless specified otherwise this implies that:

– the entire service area is located within the region in question;

– in the case of a national system, the service area is limited to the territory of the notifying administration;

– where the service area covers the territory of several administrations which by common agreement have so decided in order to form a sub-regional system, the latter shall be limited to the territory of these administrations and shall be notified by one of them on behalf of the administrations forming the group identifying them as such;

– if the satellite network operates within an international system to which countries outside the Region in question belong, the notification shall state that use is limited to the territories of the member administrations located in the Region in question and, if any, of other administrations in the Region which have so decided, and shall identify such administrations.

Use of the non-geostationary fixed-satellite service in the band 17.3-17.8 GHz in Region 2

Resolution 538 (WRC-97), in establishing provisional limits to the level of interference caused by a non-GSO FSS system to GSO systems in the frequency bands covered by the resolution, did not specify values for the band 17.3-17.8 GHz in Region 2, but simply indicated that further studies were necessary.

In Region 2 there are three sharing situations in this context:

1) interference to the non-GSO FSS receiving space station caused by emissions from space stations of GSO systems;

2) interference to the GSO FSS receiving space station (BSS feeder links) caused by emissions from earth stations in the non-GSO FSS;

3) interference to receiving earth stations in the BSS and GSO FSS (17.7-17.8 GHz) caused by emissions from transmitting earth stations in the non-GSO FSS.

As the CPM Report itself states, the first sharing situation is not different from that existing between transmitting space stations in the GSO FSS and receiving space stations in the non-GSO FSS in the band immediately above, and therefore requires no specific provision.

With regard to the protection of BSS feeder-link receiving space stations, it has been ascertained that such protection is feasible by establishing uplink power flux-density limits for the protection of BSS feeder links in Regions 1 and 3 in the same frequency band. It is likely that such limits will have to be applied in any case in Region 2 to protect BSS feeder links from uplink non-GSO FSS emissions in Regions 1 and 3.

Although sharing between ubiquitous BSS and non-GSO FSS is not feasible, this band could be used for gateway stations in the non-GSO FSS, which would mean a considerable reduction in the number of earth stations in this service which can be expected to operate in the Region, creating a very different situation for sharing. Studies indicate that a maximum coordination distance of 100 km would be an adequate value, which means that gateway earth stations located at a distance of more than 100 km from the territory of another administration would ensure protection for BSS receiving earth stations located in that administration's territory. Moreover, if the location of non-GSO BSS gateway stations was properly chosen, sharing between both services in the same country would be feasible.

Furthermore, forecasts of BSS development in the band 17.3-17.8 GHz are not clear for many countries in Region 2. It is probable that, to some extent, their satellite broadcasting requirements in the medium and even the long term will be met by allocating them in the Plan for the 12 GHz band. Consequently, allocation of the band 17.3-17.8 GHz to the non-GSO FSS might be an attractive option, as it will give administrations greater flexibility in the use of this segment of the spectrum, particularly if regulatory provisions are made to allow the sharing of these services without penalizing development of the BSS by administrations when they decide on it. Sharing between GSO and non-GSO FSS earth stations must remain subject to S9.17A.

On the basis of the foregoing considerations, Cuba submits the following proposal to the Conference:

MOD CUB/31/69

TABLE **S22-2**

Frequency band (GHz)	**Aggregate pfd dB(W/m^2/4 kHz)**	**Percentage of time during which aggregate pfd level may not be exceeded**
17.3-18.1 ~~in Regions 1 and 3 and 17.8-18.1 in Region 2~~	–163	100%

Reasons: To establish in Article S22 (Table S22-2) uplink epfd limits for the band 17.3-17.8 GHz in Region 2 and to indicate that the limits agreed on by the Conference for the entire 17.3-18.1 GHz band must be the same for the three Regions.

MOD CUB/31/70

S5.515 In the band 17.3-17.8 GHz, sharing between geostationary-satellite networks in the fixed-satellite service (Earth-to-space) and the broadcasting-satellite service shall also be in accordance with the provisions of § 1 of Annex 4 of Appendix **S30A/30A**.

MOD CUB/31/71

S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) ~~in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2~~ by non-geostationary-satellite systems in the fixed-satellite service is subject to the application of the provisions of No. **S9.12** for the coordination with other non-geostationary-satellite systems in the fixed-satellite service. The provisions of Resolution **538 (WRC-~~97~~2000)** apply.

ADD CUB/31/72

S5.516A In Region 2, earth stations of non-geostationary-satellite systems in the fixed-satellite service in the band 17.3-17.8 GHz are limited to operating with antennas of not less than 4.5 metres in diameter and with elevation angles greater than or equal to 10º. Sharing with the broadcasting-satellite service is subject to obtaining the agreement indicated in **S9.21** with administrations whose territory is at a distance of less than 100 km from the location of the earth station of the non-geostationary-satellite system.

Reasons: To allow use of this band in Region 2 for non-GSO FSS system links (Earth-to-space), while ensuring sharing conditions that do not restrict development of the BSS.

NOTE - Cuba considers that this situation requires further study in ITU-R.

APPENDIX S5

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article S9

MOD CUB/31/73

TABLE S5-1A (*end*)

Frequency band	**RR foot-note/Res.**	**Space services[1] in the footnote to which No. S9.11A applies**		**Other space services[1] to which No. S9.11A applies equally**	**Date of provisional application of allocation if later than 22.11.1997**
17.3-18.1 GHz ~~(R1,R3)~~	**S5.516**	Non-GSO FSS[2]	↑	BSS	see Res. **538**
~~17.8-18.1 GHz (R2)~~	~~**S5.516**~~	~~Non-GSO FSS~~[2]	~~↑~~	~~---~~	~~see Res. **538**~~

Reasons: To align Table S5-1 of Appendix S5 with the foregoing proposals.

Item 1.18: Revision of Appendix S18

Having considered the steps taken so far regarding the use of new technologies for the maritime mobile service in the band 156-174 MHz and the consequent revision of Appendix S18, Cuba is of the view that the studies on the introduction of new technologies are not yet complete and that this Conference is therefore not in a position to decide in favour of any particular technology. Nor would it be judicious at present to identify spectrum for new technologies which are still under study. However, Cuba is aware of the existing problems and believes that it is necessary to find at least a provisional solution allowing more efficient use of the 156-174 MHz band.

It therefore proposes increasing the number of channels available in the band 156-174 MHz by modifying footnote *m)* to Appendix S18 to increase the use of duplex channels in simplex mode.

To that end, it submits the following proposal to the Conference:

APPENDIX S18

Table of transmitting frequencies in the VHF maritime mobile band

(See Article **S52**)

NOTE – For assistance in understanding the Table, see notes *a)* to *n)* below.

MOD CUB/31/74

Channel designator	Notes	Transmitting frequencies (MHz)		Inter-ship	Port operations and ship movement		Public corres-pondence
		Ship stations	Coast stations		Single frequency	Two frequency	
60		156.025	160.625			x	x
01		156.050	160.650			x	x
61		156.075	160.675			x	x
02		156.100	160.700			x	x
62		156.125	160.725			x	x
03		156.150	160.750			x	x
63		156.175	160.775			x	x
04		156.200	160.800			x	x
64		156.225	160.825			x	x
05		156.250	160.850			x	x
65		156.275	160.875			x	x
06	*f)*	156.300		x			
66		156.325	160.925			x	x
07		156.350	160.950			x	x
67	*h)*	156.375	156.375	x	x		
08		156.400		x			
68		156.425	156.425		x		
09	*i)*	156.450	156.450	x	x		
69		156.475	156.475	x	x		
10	*h)*	156.500	156.500	x	x		
70	*j)*	156.525	156.525	Digital selective calling for distress, safety and calling			
11		156.550	156.550		x		
71		156.575	156.575		x		
12		156.600	156.600		x		
72	*i)*	156.625		x			
13	*k)*	156.650	156.650	x	x		
73	*h), i)*	156.675	156.675	x	x		
14		156.700	156.700		x		
74		156.725	156.725		x		
15	*g)*	156.750	156.750	x	x		
75	*n)*	156.775			x		

Channel designator	Notes	Transmitting frequencies (MHz)		Inter-ship	Port operations and ship movement		Public corres-pondence
		Ship stations	Coast stations		Single frequency	Two frequency	
16		156.800	156.800	DISTRESS, SAFETY AND CALLING			
76	*n)*	156.825			x		
17	*g)*	156.850	156.850	x	x		
77		156.875		x			
18	*m)*	156.900	161.500		x	x	x
78	*m)*	156.925	161.525		x	x	x
19	*m)*	156.950	161.550		x	x	x
79	*m)*	156.975	161.575		x	x	x
20	*m)*	157.000	161.600		x	x	x
80	*m)*	157.025	161.625		x	x	x
21	*m)*	157.050	161.650		x	x	x
81	*m)*	157.075	161.675		x	x	x
22	*m)*	157.100	161.700		x	x	x
82	*m)*	157.125	161.725		x	x	x
23	*m)*	157.150	161.750		x	x	x
83	*m)*	157.175	161.775		x	x	x
24	*m)*	157.200	161.800		x	x	x
84	*m)*	157.225	161.825		x	x	x
25	*m)*	157.250	161.850		x	x	x
85	*m)*	157.275	161.875		x	x	x
26	*m)*	157.300	161.900		x	x	x
86	*m)*	157.325	161.925		x	x	x
27	*m)*	157.350	161.950		x	x	x
87		157.375			x		
28	*m)*	157.400	162.000		x	x	x
88		157.425			x		
AIS 1	*l)*	161.975	161.975				
AIS 2	*l)*	162.025	162.025				

Specific notes

MOD CUB/31/75

m) These channels (18 to 27 and ~~82~~78 to 86) may be operated as single frequency channels, subject to special arrangement between interested or affected administrations.

Item 1.19*bis*: Rules of Procedure relating to RR No. 2674/S23.13

The Administration of Cuba has considered the application of the Rules of Procedure relating to RR No. S23.13 in relation to the provisions of Annex 1 to Resolution 531 (WRC-95). While agreeing that the service area of a BSS network may comprise only the territories of administrations that have given their consent thereto, Cuba considers that the wording of § 4.3 of the Annex to Resolution 531 (WRC-95) and of the relevant Rules of Procedure is not sufficiently clear and introduces a certain ambiguity.

Under the procedure currently in use, where it exceeds the territory of the notifying administration the service area should be defined in terms of the other administrations included in the area, and the notifying administration must indicate whether it has obtained a special agreement with those administrations on the inclusion of their territories in the service area. The procedure then establishes that the relevant special sections of the BR will indicate agreements already obtained under No. S23.13 or agreements applied for but not yet obtained. Thereafter, those administrations which have not been consulted, but whose territories appear in the service area published in the relevant special section, have a period of four months from the date of publication in which to react and so indicate if they do not wish their territories to be included in the service area.

The foregoing suggests that an administration which, for whatever reason, has not communicated within the established period its disagreement to inclusion in the service area, will find that the emissions of the network in question have acquired the right to protection in its territory, which raises the following questions. A right to protection against what emissions? Who is entitled to claim such protection? What happens if the administration responsible for the territory decides to use other terrestrial radiocommunication services, in conformity with the Table, whose emissions do not comply with the levels required for protection of the emissions of the broadcasting-satellite service within its own territory? Is this not a part of every administration's sovereign right to regulate its radiocommunication services within its own territory?

The problem is better illustrated by Appendix S30, where the service area is the area in which the administration responsible for the service is entitled to claim protection for it. According to Article 6 of Appendix S30, such protection applies in respect of the emissions of terrestrial stations. If an administration whose territory has been included in the service area pursuant to the above procedure decides, in exercise of its sovereign right to regulate its telecommunications, to use terrestrial service stations that conform to the Radio Regulations such that their emissions do not affect the territory of neighbouring administrations, but that are incompatible with the protection of the BSS system in question in its own territory, would it have to apply the Article 6 procedure and make a request for the coordination of its terrestrial stations, within its territory, to the administration in whose name the BSS frequency assignment is recorded?

The following question also requires clarification. Does an administration have the authority, pursuant to its sovereign rights, to decide that, as from a specified date, a service will not be provided in its territory? Would it be consistent with the principle of ensuring rational and efficient use of a scarce resource, such as the spectrum, to impose restrictions in such cases on the services of other administrations by demanding levels of protection in a territory whose administration is not interested in using the protected system?

Furthermore, under the current procedure, when an agreement is not reached with an administration, its territory is excluded from the service area, which means that the right to protection within such territory is not considered for the network in question and that thereafter the administration initiating the BSS project is entitled to bring it into use. But this overlooks the fact that if the initial service area has been reduced, in all likelihood the coverage area of the network can be adjusted and hence reduced proportionally. It is precisely this situation which gives rise to part of No. S23.13 and which should be reflected explicitly in the corresponding rules, bearing in mind that if the responsible administration fails to modify the coverage area of its network, rational and efficient use of the spectrum will not be achieved, which could result in additional constraints for the development of the radiocommunication services of other administrations.

On the basis of the foregoing, Cuba considers that the following minor modifications would suffice to solve these problems:

CUB/31/76

Where BR special sections relating to BSS networks include requests to other administrations for agreement to the inclusion of their territories in the network service area, only those administrations that have responded in the affirmative to such requests shall be deemed to have consented to the inclusion of their territories in the planned service area.

CUB/31/77

Once the consultation process is completed, the administration responsible for the planned network shall, in accordance with No. S23.13, adjust the coverage area of the network to the service area resulting from the consultation process.

CUB/31/78

An administration whose territory is included in the service area of a BSS network may at any time indicate the exclusion of its territory from that service area. Such exclusion shall imply only withdrawal of the right to protection for that network in the territory in question and at no time may imply the imposition of changes to the characteristics established for the network.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to
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PLENARY MEETING

Note by the Secretary-General

REPORT ON ADMINISTRATIVE DUE DILIGENCE APPLICABLE TO SOME SATELLITE COMMUNICATION SERVICES

1 In paragraph 6 of the Attachment, lines 9 and 10, replace "… the related special sections in respect of 37 satellite networks (see Annex 2)." with "... the related special sections in respect of 36 satellite networks (see Annex 2)."

2 Replace Annex 1 and Annex 2 by the attached pages.

Yoshio UTSUMI
Secretary-General

ANNEX 1

Details of the implementation of Resolution 49 (WRC-97)

Letters to administrations	**Number of administrations**	**Number of networks**	**Period of survey**	**Deadline for reply**	**DBIU date extension (number of networks)**	**Cancellation**		**Due diligence received**	**Due diligence published**
						By Administration	**By Bureau**		
CR/97 of 20.06.1998	53	884	DBIU < 01.07.98	30.09.98	323	26	23	512	376*
Letter 49(SSC)/ of 30.04.99	20	72	01.07.98 ≤ DBIU < 01.10.99	01.10.99	48	5	13**	8**	-
Letter 49(SSC)/ of 03.09.99	15	65	01.10.99 ≤ DBIU < 01.05.00	01.05.00	15	-	50***	-	-
Letter 49(SSC)/ of 05.05.00	20	117	01.05.00 ≤ DBIU < 31.10.00	31.10.00	-	-	-	-	-

* As of 2 May 2000.   ** Partly for 2 networks   *** Under treatment

Appendices S30 and S30A Plans

CR/97 of 20.06.1998	11	22	DBIU < 30.04.00	30.04.00	-	0	0	22	14*
Letter 49(SNP)/ of 21.04.00	2	2	30.04.00 ≤ DBIU < 21.11.00	21.11.00	-	-	-	-	-

* As of 2 May 2000.

ANNEX 2

List of networks cancelled in application of < *resolves* 6 > of Resolution 49

Admin.	Network	Long.	BR Circular	Application of Resolution 51
USA	USASAT-7A	74° W	2388	✓
USA	USASAT-12A	79° W	2388	✓
USA	USASAT-13N	70° E	2388	✓
USA	USASAT-22F	81° W	2388	✓
USA	USASAT-23C	121° W	2388	✓
USA	USASAT-24A	129° W	2388	✓
USA	USASAT-24B	103° W	2388	✓
USA	USASAT-24H	69° W	2388	✓
USA	USASAT-25F	56° W	2388	✓
USA	USASAT-25H	60° W	2388	✓
USA	USASAT-26E	47° W	2388	✓
USA	USASAT-26F	56° W	2388	✓
USA	USASAT-26H	60° W	2388	✓
ARG	NAHUEL-1	72° W	2389	✓
ARG	NAHUEL-2	76° W	2389	✓
D	DFS-6	26° E	2389	✓
USA	SPACENET-1	120° W	2389	✓
USA	GSTAR-2	105° W	2389	✓
USA	MARISAT-CONUS	106° W	2389	✓
USA	ACS-3K	139° W	2389	✓
USA	MCS-2	62° W	2389	✓
USA	MCS-3	139° W	2389	✓
VEN	SIMON BOLIVAR 3	109° W	2389	✓
BEL	SATCOM-4/60W	60° W	2419	✓
D	SATPHONE-1	41° E	2419	✓
D	SATPHONE-2	52° E	2419	✓
MHL	ORION-AP-2	114° E	2419	✓
USA	USGCSS PH4 INDOC-1	56° E	2419	✓
USA	USGCSS PH4 INDOC-2	60° E	2419	✓
USA	USGCSS PH4 ATL-1	35° W	2419	✓
USA	USGCSS PH4 ATL-2	39° W	2419	✓
USA	USGCSS PH4-ATL-3	42.5° W	2419	✓
USA	USGCSS PH4 E PAC-1	109° W	2419	✓
USA	USGCSS PH4 W PAC-1	155° E	2419	✓
SEY	SEYSAT-1	42.5° E	2420	11/14 GHz only
SEY	SEYSAT-2	37.5° E	2420	11/14 GHz only

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 32-E
3 March 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Note by the Secretary-General

REPORT ON ADMINISTRATIVE DUE DILIGENCE APPLICABLE TO SOME SATELLITE COMMUNICATION SERVICES

This document contains the Report of the Director of the Radiocommunication Bureau pursuant to the requirements of Resolution 49 (WRC-97) and Resolution 85 (Minneapolis, 1998).

The Conference is invited to consider the Report and, in particular, the matters raised in the concluding paragraph.

Yoshio Utsumi
Secretary-General

Attachment: 1

ATTACHMENT

Director, Radiocommunication Bureau

REPORT ON IMPLEMENTATION OF RESOLUTION 49 (WRC-97) ON DUE DILIGENCE

1 The Radiocommunication Bureau presents this Report on the activities it has undertaken pursuant to the requirements of Resolution 49 (WRC-97) and Resolution 85 (Minneapolis, 1998). Under the provisions of these Resolutions, the Director of the Radiocommunication Bureau is required to report to WRC-2000 and to future radiocommunication conferences on the results of the implementation of the administrative due diligence procedure. WRC-2000 is also required, under the provisions of Resolution 85 (Minneapolis, 1998) to evaluate the results of the implementation of administrative due diligence and to inform the following Plenipotentiary Conference in 2002 of its conclusions in that regard.

Implementation steps

2 Circular Letter CR/96 of 2 June 1998 provided a form RS49 and detailed instructions for completion according to a timetable based on the date of bringing into use and regulatory registration status of satellite networks. The PC-based SpaceCap software for RS49 electronic data submission was made available to administrations with the Space Radiocommunication Systems CD-ROM (March, 1999).

3 In order to help administrations comply with Resolution 49 (WRC-97), the Bureau provided in Circular Letter CR/97 dated 20 June 1998, for information purposes, a comprehensive list of planned or existing satellite networks for which the administrative due diligence information was required. The list focused on the most urgent requirements, i.e., the satellite networks with a date of bringing into use, including any authorized extension, prior to 1 July 1998. Subsequently, on 30 April 1999, a list of networks with a planned date of bringing into use between 1 July 1998 and 1 October 1999 for which due diligence information was required, was sent to administrations indicating that information should be submitted by 1 October 1999. A similar list covering the period 1 October 1999 - 30 April 2000 and 1 May 2000 - 31 October 2000 was addressed to administrations respectively on 3 September 1999 (information to be submitted by 30 April 2000) and during ***March 2000*** (information to be submitted by 31 October 2000).

4 As a follow-up action on the above circular letters, individual letters and subsequent reminders to administrations, the Bureau immediately captures any received due diligence information in a database that is made available to administrations on the ITU website (http://www-br/sns/res49.html). Information is analysed for each administration on a network level, i.e., comparison between the list of networks with a date of bringing into use prior to the appropriate deadline and the list of networks with due diligence information provided by administrations in order to establish a list of networks for which due diligence information is still missing. Prior to the publication in the BR International Frequency Information Circular (IFIC) (RES49/-- special section), a further examination is undertaken network by network to verify compliance with Resolution 51 (WRC-97)/No. S11.44 in respect of the regulatory period to bring a satellite network into use, to cross-check references to special sections and associated frequency ranges.

5 As a result of the above examination, whenever it appears that due diligence information is still missing, the Bureau initiates further action as foreseen by <*resolves* 6> of Resolution 49 (WRC-97):

i) to inform the concerned administration of the list of satellite network(s) or frequency ranges for which the required due diligence information was not received by the Bureau before the regulatory expiry date; and

ii) to cancel part or all of the related Special Section(s) and publish this information in the IFIC.

Results of the process

6 Detailed information/statistics on the processing by the Bureau of Resolution 49 (WRC-97) due diligence requests and notices are in Annex 1. At this stage in the implementation of Resolution 49 (WRC-97), the Bureau has not encountered any administrative difficulty in applying the provisions and in gathering and publishing information, although it has involved the collection of considerable data and the application of Bureau resources (approximately 1 professional staff per annum). One issue has, however, been identified by the Bureau and raised with the Radio Regulations Board which suggested that it be considered by the Conference (see paragraph 9 below). In terms of results, it will be noted that the Bureau has taken action pursuant to <*resolves* 6> of Resolution 49 to cancel and publish accordingly, the related special sections in respect of 37 satellite networks (see Annex 2). As noted in Annex 2, however, all of these cancellations had reached the maximum (nine year) period for bringing into use pursuant to the application of <*resolves* 1 and 2> of Resolution 51 (WRC-97) and S11.44 of the Radio Regulations and hence would have been cancelled in any event.

7 A particular feature of implementation of the Resolution is that when requested to provide due diligence information (triggered by the original date of bringing into use of their satellite networks), administrations have generally requested, wherever it is possible, extension of the regulatory period for bringing their satellites into use up to the maximum limit authorized by the Radio Regulations (S11.44 and S11.44B to S11.44I). It is noted that, in the case of networks for which an API was received prior to 22 November, 1997, the period for bringing the satellite into use may be six years plus the extension pursuant to No. 1550 (<*resolves* 3> of Resolution 51 (WRC-97) refers). The result of these provisions is that, for a majority of cases, the due diligence information needs to be provided not later than 21 November 2003 (<*resolves* 2> of Resolution 49 (WRC-97). Any effect of administrative due diligence may not, therefore, be fully apparent until at least that date. In the meantime, the Bureau continues to undertake its examination of the networks in accordance with the relevant provisions of the Radio Regulations.

8 The Bureau notes also that, in addition to publication in the IFIC, due diligence information is made available on the ITU website. The Bureau has not so far received queries from any administration on the information received and published pursuant to the requirements of the Resolution.

Consideration by the Radio Regulations Board

9 As noted above, the Bureau has not encountered any specific difficulties in implementing Resolution 49 (WRC-97) in the terms established by the Conference and subsequently by the RRB, in particular at its 16th Meeting (Geneva, 24-28 May 1999). However, one issue which the Bureau raised with the RRB and included in the RRB's decisions of the above meeting, is brought to the attention of WRC-2000 in order to request guidance from the Conference as to whether <*resolves* 3> of Resolution 49 (WRC-97) includes satellite systems which are already in operation.

10 The RRB's advice was sought by the Bureau, following a letter from the Administration of Russia disputing the Bureau's conclusions concerning Russian satellites included in a list of networks proposed for cancellation because of missing Due Diligence information. That administration expressed the view that Resolution 49 did not apply to satellite networks which have been implemented (including the associated earth segments) and notified as having been put into operation. The Board at its 16th Meeting considered the matter and in essence concluded that:

i) for satellite networks which are under coordination, i.e. not yet recorded in the MIFR, administrations should provide Due Diligence information in accordance with <*resolves* 2> of Resolution 49 (WRC-97), i.e. not later than 21 November 2003, or before the expiry of the notified period for bringing the satellite into use; and

ii) for satellite networks which are partly or fully recorded in the MIFR, administrations would have to provide the Due Diligence information in accordance with <*resolves* 3> of Resolution 49 (WRC-97) not later than 21 November 2000.

11 Noting the above situation and the views expressed by the Administration of Russia, the Board considered that it would be desirable to seek guidance from WRC-2000 as to whether <*resolves* 3> of Resolution 49 (WRC-97) includes satellite systems already in operation. In view of the Board's decisions, the Bureau revised the list of Russian satellite networks for which due diligence had been originally by 1 July 1998 (in accordance with *resolves* 2) and the Administration of Russia subsequently provided the necessary information.

12 In order to enable the Bureau to process the due diligence information where submission is required before 21 November 2000 for satellite networks or systems recorded in the MIFR, as required by <*resolves* 3> of Resolution 49 (WRC-97), guidance from WRC-2000 is requested to indicate the appropriate regulatory approach to apply concerning the provisions of <*resolves* 3> of Resolution 49 (WRC-97).

Conclusion

13 The Conference is invited to consider the above report and, in particular, to provide guidance to the Radiocommunication Bureau on the matter considered by the RRB (paragraphs 7-10 above). The Conference is also invited to draft a report to the next Plenipotentiary Conference as required by the *resolves* of Resolution 85 (Minneapolis, 1998).

ANNEX 1

Details of the implementation of Resolution 49 (WRC-97)

Letters to administrations	Number of administrations	Number of networks	Period of survey	Deadline for reply	DBIU date extension (number of networks)	Cancellation		Due diligence received	Due diligence published
						By Administration	By Bureau		
CR/97 of 20.06.1998	53	884	DBIU < 01.07.98	30.09.98	323	26	23	512	341*
Letter 49(SSC)/ of 30.04.99	20	73	01.07.98 ≤ DBIU < 01.10.99	01.10.99	48	5	14	6	-
Letter 49(SSC)/ of 03.09.99	15	67	01.10.99 ≤ DBIU < 01.05.00	01.05.00	15*	-	-	-	-
Letter 49(SSC)/ of 03.00	20	117	01.05.00 ≤ DBIU < 31.10.00	31.10.00	-	-	-	-	-

* As of 9 March 2000.

ANNEX 2

List of networks cancelled in application of < *resolves* 6 > of Resolution 49

Admin.	Network	Long.	BR Circular	Application of Resolution 51
USA	USASAT-7A	74° W	2388	✓
USA	USASAT-12A	79° W	2388	✓
USA	USASAT-13N	70° E	2388	✓
USA	USASAT-22F	81° W	2388	✓
USA	USASAT-23C	121° W	2388	✓
USA	USASAT-24A	129° W	2388	✓
USA	USASAT-24B	103° W	2388	✓
USA	USASAT-24H	69° W	2388	✓
USA	USASAT-25F	56° W	2388	✓
USA	USASAT-25H	60° W	2388	✓
USA	USASAT-26E	47° W	2388	✓
USA	USASAT-26F	56° W	2388	✓
USA	USASAT-26H	60° W	2388	✓
ARG	NAHUEL-1	72° W	2389	✓
ARG	NAHUEL-2	76° W	2389	✓
D	DFS-6	26° E	2389	✓
USA	SPACENET-1	120° W	2389	✓
USA	GSTAR-2	105° W	2389	✓
USA	MARISAT-CONUS	106° W	2389	✓
USA	ACS-3K	139° W	2389	✓
USA	MCS-2	62° W	2389	✓
USA	MCS-3	139° W	2389	✓
VEN	SIMON BOLIVAR 3	109° W	2389	✓
BEL	SATCOM-4/10^{E}	10° E	2417	✓
BEL	SATCOM-4/20.2^{E}	20.2° W	2417	✓
BEL	SATCOM-4/60W	60° W	2417	✓
D	SATPHONE-1	41° E	2417	✓
D	SATPHONE-2	52° E	2417	✓
F	VIDEOSAT-4	32° E	2417	✓
MHL	ORION-AP-2	114° E	2417	✓
USA	USGCSS PH4 INDOC-1	56° E	2417	✓
USA	USGCSS PH4 INDOC-2	60° E	2417	✓
USA	USGCSS PH4 ATL-1	35° W	2417	✓
USA	USGCSS PH4 ATL-2	39° W	2417	✓
USA	USGCSS PH4-ATL-3	42.5° W	2417	✓
USA	USGCSS PH4 E PAC-1	109° W	2417	✓
USA	USGCSS PH4 W PAC-1	155° E	2417	✓

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 1 to Document 33-E
20 April 2000
Original: Russian

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Russian Federation

PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.13.1

The Russian Federation supports the results of ITU-R studies on non-GSO FSS sharing with space and terrestrial radio services in the frequency bands indicated in Resolutions 130, 131 and 538 (WRC-97), subject to protecting the operation and development of GSO FSS and GSO BSS systems.

The Russian Federation supports the inclusion in the Radio Regulations of the limits on non-GSO FSS system emissions specified in the CPM-99 Report which ensure the protection of existing and planned terrestrial and space service systems.

At the same time, in view of the problems which administrations might face in checking the actual levels of interference caused by non-GSO FSS systems, the Russian Federation proposes:

ADD RUS/33/18

1) the adoption of a new Resolution requesting ITU-R to undertake, as a matter of urgency, further development of methods of checking and measuring levels of $epfd_{down}$ caused by non-GSO FSS systems and of verifying their compliance with operational limits in the frequency bands 10.7-12.75 GHz, 17.8-18.6 GHz and 19.7-20.2 GHz:

RESOLUTION RRR (WRC-2000)

Further development of methods of checking and measuring the epfd$_{down}$ levels generated by non-geostationary systems in the fixed-satellite service and of verifying their compliance with the operational limits in the frequency bands 10.7-12.75 GHz, 17.8-18.6 GHz and 19.7-20.2 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that WRC-97 adopted, in Article **S22**, provisional epfd limits to be met by non-GSO FSS systems in order to protect GSO FSS and GSO BSS networks in parts of the frequency range 10.7-30 GHz;

b) that WRC-2000 has revised Article **S22** to ensure that the limits contained therein provide adequate protection to GSO FSS and GSO BSS systems without causing undue constraints to any of the systems and services sharing these frequency bands;

c) that Article **S22** contains validation epfd$_{down}$ limits, operational epfd$_{down}$ limits and additional operational epfd$_{down}$ limits for specific antenna diameters applicable to non-GSO FSS systems in the frequency bands 10.7-12.75 GHz, 17.8-18.6 GHz and 19.7-20.2 GHz;

d) that compliance of a notified non-GSO FSS system with the validation limits will be verified by the Radiocommunication Bureau in accordance with Nos. **S9.35** and **S11.31**;

e) that compliance of an operating non-GSO FSS system with the operational limits and the additional limits for specific antenna diameters is not to be verified by the Radiocommunication Bureau;

f) that administrations responsible for non-GSO FSS systems shall guarantee their compliance with the additional operational epfd$_{down}$ limits;

g) that there is a need to continue developing methods of checking and measuring levels of epfd$_{down}$ generated by non-GSO FSS systems and of verifying their compliance with the operational limits,

recognizing

a) that the ITU-R study groups have developed a recommendation containing a functional description of the software to be used by the Radiocommunication Bureau for verifying the compliance of a notified non-GSO FSS system with the validation epfd$_{down}$ limits;

b) that the ITU-R study groups have concluded that compliance of an operating non-GSO FSS system with the operational epfd$_{down}$ limits can be verified by local measurements and have confirmed the feasibility of carrying out such measurements;

c) that the ITU-R study groups have concluded that compliance of an operating non-GSO FSS system with the additional epfd$_{down}$ limits cannot be verified by local measurements,

resolves to instruct ITU-R

to undertake, as a matter of urgency, further development of methods of checking and measuring levels of epfd$_{down}$ caused by non-GSO FSS systems and of verifying that they meet the operational limits in the frequency bands 10.7-12.75 GHz, 17.8-18.6 GHz and 19.7-20.2 GHz, *invites administrations*

to participate actively in the aforementioned studies, by submitting appropriate material for consideration in ITU-R,

instructs the Director of BR

to report on the progress of these studies to WRC-02/03.

ADD RUS/33/19

2) the inclusion of the following additional wording in the revised Resolution 130 proposed in the CPM-99 Report:

– under *considering further*:

"*) that WRC-2000 has adopted operational $epfd_{down}$ limits to protect GSO FSS systems in the frequency bands 10.7-12.75 GHz, 17.8-18.6 GHz and 19.7-20.2 GHz which have to be met by non-GSO FSS systems during their operation;"

– under *resolves*:

"2 that an administration responsible for the operation of a non-GSO FSS system shall give any other administration access to information on the current parameters of the orbital constellation of the non-GSO FSS system and other data that may be required in order to check that the non-GSO FSS system meets the operational $epfd_{down}$ limits".

ADD RUS/33/20

3) the addition of the following wording in the notes to Table S22-4A set out in the CPM-99 Report:

"* The operational limits to the $epfd_{down}$ radiated by non-GSO FSS systems shall be the values given in Table S22-1A or Table S22-4A, whichever are the more stringent".

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Russian Federation

PROPOSALS FOR THE WORK OF THE CONFERENCE

In preparing for WRC-2000, the Russian Federation has focused on the need to ensure smooth operation, future development and enhancement of operating and planned radio services, taking into account technological progress and international cooperation for improving the efficiency of use of the radio-frequency spectrum.

The Russian Federation highly commends the results of the studies carried out within ITU in preparation for WRC-2000, reflected in the Report of the Conference Preparatory Meeting (CPM-99), which constitutes a sound basis for discussion and decision-making at the conference. The Russian Federation also considers the preparatory work carried out within regional organizations to be extremely fruitful and useful.

While on the whole supporting the conclusions in the CPM-99 Report and associating itself with a number of common European proposals, in order to complement and expand upon those conclusions and proposals the Russian Federation wishes to submit the following proposals to WRC-2000 on various agenda items.

Agenda item 1.1

The Russian Federation proposes that the Russian Federation's name be deleted from footnotes S5.387 and S5.418.

MOD RUS/33/1

S5.387 *Additional allocation:* in Armenia, Azerbaijan, Belarus, Georgia, Kazakstan, Mali, Mongolia, Uzbekistan, Kyrgyzstan, Slovakia, the Czech Republic, Romania, ~~Russian Federation,~~ Tajikistan, Turkmenistan and Ukraine, the band 1 770-1 790 MHz is also allocated to the meteorological-satellite service on a primary basis, subject to agreement obtained under No. **S9.21**.

MOD RUS/33/2

S5.418 *Additional allocation:* in Bangladesh, Belarus, China, Rep. of Korea, India, Japan, Pakistan, ~~Russian Federation,~~ Singapore, Sri Lanka, Thailand and Ukraine the band 2 535-2 655 MHz is also allocated to the broadcasting-satellite service (sound) and complementary terrestrial broadcasting service on a primary basis. Such use is limited to digital audio broadcasting and is subject to provisions of Resolution **528 (WARC-92)**. The provisions of No. **S5.416** and Article **S21**, Table **S21-4**, do not apply to this additional allocation.

Agenda item 1.4

With respect to Resolutions 128 (WRC-97), 129 (WRC-97) and 134 (WRC-97), the Russian Federation, on the basis of the material in the CPM-99 Report, considers that the band 40.5-42.5 GHz may be allocated for the fixed-satellite service with the appropriate pfd limits at the Earth's surface indicated in the CPM Report, which make sharing possible between FSS space stations and terrestrial systems in the fixed service. The CPM Report also states that sharing between FSS receiving earth stations and FS transmitting stations is technically feasible with geographical separation between the systems by means of coordination areas. It is also necessary to limit out-of-band emissions from FSS space stations in order to protect the radio astronomy service in the adjacent band 42.5-43.5 GHz (Recommendation ITU-R RA.796-1). Allocation of the band 40.5-42.5 GHz for the FSS should not modify the existing allocation of that band under Article S5 of the Radio Regulations.

Allocation of the band 40.5-42.5 GHz to the FSS (space-to-Earth) in Region 1 will make it possible to allocate this band to various radio services on a worldwide basis.

MOD RUS/33/3

40.5-55.78 GHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td>40.5-42.5
FIXED
FIXED-SATELLITE
(space-to-Earth)
BROADCASTING
BROADCASTING-SATELLITE
Mobile
~~S5.551B S5.551D~~ADD S5.XXX</td><td colspan="2">40.5-42.5
FIXED
FIXED-SATELLITE (space-to-Earth) ~~S5.551B S5.551E~~
BROADCASTING
BROADCASTING-SATELLITE
Mobile

MOD S5.551C S5.551F ADD S5.XXX</td></tr>
<tr><td>42.5-43.5</td><td colspan="2">FIXED
FIXED-SATELLITE (Earth-to-space) S5.552
MOBILE except aeronautical mobile
RADIO ASTRONOMY
S5.149 ADD S5.XXX</td></tr>
</table>

ADD RUS/33/4

S5.XXX The aggregate power flux-density radiated in the band 42.5-43.5 GHz by all space stations of any non-GSO FSS (space-to-Earth) system operating in the band 41.5-42.5 GHz shall not exceed –137 dB(W/m^2) in any 1 GHz band at the site of a radio astronomy station for more than 2% of the time. The power flux-density radiated in the band 42.5-43.5 GHz by GSO FSS (space-to-Earth) systems operating in the band 41.5-42.5 GHz shall not exceed –137 dB(W/m^2) in any 1 GHz band at the site of a radio astronomy station. These limits will be refined in accordance with Resolution **128 (Rev.WRC-2000)**.

Reasons: To protect radio astronomy.

MOD RUS/33/5

RESOLUTION 128 (Rev.WRC-~~97~~2000)

Allocation to the fixed-satellite service (space-to-Earth) in the 41.5-42.5 GHz band and protection of the radio astronomy service in the 42.5-43.5 GHz band

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

considering

a) that ~~this Conference has added a primary allocation~~the band 41.5-42.5 GHz is allocated to the fixed-satellite service (space-to-Earth) ~~in the band 41.5-42.5 GHz~~ in all Regions ~~2 and 3 and in certain countries in Region 1~~ and that this band is adjacent to the band 42.5-43.5 GHz which is allocated, *inter alia,* to the radio astronomy service for both continuum and spectral line observations;

b) that unwanted emissions from space stations in the fixed-satellite service (space-to-Earth) in the band 41.5-42.5 GHz may result in harmful interference to the radio astronomy service in the band 42.5-43.5 GHz;

c) that various technical means may be used to reduce these unwanted emissions from space stations in the fixed-satellite service;

d) ~~that a limited number of radio astronomy stations worldwide require protection, and that there may be means to limit the susceptibility of radio astronomy receivers to interference~~that WRC-2000 has set preliminary limits to protect the radio astronomy service from unwanted fixed-satellite service emissions in the band 41.5-42.5 GHz,

taking into account

the relevant provisions of the Radio Regulations,

~~*resolves*~~

~~that administrations shall not implement fixed-satellite systems in the band 41.5-42.5 GHz until technical and operational measures have been identified and agreed within ITU-R to protect the radio astronomy service from harmful interference in the band 42.5-43.5 GHz,~~

invites ITU-R

1 to ~~study~~carry out studies, as a matter of urgency, ~~the harmful interference that space stations in the fixed-satellite service (space-to-Earth) operating in the band 41.5-42.5 GHz may cause to stations~~ in order to refine the preliminary pfd limits established in No. **S5.XXX** so as to protect the radio astronomy service ~~operating in the band 42.5-43.5 GHz~~from unwanted fixed-satellite service emissions in adjacent bands;

2 to identify technical and operational measures that may be taken to protect stations in the radio astronomy service operating in the band 42.5-43.5 GHz, ~~including geographical separation and out-of-band emission limits to be applied to space stations operating in the fixed-satellite service in the band 41.5-42.5 GHz,~~ as well as measures that may be implemented to reduce the susceptibility of stations in the radio astronomy service to harmful interference;

3 to report on the results of these studies to the Conference Preparatory Meeting for WRC-~~99~~03,

urges administrations

to participate actively in the aforementioned studies by submitting contributions to ITU-R~~,~~.

~~*requests*~~

~~WRC-99 to take appropriate action based on those studies.~~

Reasons: Preliminary technical and operational measures having been identified to protect the radio astronomy service in the band 42.5-43.5 GHz from harmful interference caused by the fixed-satellite service operating in the adjacent band, Resolution 128 needs to be amended to provide for further studies with a view to refining those measures.

Agenda item 1.6.1

Terrestrial component of IMT-2000

Introduction

The Russian Federation supports the studies carried out by ITU-R, but believes that the adoption of a decision on the allocation of additional frequency bands should not be considered before WRC-03, on the basis of practical experience once the operation of IMT-2000 systems has started in existing allocations under No. S5.388. In taking the decision, account should be taken of the economic consequences of reallocating frequencies and the different requirements in terms of additional allocations for both the terrestrial and the space component in different countries of the world.

RUS/33/6

The Russian Federation proposes that no amendments be made to the current provisions of the Radio Regulations with respect to additional allocations for the terrestrial component of IMT-2000 at this Conference, and that supplementary studies be pursued with a view to adopting an appropriate decision at a forthcoming WRC. It also proposes that footnote S5.388 and Resolution 212 (WRC-97) should be maintained as they stand.

Reasons:

1 WARC-92 allocated the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz for IMT-2000 in accordance with the provisions of No. S5.388, including the bands 1 980-2 010 MHz (uplink) and 2 170-2 200 MHz (downlink) for the space component. The basic provisions associated with that allocation were incorporated by WARC-92 in the text of Resolution 212 (WRC-97), since amended in the light of the results of WRC-95 and WRC-97. Subsequently, in the course of WRC-95, the frequency bands 2 010-2 025 MHz (uplink) and 2 160-2 170 MHz (downlink) within the IMT-2000 range in Region 2 were allocated for the mobile-satellite service (MSS).

2 In order to satisfy future spectrum requirements for IMT-2000, and especially its terrestrial component, WRC-2000 agenda item 1.6.1 includes a review of spectrum and regulatory issues pertaining to the use of the spectrum by advanced land mobile radiocommunication systems in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of IMT-2000 and that first priority should be given in this allocation to land mobile service applications.

3 The CPM Report considers overall requirements for the terrestrial component of IMT-2000 in areas with the highest forecasted traffic demand in all three Regions[1] as the sum of:

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[1] 555 MHz in Region 1, 390 MHz in Region 2 and 480 MHz in Region 3.

the frequency bands already allocated for IMT-2000 under No. S5.388; the frequency bands allocated in the three Regions for existing second-generation mobile radiocommunication systems; and additional frequency bands. According to ITU-R calculations, the amount of additional spectrum required in the 2010 time-frame is 160 MHz for all three Regions. However, this conclusion fails to take into account the following factors:

- Given that the first commercial IMT-2000 systems are not planned to be introduced until after 2002, any calculations of spectrum requirements are theoretical and not based on actual market development for IMT-2000 systems.
- The “core” spectrum identified for IMT-2000 under No. S5.388 is sufficient to satisfy the minimum spectrum requirements for the terrestrial component of IMT-2000 in the initial stages of development for up to six operators. The UMTS Forum came to the conclusion that if the market does not develop as strongly as forecast then, when there are more than two national operators, they will be confronted with serious problems of return on investment. This means that additional spectrum requirements for the development of IMT-2000 networks in the medium term may be satisfied with the “core” spectrum.
- The allocation and identification of additional channels to satisfy peak spectrum requirements in particular urban areas (“hot spots”) does not require any amendment of the provisions of the Radio Regulations and is an inalienable right of every telecommunication administration.
- IMT-2000 is one member of a whole family of advanced technologies providing wideband data transmission services, its distinctive feature being global mobility. Thus, when making market forecasts for IMT-2000 services detailed account has to be taken of the mutual impact of future wideband data transmission services offered by systems based on other technologies, such as cable TV networks, “quasi”-telecommunication services (voice/fax) over the Internet, delivery of broadcasting services over cable telecommunication networks, high-density FS systems (MWS), wideband wireless access systems and enhanced data transmission speeds in second-generation mobile radiocommunication systems.

4 The worldwide harmonization of frequency allocations for IMT-2000 will facilitate global roaming and also bring down the price of equipment and avoid additional complications for the introduction of IMT-2000.

5 The principle of harmonizing spectrum allocations for IMT-2000 is fundamental for manufacturers in order to reduce the cost of equipment, something which is particularly important for the successful introduction and profitable operation of IMT-2000 in both the developed and developing countries. This principle confers a higher status on the frequency bands identified for IMT-2000 in relation to other land mobile service systems, and this is considered to be particularly important in view of the significance of the IMT-2000 project within ITU and the major efforts deployed by both ITU and other standardization bodies in developing harmonized standards for IMT-2000.

6 The positions of individual telecommunication administrations during CPM-99 with respect to current and future use of specific candidate extension bands varied considerably. The interested administrations did not unanimously support any one of the proposed candidate bands. Moreover, some administrations were unequivocally opposed to global identification of particular

frequency bands for IMT-2000. Clear opposition of individual administrations in respect of particular frequency bands at the Conference could lead to the identification of specific bands on a national basis, which would constrain their worldwide use and run counter to the principle of global harmonization of spectrum for IMT-2000.

7 It is very important to point out that all the currently proposed extension bands are used intensively by radiocommunication service systems other than land mobile service systems and that such use is proposed for the future. As stated in the CPM Report, "in those cases where sharing is impossible ... the only way to solve the problem of implementing IMT-2000 would be transition of the existing services to other frequency bands", which would entail significant financial expense. Special studies on the problem of reallocating spectrum ought to be carried out before actually embarking on a process of migration of existing services to other bands.

8 In order to take a decision on frequency allocation, studies have to be carried out on such problems as shared use of the frequency bands with existing systems in other services, the technical and economic consequences of reallocation, the basic aspects of the process of migration of existing systems to other bands, harmonization of frequency plans, completion of the standardization process and consideration of the impact of actual market evolution on overall spectrum resource requirements, etc.

RUS/33/7

The Russian Federation proposes that no change should be made to the Radio Regulations in respect of the bands 806-960 MHz and 1 710-1 885 MHz used by first- and second-generation cellular systems and that studies be continued on those bands to investigate the feasibility of their reallocation and use of IMT-2000 in the longer term.

Reasons:

1 The frequency bands 862-960 MHz in Region 1, 806-902 MHz in Region 2 and 806-960 MHz in Region 3 are allocated on a primary basis to the land mobile service, the frequency band 1 710-1 885 MHz is allocated worldwide to the fixed and mobile services on a primary basis and a large part of those bands is used in many countries by second-generation land mobile service systems. The bands are used by second-generation systems in accordance with national frequency plans. Thus, the bands 806-960 MHz and 1 710-1 885 MHz are genuine candidates for band extension for IMT-2000 in the longer term in those Regions, as and when use of existing services decreases.

2 Second-generation mobile radiocommunication systems have only been introduced in certain portions of the above bands (70 MHz in Europe below 1 GHz and 155 MHz in the range from 1 GHz to 2 GHz).

3 Certain portions of those bands are used intensively in some countries by systems in other services and some administrations have signified their intention to continue such operation in the foreseeable future. In countries where the bands in question are used by second-generation cellular communication systems, their availability for third-generation systems can only be achieved in the longer term, taking into account the significant investment made in existing systems.

4 Actual time-scales for availability of these bands for IMT-2000 will differ from country to country, ranging from the very short to the much longer term, according to their different technical approaches to the evolution from second- to third-generation systems, specific regulatory characteristics and economic situation. At present, different countries use different frequency plans for second-generation systems in the bands in question. It is necessary to develop a harmonized frequency plan for those bands in order to avoid potential barriers to the overall harmonization of IMT-2000 worldwide.

5 ITU should carry out supplementary studies on issues such as the feasibility of shared use of the bands by IMT-2000 and existing systems in other services, the technical and economic consequences spectrum reallocation, aspects relating to the phasing out of existing systems and the development of harmonized frequency plans.

Agenda item 1.6.2

RUS/33/8

The Russian Federation supports the conclusion in the CPM Report that there is no need for a global control channel.

Agenda item 1.9

a) Resolution 220 (WRC-97)

Introduction

The Russian Federation considers that the results of ITU-R studies and the CPM-99 Report clearly indicate that no part of the band 1 559-1 610 MHz can be allocated for the mobile-satellite service. Accordingly, it is proposed that no amendment be made to Article S5 and that Resolution 220 (WRC-97) be deleted.

SUP RUS/33/9

RESOLUTION 220 (WRC-97)

Studies to consider the feasibility of use of a portion of the band 1 559-1 610 MHz by the mobile-satellite service (space-to-Earth)

NOC RUS/33/10

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 559-1 610	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) S5.341 S5.355 S5.359 S5.363	

Reasons: The global navigation satellite system (GNSS) must enjoy appropriate protection as a global safety-of-life service.

b) Resolution 213 (Rev.WRC-95)

Introduction

The Russian Federation considers that the studies to identify a possible allocation (space-to-Earth) for the mobile-satellite service (MSS) have not demonstrated the feasibility of allocating any portion of the 1 350-1 525 MHz band for this purpose.

NOC RUS/33/11

1 350-1 525 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 350-1 400 FIXED MOBILE RADIOLOCATION S5.149 S5.338 S5.339	**1 350-1 400** RADIOLOCATION S5.149 S5.334 S5.339	
1 400-1 427	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) S5.340 S5.341	
1 427-1 429	SPACE OPERATION (Earth-to-space) FIXED MOBILE except aeronautical mobile S5.341	
1 429-1 452 FIXED MOBILE except aeronautical mobile S5.341 S5.342	**1 429-1 452** FIXED MOBILE S5.343 S5.341	
1 452-1 492 FIXED MOBILE except aeronautical mobile BROADCASTING S5.345 S5.347 BROADCASTING-SATELLITE S5.345 S5.347 S5.341 S5.342	**1 452-1 492** FIXED MOBILE S5.343 BROADCASTING S5.345 S5.347 BROADCASTING-SATELLITE S5.345 S5.347 S5.341 S5.344	
1 492-1 525 FIXED MOBILE except aeronautical mobile S5.341 S5.342	**1 492-1 525** FIXED MOBILE S5.343 MOBILE-SATELLITE (space-to-Earth) S5.348A S5.341 S5.344 S5.348	**1 492-1 525** FIXED MOBILE S5.341 S5.348A

Reasons: Criteria have not been identified that would ensure protection of the operation and development of existing systems.

Agenda item 1.12

RUS/33/12

The Russian Federation supports the conclusion of CPM-99 to the effect that this agenda item may be resolved by means of ITU-R recommendations and does not require any amendment of the Radio Regulations. Resolution 121 (Rev.WRC-97) may be deleted.

Agenda item 1.15.1

The Russian Federation supports allocation of the band 1 260-1 300 MHz for the radionavigation-satellite service subject to the preliminary establishment of a pfd limit of –133 dB(W/m^2/MHz).

Introduction

1 In accordance with the Radio Regulations, the band 1 260-1 300 MHz is allocated on a primary basis in all the ITU Regions to the Earth exploration-satellite (active) service and on a secondary basis to the amateur service. Under footnote S5.331, in a number of countries the band is also allocated to the radionavigation service on a primary basis. Under footnote S5.282, the amateur-satellite service (Earth-to-space) may operate in the 1 260-1 270 MHz band subject to not causing harmful interference to other services operating in accordance with the Table (see No. S5.43). The primary allocations are similar to the allocations in the band 1 215-1 260 MHz, which is already allocated to the radionavigation-satellite service (space-to-Earth) on a primary basis.

2 In order to support the development of highly reliable and accurate systems, new allocations are required for the radionavigation-satellite service (RNSS), since the previously allocated bands are insufficiently wide. Moreover, new allocations have to be sufficiently wide to accommodate various different systems.

3 It is considered that the sharing scenario will be similar to the situation in the 1 215-1 260 MHz band, where RNSS systems have successfully operated for many years for non-safety-of-life applications. Use of the band by high-power radars rules out safety-of-life applications on account of the risk of blocking RNSS receivers at distances of up to 700 metres if the combination of main beams is calculated. In order to protect radiolocation and radionavigation systems in the 1 260-1 300 MHz band, a provisional pfd limit of –133 dB(W/m^2/MHz) is proposed for each individual RNSS satellite, subject to review in accordance with Resolution YYY.

4 When properly used, ground-based RNSS receivers will suffer interference only in very small areas around radar sites.

MOD RUS/33/13

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 260-1 300	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION <u>RADIONAVIGATION-SATELLITE (space-to-Earth) ADD S5.329A</u> SPACE RESEARCH (active) Amateur S5.282 S5.330 S5.331 S5.332 S5.334 S5.335	

ADD RUS/33/14

S5.329A Use of the radionavigation-satellite service in the band 1 260-1 300 MHz shall be subject to not causing harmful interference to the radionavigation service authorized under No. **S5.331** or to the radiolocation service. The power flux-density from the radionavigation-satellite service at the Earth's surface shall not exceed –133 dB(W/m^2/MHz) for each individual RNSS satellite, subject to review under Resolution **YYY**.

Reasons: CPM Report § 2.4.1.1.2.

ADD RUS/33/15

RESOLUTION YYY (WRC-2000)

Use of portions of the frequency bands 1 151-1 215 MHz and 1 260-1 300 MHz by systems in the radionavigation-satellite service (space-to-Earth)

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that, in accordance with the Radio Regulations, the band 960-1 215 MHz is allocated on a primary basis to the aeronautical radionavigation service in all three Regions;

b) that, in accordance with No. **S5.328**, the band 960-1 215 MHz is reserved on a worldwide basis for the use and development of airborne electronic aids to air navigation and any directly associated ground-based facilities;

c) that, in accordance with the Radio Regulations, in all three Regions the bands between 1 215 and 1 300 MHz are allocated on a primary basis to the Earth exploration-satellite (active) service, the radiolocation service and the space research (active) service, and the bands between 1 240 and 1 300 MHz are also allocated on a secondary basis to the amateur service; that, in addition, in accordance with No. **S5.331**, in a number of countries the bands are allocated to the radionavigation service on a primary basis; and that in accordance with No. **S5.282**, the amateur-satellite service (Earth-to-space) may operate in the band 1 260-1 270 MHz subject to not causing harmful interference to other services operating in accordance with the Table (see No. **S5.43**);

d) that this Conference has decided to include in Article **S5** of the Radio Regulations a new allocation for the radionavigation-satellite service (space-to-Earth) in the frequency bands 1 151-1 215 MHz and 1 260-1 300 MHz, subject to preliminary power flux-density limits;

e) that preliminary power flux-density limits for the radionavigation-satellite service have been set in new footnotes, which need verifying and possibly refining,

resolves

1 that, as from 2 June 2000:

1.1 systems in the radionavigation-satellite service (space-to-Earth) planned to operate in the frequency bands 1 151-1 215 MHz and 1 260-1 300 MHz shall comply with the provisional limits set in Nos. **S5.328A** and **S5.329A** of the Radio Regulations or the corresponding sub-bands;

1.2 such systems shall, as from the end of WRC-03, comply with the limits in the corresponding sub-bands adopted by WRC-03, irrespective of the date of receipt of the complete information for the system in question;

1.3 as from the end of WRC-03, it shall be considered that an administration planning to use a system in the radionavigation-satellite service (space-to-Earth) in the corresponding sub-band which complies with all the requirements in terms of the limits adopted by WRC-03 fulfils its obligations irrespective of when the complete notice for the radionavigation-satellite service (space-to-Earth) system was submitted to the Bureau,

requests ITU-R

1 as a matter of urgency, and in time for WRC-03, to carry out technical, operational and regulatory studies in order to review the provisional pfd limits for systems in the radionavigation-satellite service (space-to-Earth) in the frequency bands 1 151-1 215 MHz and 1 260-1 300 MHz from the point of view of ensuring that the radionavigation-satellite service (space-to-Earth) does not cause harmful interference to the aeronautical radionavigation, radionavigation and radiolocation services;

2 to carry out studies, as a matter of urgency, prior to WRC-03, on the relevant technical and operational aspects and on sharing between the radionavigation-satellite and aeronautical radionavigation services in the band 960-1 215 MHz;

3 to report to CPM-03 on the results of these studies,

instructs the Radiocommunication Bureau

after the end of WRC-03, to review and if necessary modify any previous findings for compliance with the limits for radionavigation-satellite service (space-to-Earth) systems in the corresponding sub-bands notified before the end of WRC-03; this review shall be carried out on the basis of the values in the corresponding sub-bands as revised, if appropriate, by WRC-03,

instructs the Secretary-General

to bring this Resolution to the attention of ICAO for appropriate action.

Reasons: The need to refine the provisional pfd limits in the bands 1 151-1 215 MHz and 1 260-1 300 MHz in order to protect the aeronautical radionavigation, radionavigation and radiolocation services.

Agenda item 1.19

RUS/33/16

The Russian Federation participated actively in ITU-R studies on BSS replanning, realizing the huge importance of that task for the international community and the interest of many countries in obtaining capacity to develop national networks. Having carefully examined the results of the studies, the Russian Federation expresses the following views:

1) It is basically feasible to establish a BSS plan providing each country with a number of channels at least equivalent to 10 analogue TV channels.

2) In the studies, account was taken of the specific requests of a number of countries, including a request from Region 3 countries to provide them with 12 channels and a request from the Russian Federation and Australia to maintain their existing frequency assignments already in the WRC-97 Plan. Furthermore, account was taken of the request by Germany, Switzerland, Liechtenstein and Austria to allocate frequency assignments to those countries at one orbital position using the same (common) subregional beam covering all four countries.

   We propose to support accommodating the specific requests of the administrations when establishing the Plan.

3) The studies carried out by the IRG Group have shown that the most complex replanning problem is the problem of compatibility of the new BSS plan with other services using the planned frequency band with equal rights. The problem of sharing with the FSS is particularly acute, affecting the proposed plan assignments of 125 countries. Sixty-three countries are affected by interference between BSS and terrestrial services.

In order to resolve the problem of compatibility between the Plan and other services, when developing the Plan one has to either take existing services into account in the planning process or confer superprimary status on the new Plan, thereby making the other services secondary in relation to the Plan.

4) WRC-2000 will have to draw up and adopt a resolution laying down the principles and technical bases for establishment of the new BSS Plan. The resolution may be developed on the basis of Resolution 532 (WRC-97), but specifying also some additional points which arose when developing the IRG example plan, including whether account should be taken in the plan of networks at the implementation stage or already implemented but not having completed the process under Article 4 or Article 5 of Appendices S30/S30A.

The planning principles must also specify means of resolving the problem of compatibility with other services (in particular with terrestrial services and the FSS) which is exacerbated when developing the new BSS plan with at least 10 channels for each country.

It is important to mention in the planning principles the need to maintain the same proportions as in the 1977 and 1997 Plans, specifically the need to maintain in the new Plan the same number of channels for countries which have more than 10 channels in the current Plan.

5) It is proposed that the following principles be adopted for establishment of the BSS Plan:

- Provide all Region 1 and 3 countries with a capacity at least equivalent to 10 analogue TV channels, while maintaining the proportions used in establishing the 1977 and 1997 Plans. The existing number of channels must be maintained for countries having more than 10 channels in the 1997 Plan.
- Planning should be based primarily on national coverage. At the same time, account should be taken of the wishes of neighbouring countries for the allocation of unified orbital positions for the possible establishment of multi-national systems.
- In the planning, only digital transmission methods are to be used.
- Where possible, specific requests of countries concerning orbital positions, frequency channels and feeder-link frequency band should be accommodated.
- Planning must maintain and protect: Plan frequency assignments which have been brought into service, and for which the date of bringing into service has been confirmed; Plan frequency assignments which have not yet been brought into service but for which the date of bringing into service has been determined by a notice under Article 5 of Appendices S30/S30A and for which, where appropriate, information has been submitted in accordance with Resolution 49 (WRC-97). These assignments shall not claim greater protection than in the 1997 Plan.
- Equitable access to the BSS orbit/spectrum resource shall be ensured, to which end in the planning a common arc for Regions 1 and 3 shall be maintained as was adopted in establishing the 1977 and 1997 Plans.

- Countries’ requests concerning the establishment of subregional systems should be accommodated where possible. In this process, allocation of the orbit/spectrum resource to subregional systems shall not constrain allocation of the necessary resource to national systems.
- Compatibility of the plan shall be ensured with other services in all three Regions having frequency assignments recorded in the frequency register, i.e. only with those which are compatible or have been coordinated with the existing (1997) or initial (1977) Plans.

Agenda item 1.20

RUS/33/17

The Russian Federation supports the approach proposed by CPM on procedures for the use of guardbands to perform space operation functions, and does not object to the deletion of Articles 6 and 7 from Appendices S30/S30A along with corresponding amendment of Article S9 and Appendix S5.

Agenda item 7.2

The Russian Federation expresses concern at the excessively heavy agendas of conferences, in particular WRC-97 and WRC-2000, since this adversely affects the efficiency and effectiveness of conference work and decisions. While willing to discuss the inclusion in the agenda of future conferences of any matters proposed by a large number of administrations, the Russian Federation considers that the agenda must be confined to the most pressing issues in respect of which ITU-R studies are either completed or have achieved significant results endorsed within the Study Groups.

Resolutions of the Plenipotentiary Conference (Minneapolis, 1998)

We are still studying this item and will be submitting relevant proposals in due course.

The Russian Federation’s proposals in respect of other WRC-2000 agenda items are reflected in the proposals of the regional organizations of which the Russian Federation is a member.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 17 to
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

COMPATIBILITY ANALYSES WITH OTHER SERVICES AND THE REGION 2 PLAN

Please find attached to this document complementary information to that contained in Section 6.5 and Attachment 5 to Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Compatibility analyses with other services and the Region 2 plan

ATTACHMENT

Director, Radiocommunication Bureau

COMPATIBILITY ANALYSES WITH OTHER SERVICES
AND THE REGION 2 PLAN

This document provides the results of compatibility analyses performed the Bureau in response to a request made at the fifth meeting of IRG (IRG-5, Geneva 29 November – 3 December 1999) to also provide the results of compatibility analyses with respect to assignments contained in the WRC-97 Plan using the same criteria and methodology described in document WRC-2000/34 and its Corrigendum 3.

In order to compare the interference scenario of the WRC-97 Plan with that of the results of the IRG feasibility studies, a comparative analyses was performed between both files without considering any comparison between a WRC-97 assignment and its corresponding assignment in the feasibility study file.

Due to its voluminous size the results of this analyses will not be distributed but are available on the ITU web site at:

http://www.itu.int/brconf/irg-gte/index.html

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDY TO DETERMINE THE IMPACT OF A MULTINATIONAL BEAM FOR LITHUANIA AND LATVIA

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Study to determine the impact of a multinational beam for Lithuania and Latvia

ATTACHMENT

Director, Radiocommunication Bureau

STUDY TO DETERMINE THE IMPACT OF A MULTINATIONAL BEAM FOR LITHUANIA AND LATVIA

1 Introduction

The Radiocommunication Bureau received a telefax dated 31 March 2000 from the Administrations of Lithuania (Republic of) and Latvia (Republic of) requesting to investigate the inclusion of a multinational composite beam at the orbital position 23° E covering their territories with ten channels per country in the replanning feasibility studies replacing their national beams.

As the request was received after the last IRG meeting, the Bureau informed these Administrations that their request would be studied at the end of the “basic” downlink and feeder-link feasibility studies, together with other national preferences yet to be studied, if time and resources permit.

This document provides the results of this additional study conducted by the Bureau for consideration by WRC-2000.

2 Methodology

At the end of the “basic” downlink and feeder-link feasibility studies, the national beams of Lithuania and Latvia are removed from the orbital positions 23° E and 50° E respectively in both the “basic” downlink and feeder-link files.

Downlink and feeder-link composite beams are then added for these two countries at the orbital position 23° E with ten channels each in both downlink and feeder-link files.

Downlink and feeder-link MSPACE analyses are then performed to assess the new interference situation of the downlink and feeder-link files.

In order to resolve possible incompatibilities, in particular due to the use of different orbital positions for these countries in the “basic” feasibility studies, the methodology described in Document WRC2000/34 and its Corrigendum 1 may be applied.

3 Technical assumptions

3.1 Downlink

At the request of the Administrations of Lithuania and Latvia, the test points assumed in the study for the downlink multinational composite beam are those used for these countries in the Appendix S30 Plan, as follows:

Ref.	**TP1**	**TP2**	**TP3**	**TP4**	**TP5**	**TP6**	**TP7**	**TP8**	**TP9**	**TP10**
Latitude	54.38	54.50	55.25	55.58	56.08	56.25	55.66	56.10	56.15	56.25
Longitude	22.80	25.50	21.27	26.50	21.08	24.75	26.57	21.10	27.96	24.25
Ref.	**TP11**	**TP12**	**TP13**							
Latitude	57.50	57.55	57.90							
Longitude	21.75	27.25	24.40							

The subsidiary ellipse parameters of the downlink composite beam located at the orbital position 23° E were derived from the ellipse characteristics of the beams used for these countries in the Appendix S30 Plan (see Annex A to this document).

3.2 Feeder link

At the request of the Administrations of Lithuania and Latvia, the test points assumed in the study for the downlink multinational composite beam are those used for these countries in the Appendix S30 Plan, as follows:

Ref.	**TP1**	**TP2**	**TP3**	**TP4**	**TP5**	**TP6**	**TP7**	**TP8**	**TP9**	**TP10**
Latitude	53.99	54.15	55.28	55.50	56.00	56.20	55.66	56.10	56.15	56.25
Longitude	23.49	25.68	26.78	21.50	21.25	23.50	26.57	21.10	27.96	24.25
Ref.	**TP11**	**TP12**	**TP13**							
Latitude	57.50	57.55	57.90							
Longitude	21.75	27.25	24.40							

The subsidiary ellipse parameters of the downlink composite beam located at the orbital position 23° E were derived from the ellipse characteristics of the beams used for these countries in the Appendix S30 Plan (see Annex B to this document).

4 Downlink results

The national beams of Lithuania and Latvia (LTU06100 and LVA06100) were removed from the "basic" feasibility study downlink file. They were each replaced with the downlink multinational composite beam described in section 3.1 above at the orbital position 23° E.

A Victim and Culprit study was then performed. The result of this exercise was that the beam could not be accommodated with the required number of channels. There were incompatibilities with other "planned" assignments and "existing" systems. The e.i.r.p. was then adjusted in order to try and resolve incompatibilities. The result of this exercise was that the multinational composite beam still could not be accommodated into the draft downlink file without any EPM excess.

The multinational composite beam was replaced by a single ellipse covering the territories of Lithuania and Latvia. A Victim and Culprit study was then performed. The result of this exercise was that the beam still could not be accommodated with the required number of channels. The improved fast roll-off space station transmit antenna as described in Recommendation ITU-R BO.1445 was then applied to the multinational single ellipse beam. The result of this exercise was that the beam still could not be accommodated. The e.i.r.p. was then adjusted in order to try and resolve incompatibilities. The result of this exercise was that the multinational single ellipse beam still could not be accommodated into the draft downlink file without any EPM excess.

The only other action that could be taken was to change orbital position. However, this action was not attempted as it was not requested by the two Administrations. Alternatively, the two Administrations may wish to accept some negative EPM to the multinational beam. The worst-case EPM for the multinational composite beam with power adjustment applied was –2.3 dB. The worst-case EPM for the multinational single ellipse beam with improved fast roll-off antenna and power adjustment applied was –1.9 dB.

5 Feeder-link results

The national beams of Lithuania and Latvia (LTU06100 and LVA06100) were removed from the “basic” feasibility study 17 GHz feeder-link file. They were each replaced with the multinational feeder-link composite beam described in section 3.2 above, which was located at the orbital position 23° E.

As a first attempt, channels: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 CR were assigned to the composite beam LTU06100, as for the beam LTU06100 in the “basic” feeder-link feasibility study, and channels: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19 CL were assigned to the composite beam LVA06100.

An MSPACE run was then performed to assess the new interference situation of the so-revised 17 GHz feeder-link file. The results showed incompatibilities at the orbital positions 23° E.

In order to resolve the EPM excess found for the beams AZE06400 (i.e.: –0.84 dB EPM), LVA06100 (i.e.: –0.80 dB EPM) and SOM31200 (i.e.: –0.62 dB EPM), a ±0.2° orbital position offset was applied to the beams AZE06400, LTU06100 and LVA06100, which were thus shifted at the orbital positions 22.8° E, 23.2° E and 23.2° E respectively.

A new MSPACE run was then performed to confirm that the multinational composite beam for Lithuania and Latvia were accommodated into the draft 17 GHz feeder-link file without any EPM excess.

Another MSPACE run was then performed to check the impact of these ±0.2° orbital position adjustments on the downlink study. The results showed that this orbital position shift had no impact on the downlink results obtained in section 4 above.

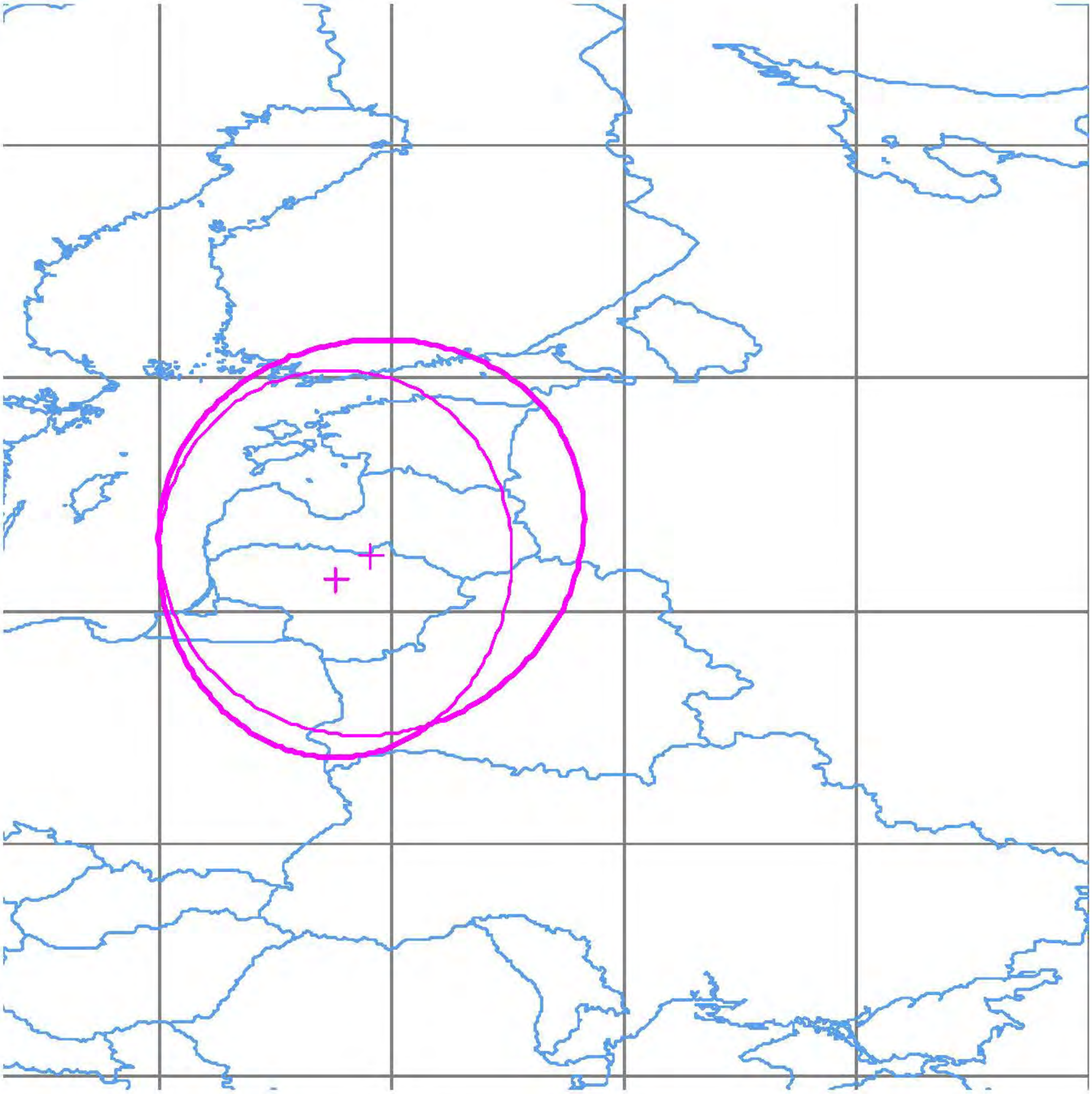
6 Summary

The results of this study show that the multinational downlink beam cannot be accommodated at the orbital position 23° E without suffering some negative EPM.

The results of this study also show that it is possible to accommodate at the orbital position 23.2° E the proposed multinational feeder-link composite beam for the Administrations of Lithuania and Latvia with ten channels per country without any EPM excess. However, this is only possible with the application of a ±0.2° offset to one beam of another Administration at the nominal orbital position 23° E.

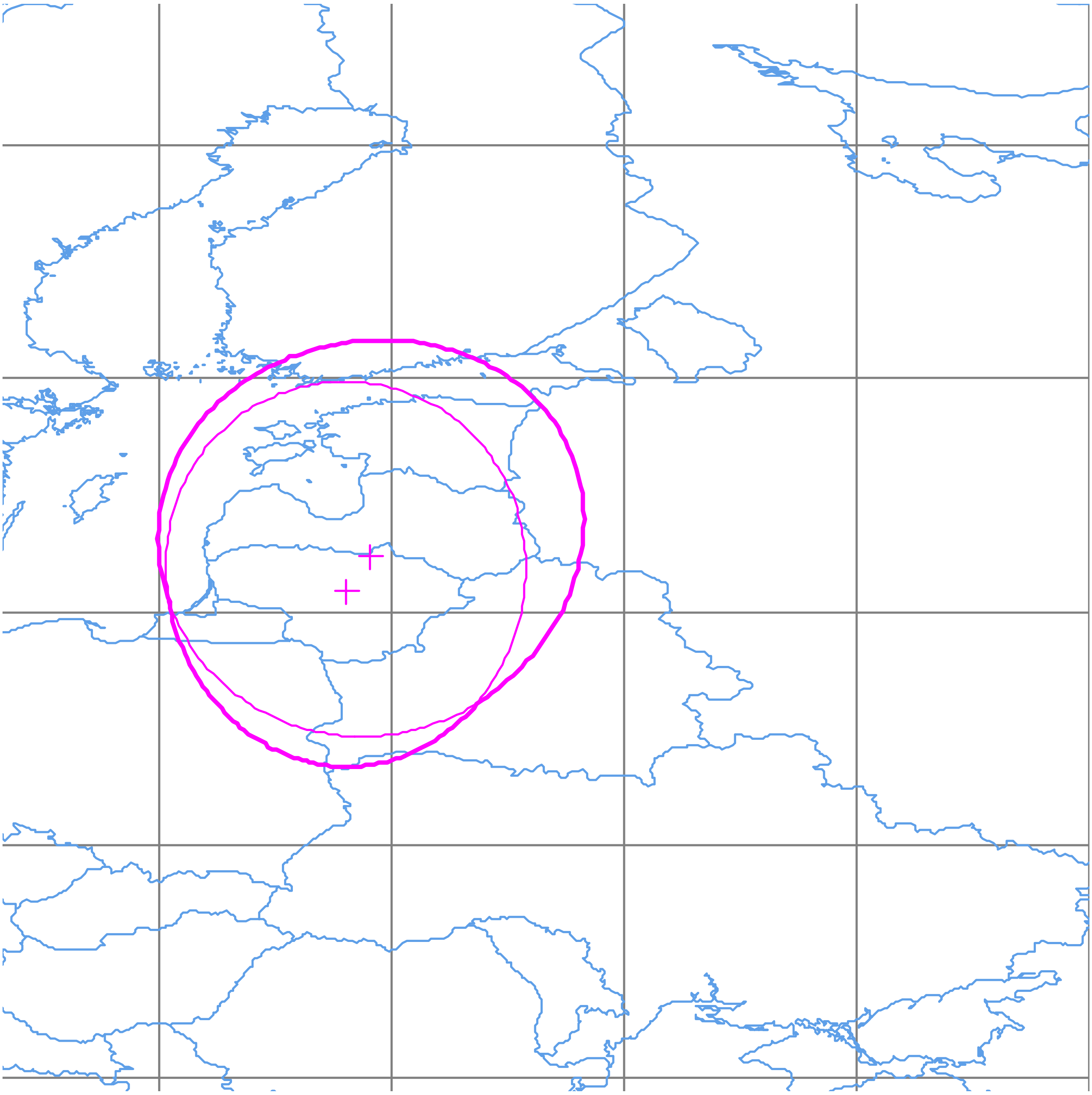
ANNEX A

**Downlink composite beam for Lithuania and Latvia
at the orbital position 23° E**



ANNEX B

Feeder-link composite beam for Lithuania and Latvia at the orbital position 23° E



INTERNATIONAL TELECOMMUNICATION UNION

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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDY TO ASSESS THE IMPACT OF USING AN ORBITAL POSITION WITHIN THE ORBITAL ARC 25° W TO 10° E FOR TUNISIA

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Study to assess the impact of using an orbital position within the orbital arc 25° W to 10° E for Tunisia

ATTACHMENT

Director, Radiocommunication Bureau

STUDY TO ASSESS THE IMPACT OF USING AN ORBITAL POSITION WITHIN THE ORBITAL ARC 25° W TO 10° E FOR TUNISIA

1 Introduction

The Radiocommunication Bureau received a telefax dated 31 March 2000 from the Administration of Tunisia requesting a preference for an orbital position within the orbital arc from 25° W to 10° E instead of the orbital position 30° W, which was used in the "basic" feasibility studies.

As the request was received after the last IRG meeting, the Bureau informed this Administration that its request would be studied at the end of the "basic" downlink and feeder-link feasibility studies, together with other national preferences yet to be studied, if time and resources permit.

This document provides the results of this additional study conducted by the Bureau for consideration by WRC-2000.

2 Methodology

At the end of the "basic" downlink and feeder-link feasibility studies, the national beams of Tunisia are removed from the orbital position 30° W in both the "basic" downlink and feeder-link files.

A search for a new orbital position within the orbital arc from 25° W to 10° E is conducted for the downlink. For that purpose, a Step 4 run is performed (see the Step 4 methodology described in Attachment 1 to Document CMR2000/34 and its Corrigendum 1).

Once the required number of downlink channels have been found at an orbital position within the requested orbital arc, a feeder-link study is performed to find the required number of feeder-link channels at the same orbital position (see the feeder-link methodology described in Attachment 1 to Document CMR2000/34 and its Corrigendum 1).

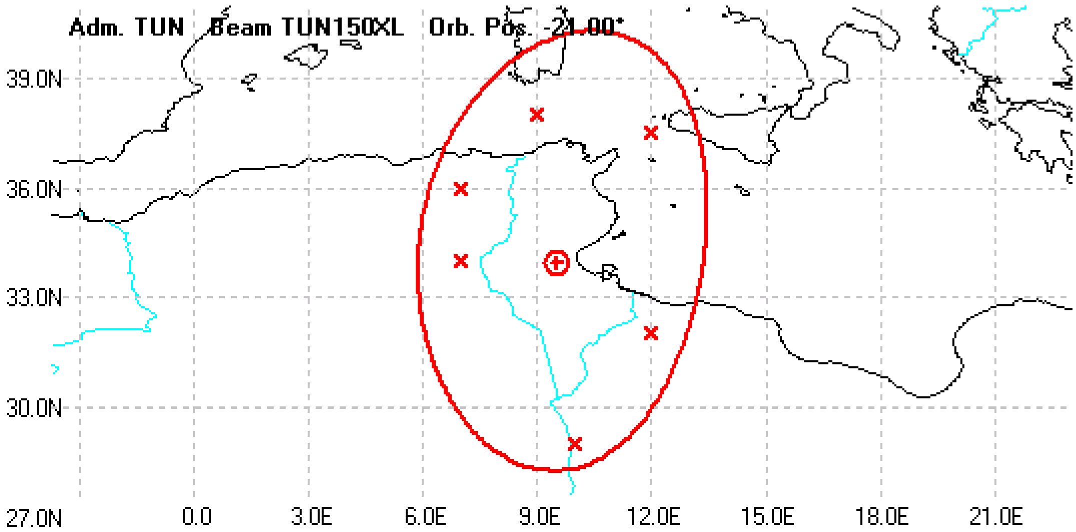
3 Downlink results

The Step 4 run firstly considered the orbital position 25° W. It was not possible to find a block of ten channels at that position. All nominal orbital positions within the arc >25° W to 10° E were then considered. Again, it was not possible to find a block of ten channels at those nominal orbital positions. A further search at non-nominal orbital positions was also unsuccessful.

The Step 4 run was repeated with the improved fast roll-off space station transmit antenna as described in Recommendation ITU-R BO.1445 applied to the TUN15000 beam. This run found that it was possible to accommodate the national downlink beam of Tunisia (TUN15000) at the non-nominal orbital position 21° W without any EPM excess.

A further Step 4 run was performed with the improved fast roll-off antenna applied and the e.i.r.p. of the TUN15000 adjusted. The result of this exercise was that it was not possible to accommodate the TUN15000 beam at a nominal orbital position within the arc 25° W to 10° E; it was only possible to accommodate the beam at the non-nominal orbital position 21° W without any EPM excess.

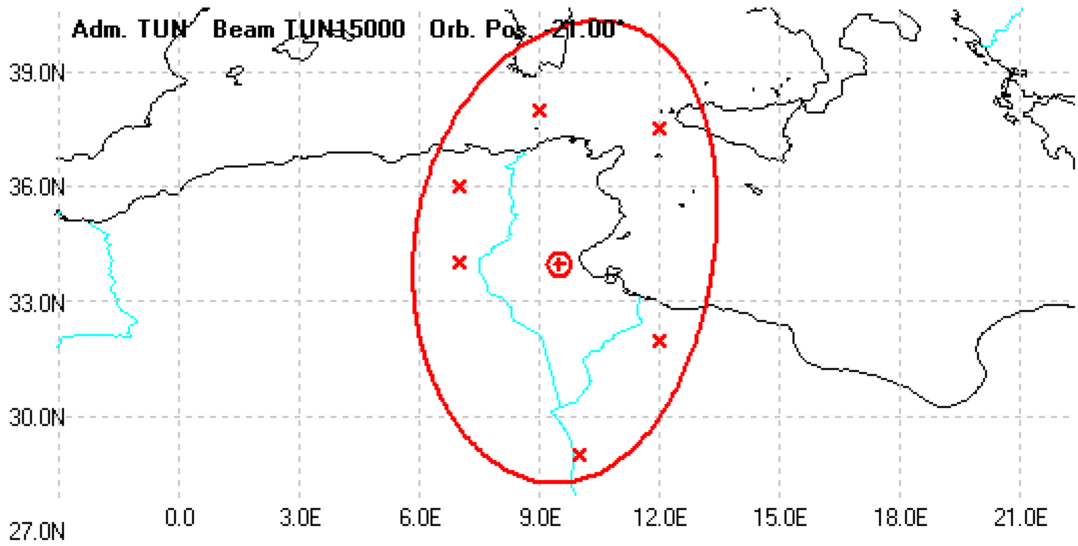
The ellipse parameters and a plot of the resulting downlink beam shape at 21° W are provided below.



Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
43.23 dB	33.95° N	9.51° E	1.70°	0.78°	115.63°

4 Feeder-link results

The orbital position of the Tunisia national feeder-link beam (TUN15000) was changed from 30° W to the orbital position found in the downlink study: 21° W. The ellipse parameters were recalculated using the ITU/EBU ellipse software. The feeder-link ellipse parameters and a plot of the resulting beam shape at 21° W are provided below.



Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
43.23 dB	33.95° N	9.51° E	1.70°	0.78°	115.63°

An MSPACE run was then performed to assess the new feeder-link interference situation resulting from the use of the channels 21, 23, 25, 27, 29, 31, 33, 35, 37, 39 CL, which were those found at 21° W in the downlink study, after a transposition of these ten channels to the feeder-link frequency band at 17 GHz.

The results showed that it was possible to accommodate into the feeder-link file the national feeder-link beam of Tunisia at the orbital position 21° W without any EPM excess.

5 Summary

The results of this BSS-to-BSS study show that it is possible to accommodate the national downlink and feeder-link beams of Tunisia at 21° W without any EPM excess in both the downlink and feeder-link respectively.

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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDIES TO ASSESS THE IMPACT OF AN ADDITIONAL OR ALTERNATIVE USE OF THE 14 GHz AND/OR THE 17 GHz FREQUENCY BANDS FOR THE ADMINISTRATIONS OF INDIA, IRAN (ISLAMIC REPUBLIC OF), ISRAEL (STATE OF), MOROCCO, AND SEYCHELLES

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Studies to assess the impact of an additional or alternative use of the 14 GHz and/or the 17 GHz frequency bands for the Administrations of India, Iran (Islamic Republic of), Israel (State of), Morocco and Seychelles

ATTACHMENT

Director, Radiocommunication Bureau

STUDIES TO ASSESS THE IMPACT OF AN ADDITIONAL OR ALTERNATIVE USE OF THE 14 GHz AND/OR THE 17 GHz FREQUENCY BANDS FOR THE ADMINISTRATIONS OF INDIA, IRAN (ISLAMIC REPUBLIC OF), ISRAEL (STATE OF), MOROCCO, AND SEYCHELLES

1 Introduction

The Administrations of India (Republic of), Iran (Islamic Republic of), Morocco (Kingdom of) and Seychelles (Republic of) requested at the last IRG meeting to assess the impact on the feeder-link feasibility study of the additional or alternative use of the 14 GHz and/or 17 GHz frequency bands for their feeder-link channels instead of the channels used for these countries in the “basic” feeder-link feasibility study (see sections 6.4.6 and 6.4.9 of the IRG Final Report: Document WRC2000/34).

The IRG agreed to investigate these proposals and asked the Radiocommunication Bureau to perform additional studies at the end of the basic study in order to determine the impact of these requests.

On the same issue, the Bureau received a telefax dated 10 January 2000 from the Israel (State of) Administration requesting to assess the impact on the feeder-link feasibility study of the use of the 14 GHz frequency band for its feeder-link channels instead of the 17 GHz frequency band. As the request was received after the last IRG meeting, the Bureau informed this Administration that its request would be studied at the end of the “basic” feeder-link feasibility study, together with other national preferences yet to be studied, if time and resources permit.

This document provides the results of all these additional studies conducted by the Bureau for consideration by WRC-2000.

2 Methodology

At the end of the “basic” feeder-link feasibility study the required number of channels are added into the relevant feeder-link file (14 GHz file or 17 GHz file). BSS-to-BSS interference analyses are then conducted separately to assess the impact of each request on the feeder link.

3 Results of the feeder-link studies

3.1 Case of India (Republic of) at 56° E and 68° E

The beams INDA__1XR, INDA__1YL, INDB__1XR and INDB__1YL at the orbital position 56° E, and the beams IND0371XR, IND037YL, IND0471XR, IND047YL, INDD__1XR and INDD__1YL at the orbital position 68° E were all added to the “basic” feasibility study 14 GHz feeder-link file in order to provide 12 channels to all the beams of the Administration of India (Republic of) in the 14 GHz frequency band.

An MSPACE run was then performed to assess the new interference situation of this revised 14 GHz feeder-link file.

After several trials, the results showed that:

- Only one of the two composite beams of this Administration at 56° E can be accommodated with 12 channels in the 14 GHz feeder-link file without any EPM excess.
- Only the composite beam and one of the two elliptical beams of this Administration at 68° E can be accommodated with 12 channels in the 14 GHz feeder-link file without any EPM excess, but with the application of a ±0.2° orbital position offset to these two Indian beams.

3.2 Case of Iran (Islamic Republic of) at 34° E

The beams IRN109XR and IRN109YL were added at the orbital position 34° E to the "basic" feasibility study 14 GHz feeder-link file in order to provide 12 channels (block E) to the Administration of Iran (Islamic Republic of) in the 14 GHz frequency band.

An MSPACE run was then performed to assess the new interference situation of this revised 14 GHz feeder-link file.

The results showed that it is possible to provide the Administration of Iran (Islamic Republic of) with 12 channels at the orbital position 34° E in the 14 GHz feeder-link file without any EPM excess.

3.3 Case of Seychelles (Republic of) at 42.5° E

The beams SEY000XL and SEY000YR were added at the orbital position 42.5° E to the "basic" feasibility study 14 GHz feeder-link file in order to provide ten channels (block E') to the Administration of Seychelles (Republic of) in the 14 GHz frequency band.

An MSPACE run was then performed to assess the new interference situation of this revised 14 GHz feeder-link file.

The results showed that it is possible to provide the Administration of Seychelles (Republic of) with ten channels at the orbital position 42.5° E in the 14 GHz feeder-link file without any EPM excess.

3.4 Case of Morocco (Kingdom of) at 25° W

The beam MRC20900 was added at the orbital position 25.0° W to the "basic" feasibility study 17 GHz feeder-link file in order to provide ten channels to the Administration of Morocco (Kingdom of) in the 17 GHz frequency band.

Several MSPACE runs were then performed to try to provide one block of ten channels to this Administration in the 17 GHz feeder-link file either at the orbital position 25.0° W, 25.2° W or 24.8° W.

The results showed that some of the beams at the orbital positions 25.0° W, 25.2° W or 24.8° W have EPM excesses.

In order to resolve this situation, one solution could be to move the beam TCD14300 to the 14 GHz frequency band. The 17 GHz feeder-link file was then revised in order to remove the beam TCD14300 and to add the beam MRC20900 at the orbital position 25.2° W with channels 22, 24, 26, 28, 30, 32, 34, 36, 38, 40 CR (i.e. block D). A new MSPACE run of this revised 17 GHz feeder-link file was then performed. In parallel, the 14 GHz feeder-link file was also revised in order to add the beams TCD143XR and TCD143YL, both at the orbital position 25.2° W with channels 5, 7, 9, 11, 13 CR and 6, 8, 10, 12, 14 CR respectively (i.e. block E'), and to remove the beams MRC209XR and MRC209YL. A new MSPACE run of this revised 14 GHz feeder-link file was then performed. The results of both runs showed that it is possible to provide the Administration of Morocco (Kingdom of) with ten channels at the orbital position 25.2° W in the 17 GHz feeder-link file without any EPM excess, provided that the beam TCD14300 is moved to the 14 GHz frequency band at the orbital position 25.2° W.

Alternatively, another solution could be to make some changes with respect to the ±0.2° orbital position offset or the channel arrangements, as well as to apply some e.i.r.p. adjustments to some of the beams at the orbital positions 25.0° W, 25.2° W or 24.8° W in order to maintain all these beams in the 17 GHz frequency band. The 17 GHz feeder-link file was then revised in order to make the following modifications:

– Use channels 21, 23, 25, 27, 29, 31, 33, 35, 37, 39 CR (i.e. block C') for the beam AGL29500 at the orbital position 25.2° W with an e.i.r.p. reduction of 0.8 dB (i.e. an e.i.r.p. of 83.2 dBW).

– Use channels 22, 24, 26, 28, 30, 32, 34, 36, 38, 40 CR (i.e. block D) for the beam LBY28021 (same as beams LBY28000 and LBY32100) at the orbital position 24.8° W.

– Use channels 21, 23, 25, 27, 29, 31, 33, 35, 37, 39 CL (i.e. block C) for the beam TCD14300 at the orbital position 25.2° W.

– Use channels 22, 24, 26, 28, 30, 32, 34, 36, 38, 40 CL (i.e. block D') for the beam MRC20900 at the orbital position 24.8° W with an e.i.r.p. reduction of 1.8 dB (i.e. an e.i.r.p. of 82.2 dBW).

A new MSPACE run of this revised 17 GHz feeder-link file was then performed. The results showed that it is also possible, alternatively, to provide the Administration of Morocco (Kingdom of) with ten channels at the orbital position 24.8° W in the 17 GHz feeder-link file without any EPM excess, provided that some changes (i.e. different ±0.2° orbital position offset or different channel arrangements) are made to the beams AGL29500, LBY28021 and TCD14300 and that some e.i.r.p. reductions are applied to the beams AGL29500 (i.e. 0.8 dB) and MRC20900 (i.e. 1.8 dB).

3.5 Case of Israel (State of) at 4° W

The beams ISR110XL and ISR110YR were added at the orbital position 4.0° W to the "basic" feasibility study 14 GHz feeder-link file in order to provide ten channels (block E) to the Administration of Israel (State of) in the 14 GHz frequency band.

An MSPACE run was then performed to assess the new interference situation of this revised 14 GHz feeder-link file.

The results showed that it is possible to provide the Administration of Israel (State of) with ten channels at the orbital position 4.0° W in the 14 GHz feeder-link file without any EPM excess.

With respect to the second request of this Administration, to study the compatibility between these 12 Israel channels in the 14 GHz feeder-link file and the other services sharing the same frequency band, no analysis was performed in accordance with the methodology related to this compatibility case, which is described in Attachment 3 to Document CMR2000/34. Information on the compatibility between any 14 GHz feeder-link channel and the other services sharing the same frequency band is provided in section 1.2 of Annex 1 of Addendum 4 to Document WRC2000/34.

4 Summary

The results of these BSS-to-BSS studies show that:

– For the Administrations of Iran (Islamic Republic of), Seychelles (Republic of) and Israel (State of), the required number of channels can be assigned to these countries in the 14 GHz feeder-link file without causing any excess of interference to any beam.

– For the Administration of India (Republic of), only one of its two beams at 56° E and two of its three beams at 68° E (±0.2°) can be assigned the required number of channels in the 14 GHz feeder-link file without causing any excess interference to any beam.

– For the Administration of Morocco (Kingdom of), the required number of channels can be assigned to this country in the 17 GHz feeder-link file without causing any excess of interference to any beam, provided that either the beam TCD14300 is moved to the 14 GHz frequency band, or different ±0.2° orbital position offset, different channel arrangements and some e.i.r.p. reductions (i.e. 0.8 dB to the beam AGL29500 and 1.8 dB to the beam MRC20900) are applied.

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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDY TO DETERMINE THE IMPACT OF ALTERNATIVE FEEDER-LINK BEAMS FOR AUSTRALIA

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Study to determine the impact of alternative feeder-link beams for Australia

ATTACHMENT

Director, Radiocommunication Bureau

STUDY TO DETERMINE THE IMPACT OF
ALTERNATIVE FEEDER-LINK BEAMS FOR AUSTRALIA

1 Introduction

The Administration of Australia requested at the last IRG meeting that 10 (12) channels be provided to all Australian test points including its offshore territories for both the downlink and feeder link.

The IRG agreed to investigate the proposal and asked the Radiocommunication Bureau to perform an additional study at the end of the basic study in order to determine the impact of the request.

After the last IRG meeting, the Administration of Australia clarified further this request. It indicated with more details its preferences with respect to its feeder-link assignments (see section 3 below). With respect to its downlink assignments, this Administration indicated that the assumptions taken to carry out the feasibility study presented at that meeting were satisfactory with a small caveat concerning the antenna patterns.

This document provides the results of a feeder-link study conducted by the Bureau, which includes the Australian preferences for consideration by WRC-2000.

2 Methodology

In accordance with the IRG decision on the issue, at the end of the basic feeder-link feasibility study, the modifications described in section 3 below are implemented, and MSPACE interference analyses are conducted.

3 Technical assumptions

Bearing in mind that the Administration of Australia requested earlier not to change its assignments of the Appendix S30A Plan, this Administration requested to use specific arrangement of beams and channels when implementing additional feeder-link channels for Australia in the feasibility studies.

3.1 Preferred feeder-link channels

The Administration of Australia requested to use channels 1, 5, 9, 13, 17, 21 CL (or alternatively 27, 31, 35, 39, 25, 29) at the orbital position 152° E, and channels 4, 8, 12, 16, 20, 24 CL (or alternatively 30, 34, 38, 24, 28, 32) at the orbital position 164° E.

Since the additional channels 1, 5, 9 CR and 4, 8, 12 CL were assigned to Australia at the orbital positions 152° E and 164° E respectively in the “basic” downlink feasibility study, the feeder-link channels 1, 5, 9 CL and 4, 8, 12 CL were used at these orbital positions respectively for the purpose of this additional study, in addition to the Appendix S30A Plan channels assigned to the other feeder-link beams of this Administration. It should be noted that these preferred additional channels were not used in the “basic” feeder-link feasibility study because they would have produced negative EPMs.

3.2 Preferred feeder-link beams

The Administration of Australia requested to use the Appendix S30A Plan feeder-link antenna pattern ellipses “AUS0040A” and “AUS0070A” for the creation of full “national coverage beams” in combination with minimum size spot beams covering its offshore territories.

Consequently, for the purpose of this additional study, the beams “AUS0060G” at 152° E and “AUS0070G” at 164° E were removed from the feeder-link feasibility study file and replaced by two composite beams: “AUSA0000” at 152° E and “AUSB0000” at 164° E respectively (see Annexes A and B to this document). It should be noted that it was not possible to use the fast-roll antenna patterns (R123FR) requested by this Administration since no fast-roll antenna pattern was adopted by the relevant ITU-R Study Group in the case of composite beams.

In addition to these composite beams, for each of the six Australian beams of the Appendix S30A Plan (AUS00400/AUS0040A, AUS00500, AUS00600 at 152° E and AUS00700/AUS0070A, AUS00800, AUS00900/AUS0090A at 164° E), six spot beams covering respectively the six Australian offshore territories identified by that Administration were created and grouped with their respective Appendix S30A Plan beam (see Annexes C and D to this document).

4 Results of the feeder-link study

An MSPACE run was performed to assess the new interference situation of the revised feeder-link file, as described in section 3 above.

The results showed some excess of interference received by the proposed new composite beams (i.e. –12.2 dB EPM for beam “AUSA0000” and –11.9 dB EPM for beam “AUSB0000”) and by some of the Australian beams of the Appendix S30A Plan (i.e. –3.3 dB EPM for beam “AUS00500”, –2.9 dB EPM for beam “AUS00700” and –3.1 dB EPM for beam “AUS0070A”).

A detailed analysis indicated that, at both orbital positions, the negative EPMs of the Australian beams of the Appendix S30A Plan are due to additional adjacent channel interference from the preferred channels used for the composite beams (see section 3.1 above). Considering that the Administration of Australia indicated that for the feeder-link Australia may consider accepting some level of negative EPMs where such EPMs are due to adjacent channel interference from other Australian beams, no solution is proposed in this document to improve this particular situation for the cases where the negative EPM was approximately –3 dB.

Another detailed analysis indicated that, at both orbital positions, only the test-points of the proposed new composite beams, which are located within Australia’s mainland territory have negative EPMs. This analysis indicated also that these negative EPMs are due to adjacent channels transmitted from the offshore territories.

In order to resolve the low negative EPMs (e.g. –12.2 dB), the use of the same approach for the additional channels as for the other channels of this Administration was implemented, i.e. using several elliptical beams grouped together instead of using composite beams, as described in Annexes E and F to this document. With this alternative option, it was then possible to use the requested fast-roll antenna patterns (R123FR) for the beam covering Australia’s mainland territory.

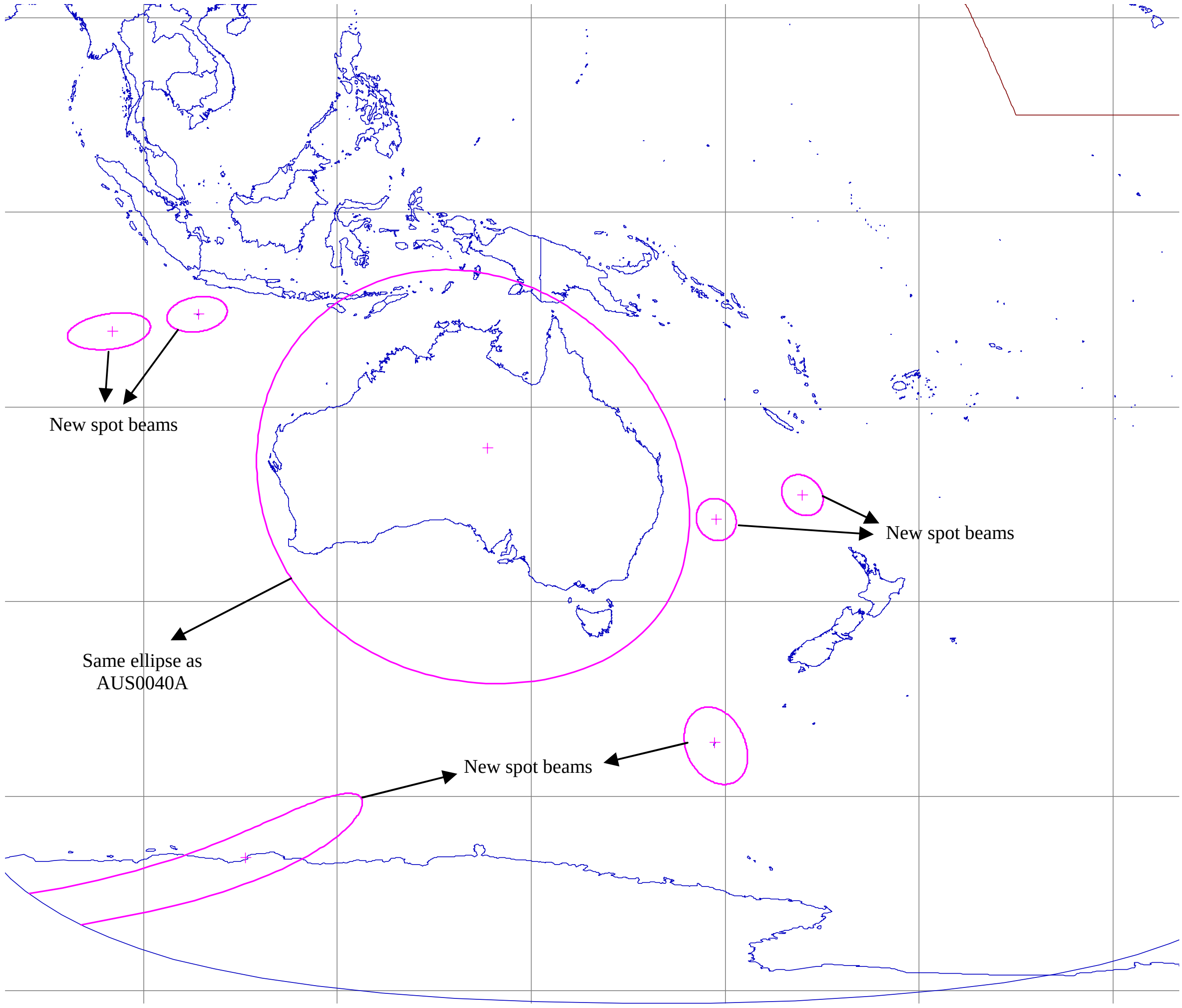
With these new modifications, a new MSPACE run was performed to confirm that the feeder-link beams and channels preferred by Australia could be accommodated into the draft feeder-link file with no EPM more negative than –3.2 dB for the Australian beams, and without any other EPM excess.

5 Summary

The results of this study show that with some specific assumptions (i.e. replacement of composite beams by elliptical beams grouped together), it is possible to accommodate into the draft feeder-link file the feeder-link beams and channels preferred by Australia with no EPM more negative than –3.2 dB for the Australian beams, and without any other EPM excess.

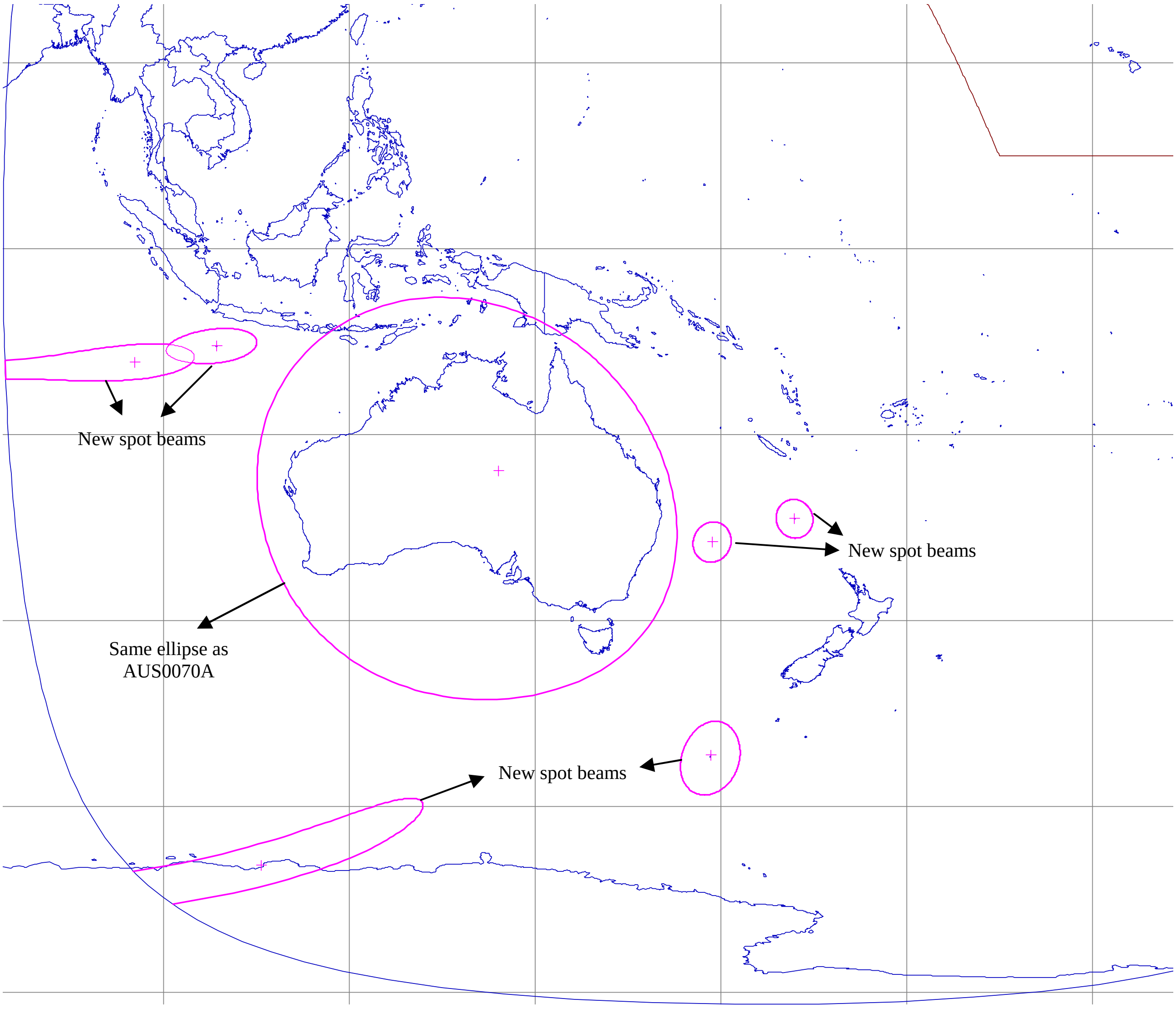
ANNEX A

**Proposed feeder-link composite beam “AUSA0000”
for the additional channels assigned to Australia at 152° E**



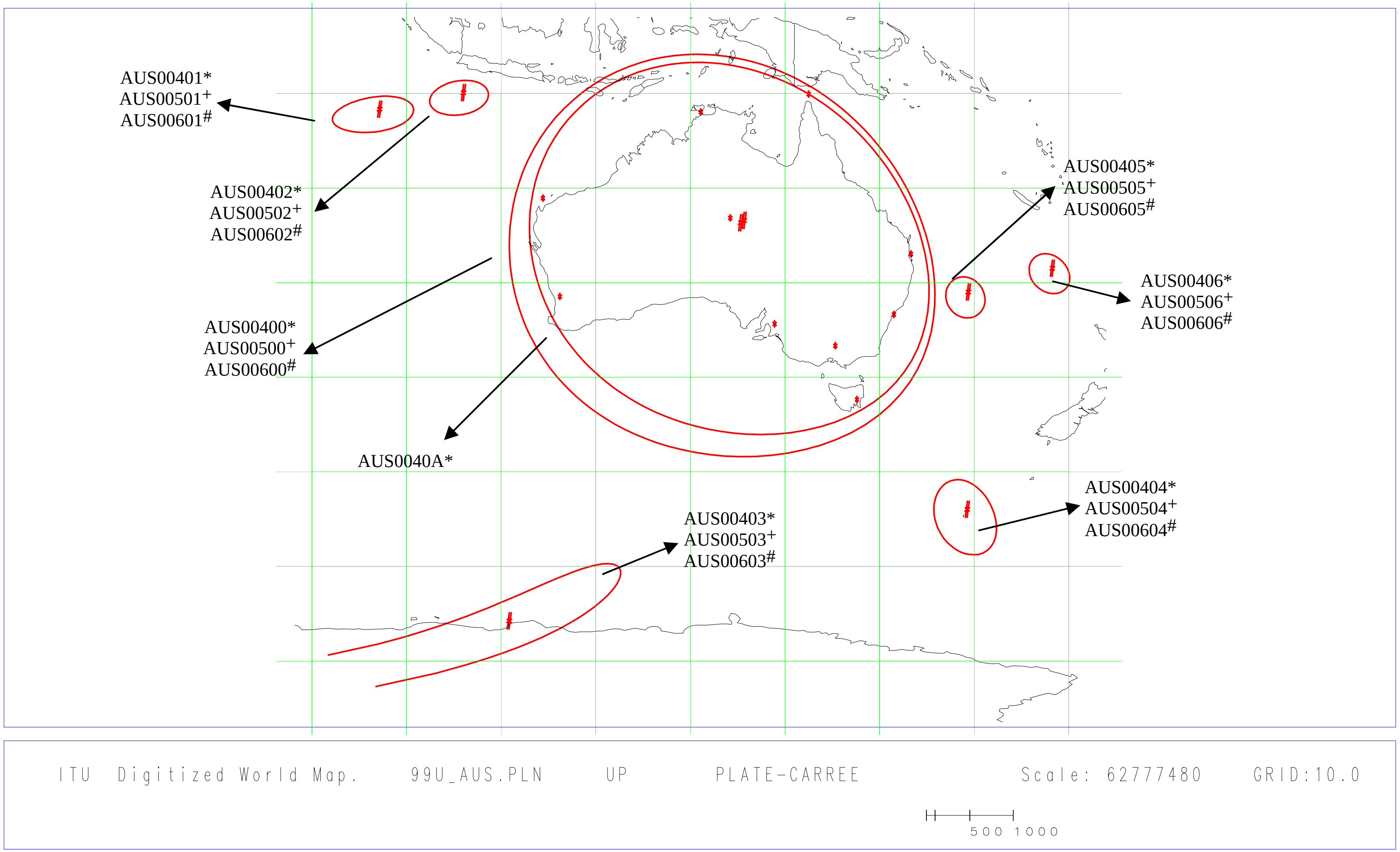
ANNEX B

Proposed feeder-link composite beam "AUSB0000" for the additional channels assigned to Australia at 164° E



ANNEX C

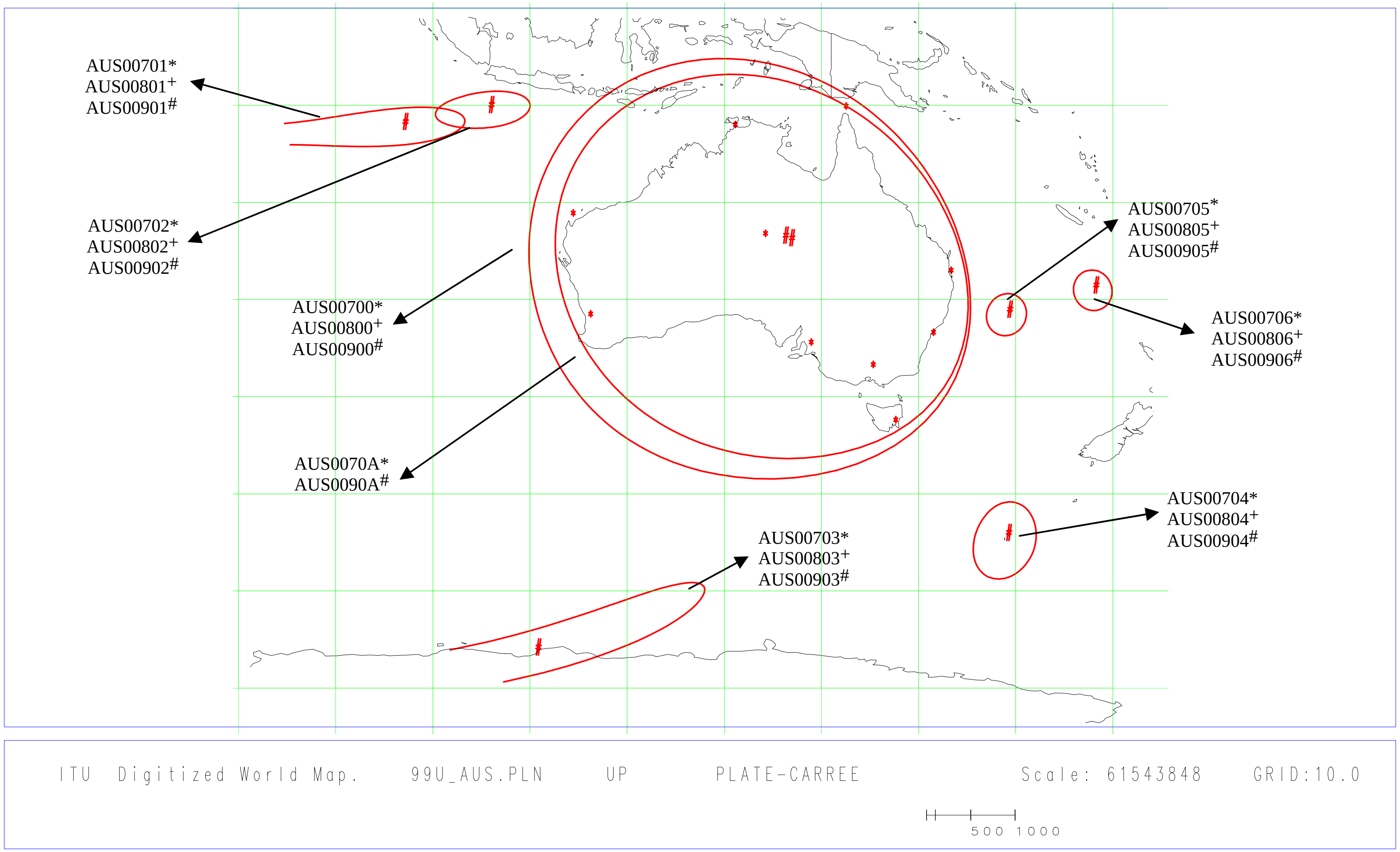
Appendix S30A Plan beams and proposed grouped spot beams for Australia at 152° E



Notes *, + or # indicate which beams are part of the same group

ANNEX D

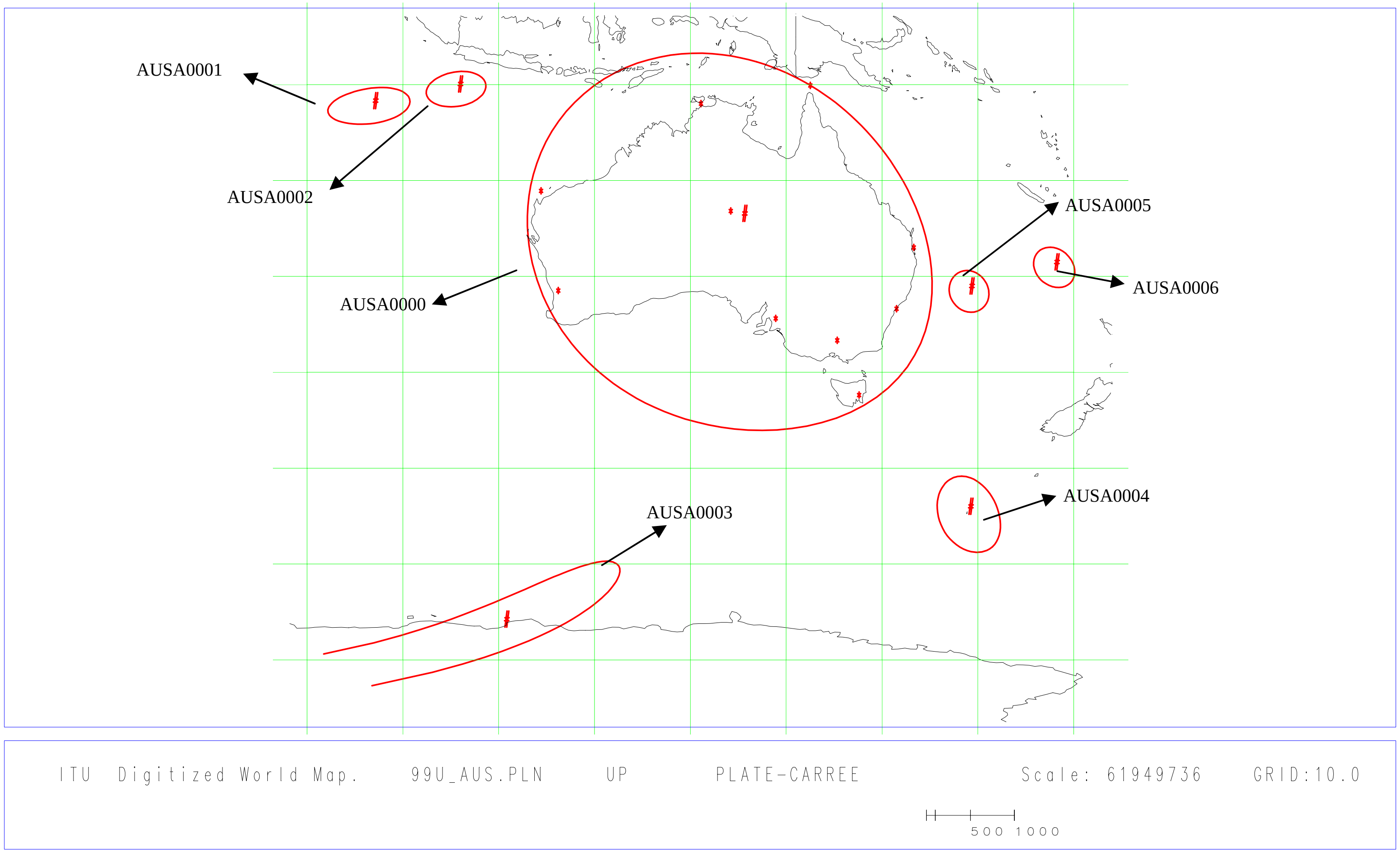
Appendix S30A Plan beams and proposed grouped spot beams for Australia at 164° E



Notes *, + or # indicate which beams are part of the same group

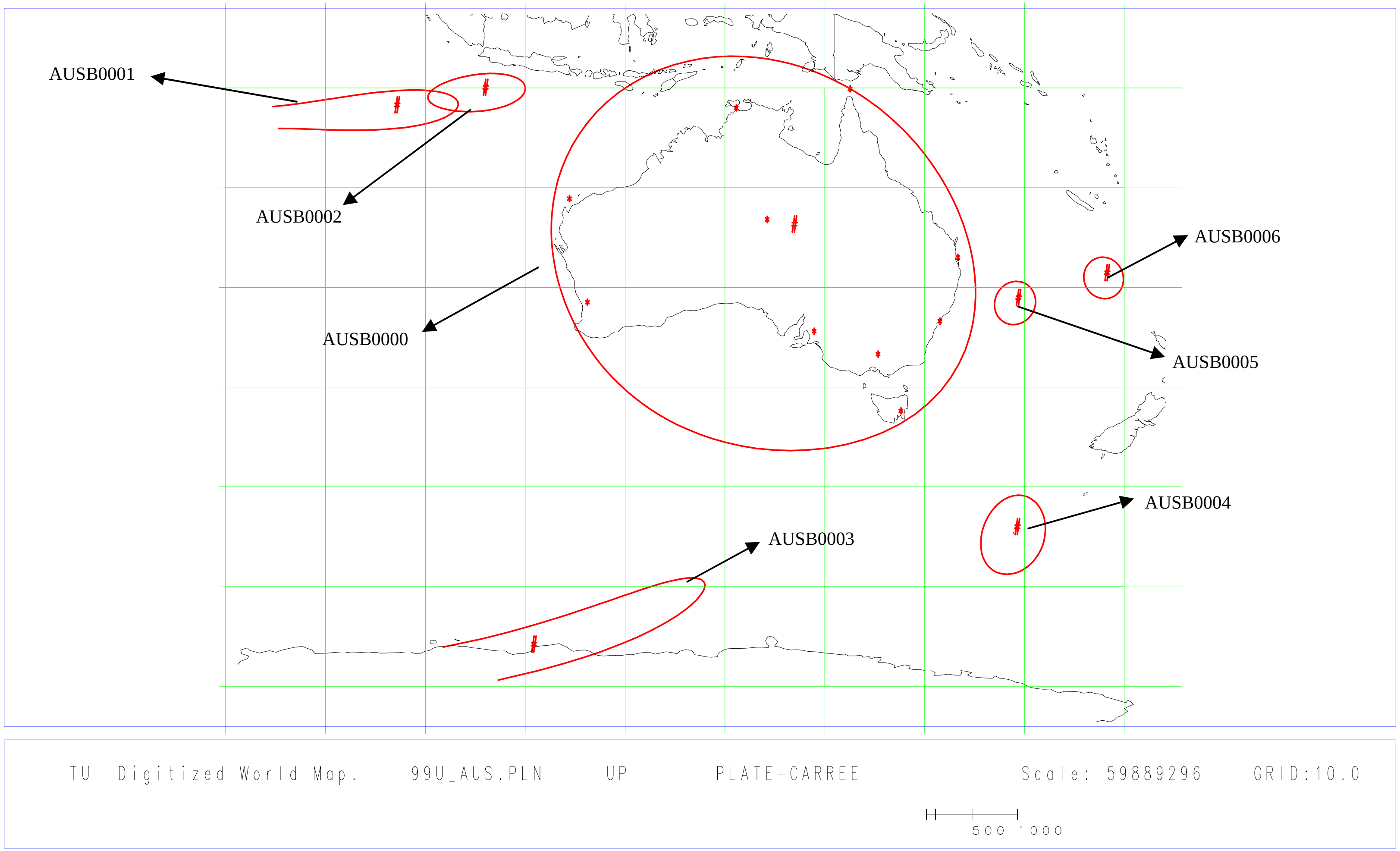
ANNEX E

Alternative elliptical beams grouped together to be used for the additional channels assigned to Australia at 152° E



ANNEX F

Alternative elliptical beams grouped together to be used for the additional channels assigned to Australia at 164° E



INTERNATIONAL TELECOMMUNICATION UNION

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Addendum 12 to Document 34-E
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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDY TO ASSESS THE IMPACT OF MOVING QATAR NATIONAL BEAM TO THE ORBITAL POSITION 20° E

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Study to assess the impact of moving Qatar national beam to the orbital position 20° E

ATTACHMENT

Director, Radiocommunication Bureau

STUDY TO ASSESS THE IMPACT OF MOVING
QATAR NATIONAL BEAM TO THE ORBITAL POSITION 20° E

1 Introduction

The Radiocommunication Bureau received a telefax dated 16 February 2000 from the Qatar (State of) Administration requesting a study to examine the impact of moving its national beam to the orbital position 20° E.

As the request was received after the last IRG meeting, the Bureau informed this Administration that its request would be studied at the end of the "basic" downlink and feeder-link feasibility studies, together with other national preferences yet to be studied, if time and resources permit.

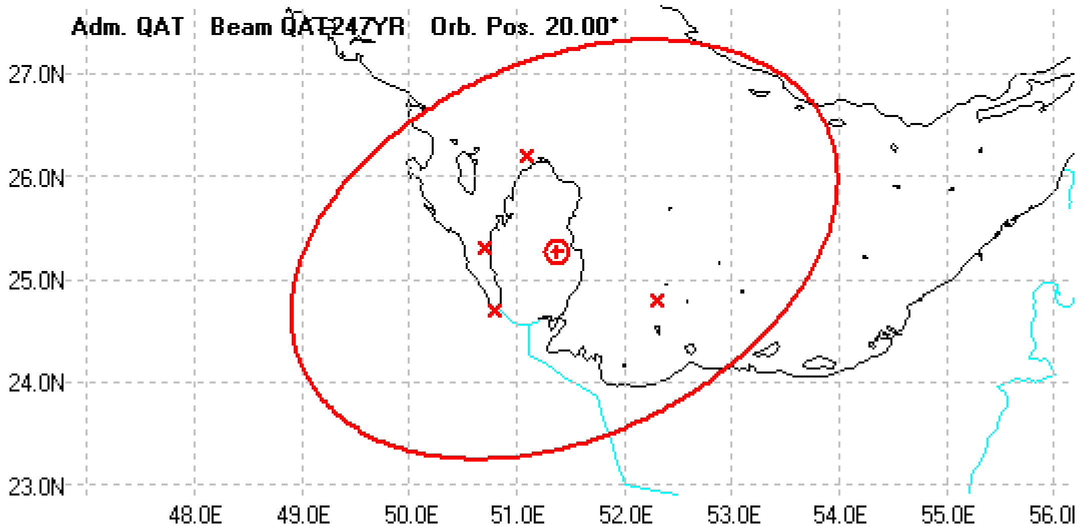
This document provides the results of this additional study conducted by the Bureau for consideration by WRC-2000.

2 Methodology

At the end of the "basic" downlink and feeder-link feasibility studies, the orbital position of the Qatar national beam is changed to 20° E. A BSS-to-BSS interference analysis is then conducted to assess the impact of the orbital position change on the downlink and feeder link.

3 Downlink results

The orbital position of the Qatar national downlink beam (QAT24700) was changed from 17° E to 20° E. The ellipse parameters were recalculated using the ITU/EBU ellipse software. The ellipse parameters and a plot of the resulting beam shape at 20° E are provided below.



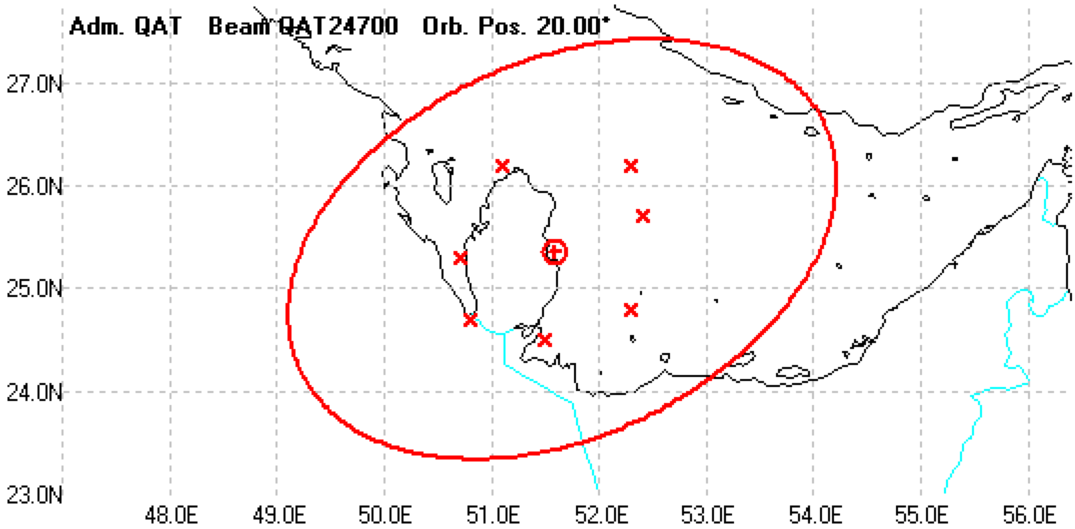
Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
48.88 dB	25.26° N	51.38° E	0.6°	0.6°	0°

A Victim and Culprit study was then performed to determine whether a block of 10 channels were available at 20° E. The result of this exercise was that the beam could not be accommodated with a block of 10 channels.

The e.i.r.p. of the beam was then increased by 1.1 dB to 57.9 dBW in order to resolve incompatibilities with neighbouring beams. With this change, the Qatar national downlink beam was able to be accommodated into the draft downlink file without any EPM excess.

4 Feeder-link results

The orbital position of the Qatar national feeder-link beam (QAT24700) was changed from 17° E to 20° E. The ellipse parameters were recalculated using the ITU/EBU ellipse software. The ellipse parameters and a plot of the resulting beam shape at 20° E are provided below.



Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
48.88 dB	25.34° N	51.59° E	0.6°	0.6°	0°

An MSPACE run was then performed to assess the new feeder-link interference situation resulting from the use of the 10 channels, which were found for the beam QAT24700 at 20° E in the downlink study, after a transposition of these 10 channels in the feeder-link frequency band at 17 GHz.

The results showed that the Qatar national feeder-link beam was able to be accommodated into the draft feeder-link file without any EPM excess.

5 Summary

The results of this BSS-to-BSS study show that it is possible to accommodate the Qatar national downlink and feeder-link beams at 20° E without an EPM excess in both the downlink and feeder link respectively.

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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDY TO DETERMINE THE IMPACT OF A 33 MHz EMISSION BANDWIDTH FOR LAO P.D.R.

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Study to determine the impact of a 33 MHz emission bandwidth for Lao P.D.R.

ATTACHMENT

Director, Radiocommunication Bureau

STUDY TO DETERMINE THE IMPACT OF A 33 MHz
EMISSION BANDWIDTH FOR LAO P.D.R.

1 Introduction

The Administration of Lao People's Democratic Republic requested at the last IRG meeting to study a 33 MHz emission bandwidth for its national assignments (see Section 6.4.9 of the IRG Final Report: Document WRC2000/34).

The IRG agreed to investigate the proposal and asked the Bureau to perform an additional study at the end of the basic study in order to determine the impact of the request. The Bureau also received a telefax dated 21 December 1999 from the Lao P.D.R. Administration requesting the use of a 33 MHz emission bandwidth for national assignments in the replanning feasibility studies.

The Bureau has conducted a study based on this advice. This document provides the results of the study for consideration by WRC-2000.

2 Methodology

In accordance with the IRG decision on the issue, at the end of the "basic" downlink and feeder-link feasibility studies, the emission bandwidth for the Lao P.D.R. national beam (LAO28400) is changed from 27 MHz to 33 MHz. A BSS-to-BSS interference analysis is then conducted to assess the impact of the bandwidth change on the downlink and feeder link. In the absence of specific protection ratios and protection masks for this non-standard emission, those described in Appendices S30 and S30A were used.

3 Downlink results

The assigned bandwidth was changed to 33 MHz and the designation of emission changed to 33M0G7W for the Lao P.D.R. national beam (LAO28400) in the MSPACE downlink file.

An MSPACE run was then performed to assess the new interference situation resulting from the 33 MHz emission bandwidth.

The results showed that only a slight degradation in EPM occurred to neighbouring downlink beams and that there was no EPM excess.

4 Feeder-link results

The assigned bandwidth was changed to 33 MHz and the designation of emission changed to 33M0G7W for the Lao P.D.R. national beam (LAO28400) in the MSPACE feeder-link file.

An MSPACE run was then performed to assess the new interference situation resulting from the 33 MHz emission bandwidth.

The results showed that only a slight variation in EPM occurred to neighbouring feeder-link beams and that there was no EPM excess.

5 Summary

The results of this BSS-to-BSS study show that it is possible to accommodate a 33 MHz emission bandwidth for the Lao P.D.R. national beam without an EPM excess in both the downlink and feeder link.

It should be noted that due to time and resource constraints, the impact of this study in relation to principle 8 of Annex 1 to Resolution 532 (WRC-97) was not examined and that the results may be different in situations where there are a greater density of beams at a particular orbital position.

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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDY TO DETERMINE THE IMPACT OF INCLUDING 12 CHANNELS AT 109.85° E FOR JAPAN

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Study to determine the impact of including 12 channels at 109.85° E for Japan

ATTACHMENT

Director, Radiocommunication Bureau

STUDY TO DETERMINE THE IMPACT OF INCLUDING
12 CHANNELS AT 109.85° E FOR JAPAN

1 Introduction

The Administration of Japan requested at the last IRG meeting to study a proposal to include 12 channels at 109.85º E in addition to and grouped with its assignments at 110º E (see Section 6.4.9 of the IRG Final Report: Document WRC2000/34).

The IRG agreed to investigate the proposal and asked the Bureau to perform an additional study at the end of the basic study in order to determine the impact of the request.

The Bureau has conducted a study based on this advice. This document provides the results of the study for consideration by WRC-2000.

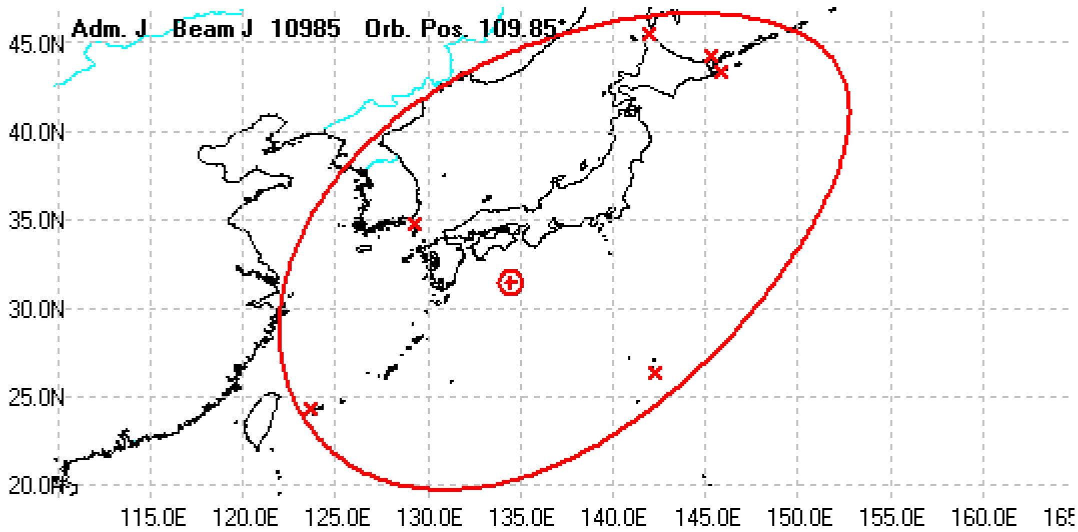
2 Methodology

In accordance with the IRG decision on the issue, at the end of the basic downlink and feeder-link feasibility studies, a new Japanese beam with 12 channels is added at 109.85º E and grouped with the Japanese assignments at 110° E. An interference analysis is then conducted to assess the impact of the additional beam.

3 Technical assumptions

3.1 Downlink beam

The new downlink beam at 109.85° E was assumed to have the same ellipse characteristics as the existing downlink beam at 109.85° E. A plot of the beam shape and ellipse parameters at 109.85° E are provided below.



Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
33.80 dB	31.50° N	134.50° E	3.52°	3.30°	68.00°

In accordance with IRG decisions, the 12 channels added at 109.85º E have new protection ratios (i.e. 21 dB co-channel, 16 dB adjacent-channel), new rotational accuracy (i.e. 1°), reduced e.i.r.p. (i.e. from 58.2 dBW to 59.4 dBW), digital modulation, 34.5 MHz bandwidth and MODRES receiving earth station antenna type.

3.2 Feeder-link beam

The new feeder-link beam at 109.85º E was assumed to have the same ellipse characteristics as the existing feeder-link beam at 109.85º E, also same as the downlink beam. A plot of the beam shape and ellipse parameters at 109.85° E are provided in Section 3.1 above.

In accordance with IRG decisions, the 12 channels added at 109.85º E have new protection ratios (i.e. 27 dB co-channel, 22 dB adjacent-channel), new pointing accuracy (i.e. 0.1°), digital modulation, 34.5 MHz bandwidth, MODRES receiving space station antenna type and MODTES transmitting earth station antenna type.

4 Downlink results

An MSPACE run was performed to assess the new interference situation resulting from the additional Japanese downlink beam described in Section 3.1 above.

The results showed that the additional beam could be accommodated into the draft downlink file at 109.85º E with 12 channels without any EPM excess.

5 Feeder-link results

An MSPACE run was performed to assess the new interference situation resulting from the additional Japanese feeder-link beam described in Section 3.2 above.

The results showed that the additional beam could be accommodated into the draft feeder-link file at 109.85º E with 12 channels without any EPM excess.

6 Summary

The results of this study show that it is possible to include 12 channels at 109.85º E for Japan in addition to and grouped with its assignments at 110º E.

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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDY TO DETERMINE THE IMPACT OF SPLITTING THE PLM/SMA AND GUM/MRA COMPOSITE BEAMS OF THE UNITED STATES

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Study to determine the impact of splitting the PLM/SMA and GUM/MRA composite beams of the United States

ATTACHMENT

Director, Radiocommunication Bureau

STUDY TO DETERMINE THE IMPACT OF SPLITTING THE PLM/SMA AND GUM/MRA COMPOSITE BEAMS OF THE UNITED STATES

1 Introduction

The Administration of the United States of America requested at the last IRG meeting to investigate a proposal to split the composite beam between American Samoa (SMA) and Palmyra Atoll (PLM) to have two individual beams. The same request was made for the Guam (GUM) and Mariana Islands (MRA) beam (see Section 6.4.9 of the IRG Final Report: Document WRC2000/34).

The IRG agreed to investigate the proposal and asked the Bureau to perform an additional study at the end of the basic study in order to determine the impact of the request.

The Bureau has conducted a study based on this advice. This document provides the results of the study for consideration by WRC-2000.

2 Methodology

In accordance with the IRG decision on the issue, at the end of the basic downlink and feeder-link feasibility studies, the PLM/SMA downlink and feeder-link composite beams are split into individual beams, and an interference analysis is conducted. The exercise is then repeated for the GUM/MRA downlink and feeder-link composite beams.

3 Technical assumptions

3.1 PLM/SMA downlink beams

The PLM/SMA downlink composite beam consists of the PLM33700 ellipse and the SMA33500 ellipse with a minimum size spot beam (see Annex C of Attachment 2 to Document WRC2000/34). The PLM33700 ellipse is split from the SMA33500 ellipse and minimum size spot beam. The SMA33500 ellipse and minimum size spot beam remains as a composite beam. A plot of the resulting beams is provided in Annex A.

3.2 GUM/MRA downlink beams

The GUM/MRA downlink composite beam consists of the GUM33100 ellipse and the MRA33200 ellipse (see Annex C of Attachment 2 to Document WRC2000/34). The composite beam is split into two separate ellipses. A plot of the resulting ellipses is provided in Annex A.

3.3 PLM/SMA feeder-link beams

The PLM/SMA feeder-link composite beam consists of the PLM33700 and SMA33500 ellipses, which are identical and cover both PLM and SMA territories, and of the PLM33701 and SMA33501 ellipses, which are also identical and cover west part of United States mainland territory (see Annex D of Attachment 2 to Document WRC2000/34). The composite beam is split into two separate but identical composite beams, the first one consisting of PLM33700 and PLM33701 ellipses and the second one consisting of SMA33500 and SMA33501 ellipses. Plots of the resulting composite beams are provided in Annex B.

3.4 GUM/MRA feeder-link beams

The GUM/MRA feeder-link composite beam consists of the GUM33100 and MRA33200 ellipses, which are identical and cover both GUM and MRA territories, and of the GUM33101 and MRA33201 ellipses, which are also identical and cover part of Hawaii territory (see Annex D of Attachment 2 to Document WRC2000/34). The composite beam is split into two separate but identical composite beams, the first one consisting of GUM33100 and GUM33101 ellipses and the second one consisting of MRA33200 and MRA33201 ellipses. Plots of the resulting composite beams are provided in Annex B.

4 Downlink results

The PLM/SMA composite beam was removed from the “basic” feasibility study downlink file. It was replaced with the split beams described in Section 3.1 above.

A Victim and Culprit study was then performed to determine whether 12 channels could be assigned to each beam. The results showed that the split beams could be accommodated into the draft downlink file with 12 channels per beam without any EPM excess.

The GUM/MRA composite beam was then removed from the “basic” feasibility study downlink file. It was replaced with the two separate ellipses described in Section 3.2 above.

A Victim and Culprit study was then performed to determine whether 12 channels could be assigned to each beam. The results showed that the split beams could be accommodated into the draft downlink file with 12 channels per beam without any EPM excess.

5 Feeder-link results

The PLM/SMA and GUM/MRA composite beams were removed from the “basic” feasibility study 17 GHz feeder-link file. They were replaced with the four composite beams described in Sections 3.3 and 3.4 above.

An MSPACE run was then performed to assess the new interference situation of the revised 17 GHz feeder-link file.

In order to resolve the EPM excess at the orbital position 170° E, the 12 channels assigned in the basic feeder-link feasibility study to the PLM/SMA composite beam were used for the PLM composite beam, and channels 29, 31, 33, 35, 37, 39 CR grouped with channels 30, 32, 34, 36, 38, 40 CL were used for the SMA composite beam.

In order to resolve the EPM excess at the orbital position 122° E, the 12 channels assigned in the basic feeder-link feasibility study to the GUM/MRA composite beam were used for the GUM composite beam, and 12 channels of the 14 GHz frequency band were used for the MRA composite beam. It was not possible to assign all channels for both GUM and MRA composite beams at 122° E in the 17 GHz frequency band even by using a ±0.2° offset around the orbital position 122° E.

A new MSPACE run was then performed to confirm that the split composite beams could be accommodated into the draft downlink file with 12 channels per beam without any EPM excess.

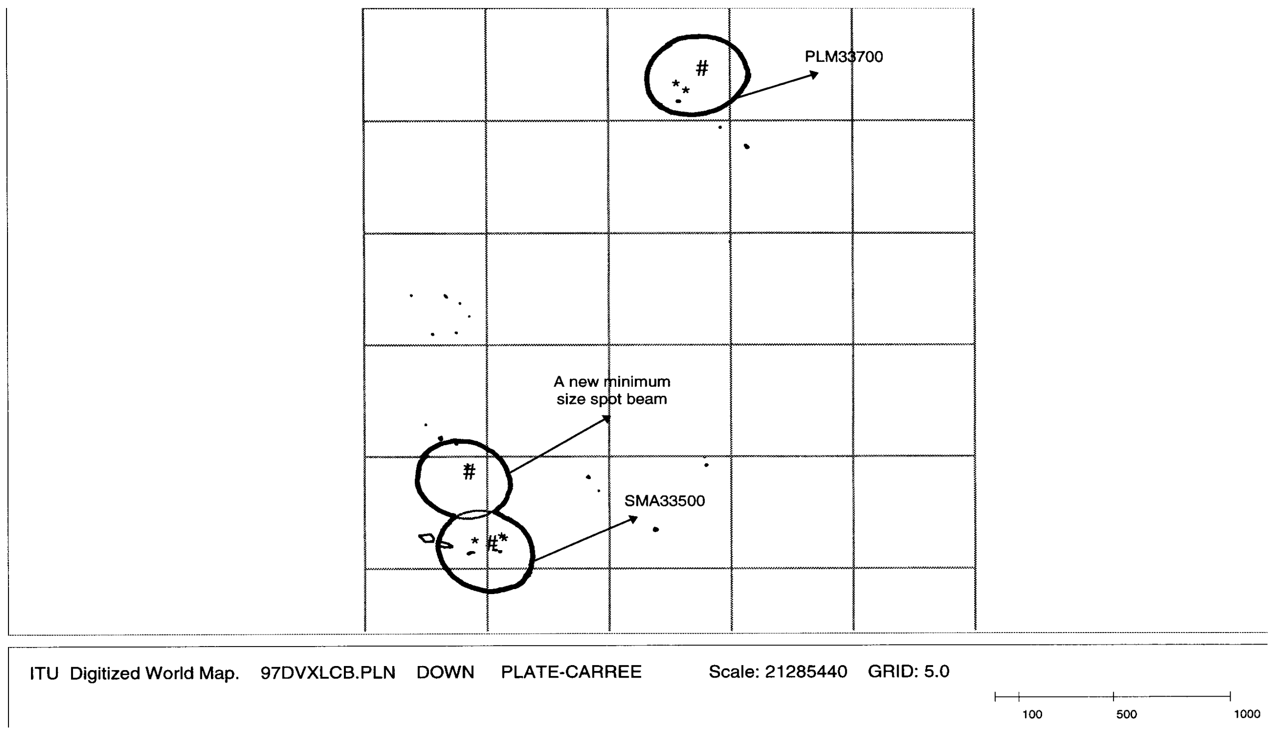
6 Summary

The results of this study show that it is possible to split the downlink and feeder-link composite beams for PLM/SMA and GUM/MRA and assign 12 channels per beam without any EPM excess.

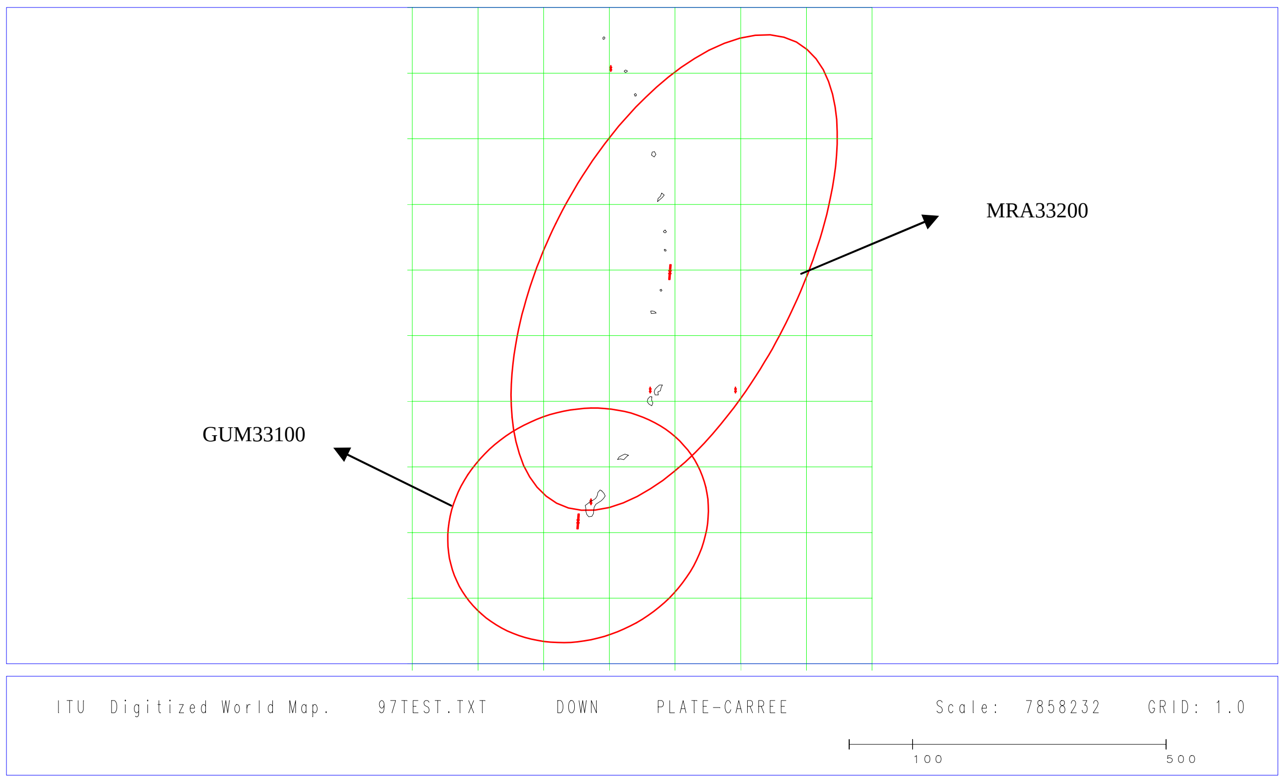
ANNEX A

Downlink beams

USA (PLM & SMA) (170.0 E)



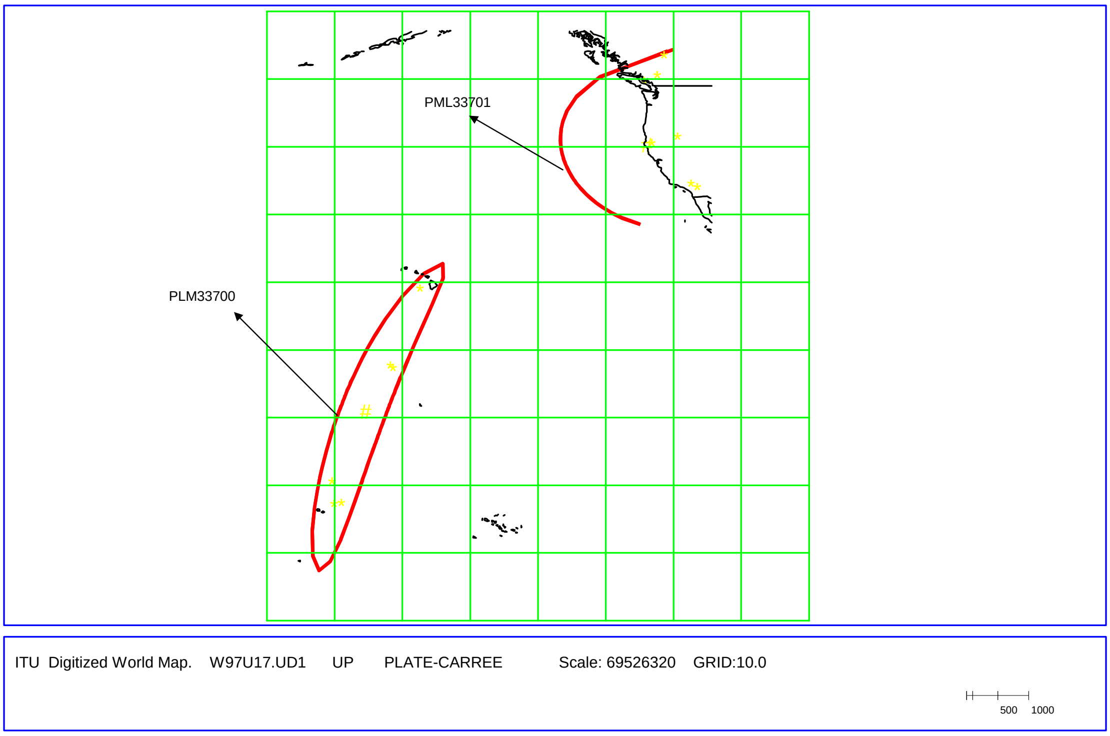
USA (GUM & MRA) (122.0° E)



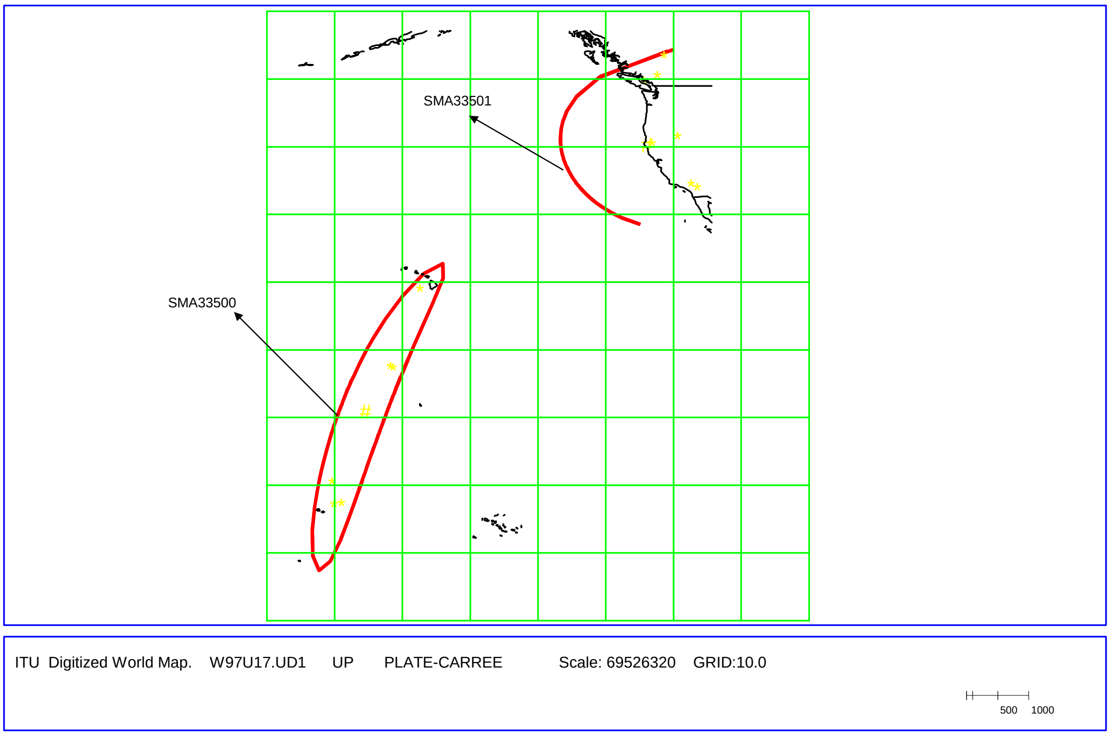
ANNEX B

Feedier-link beams

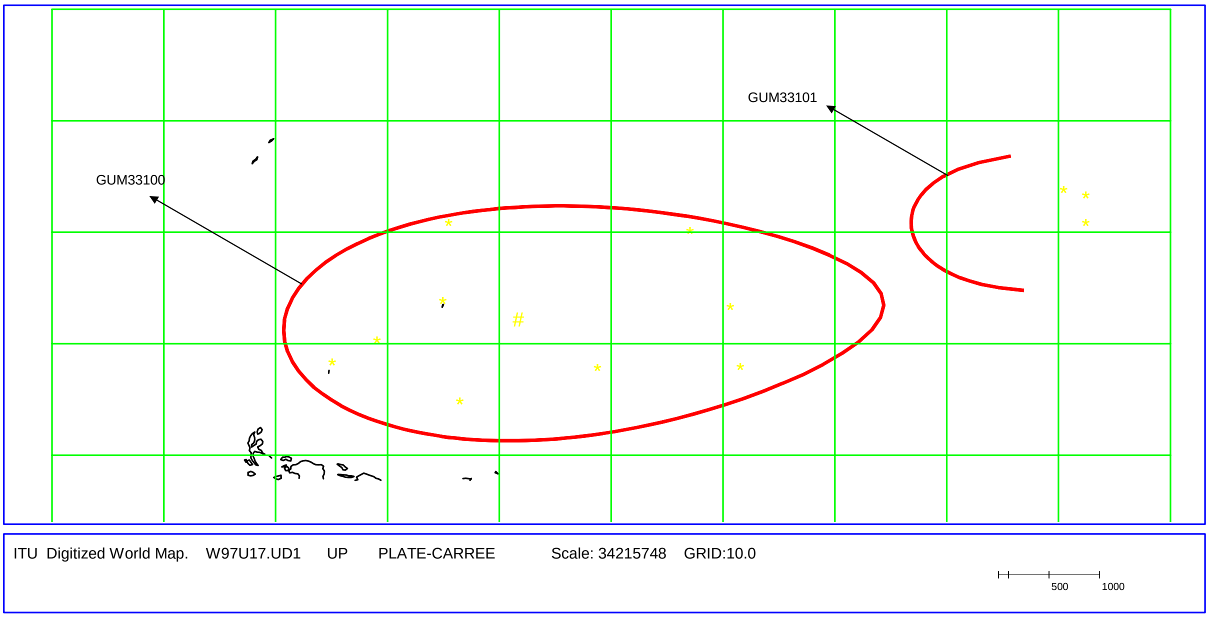
USA/PLM (170.0 E)



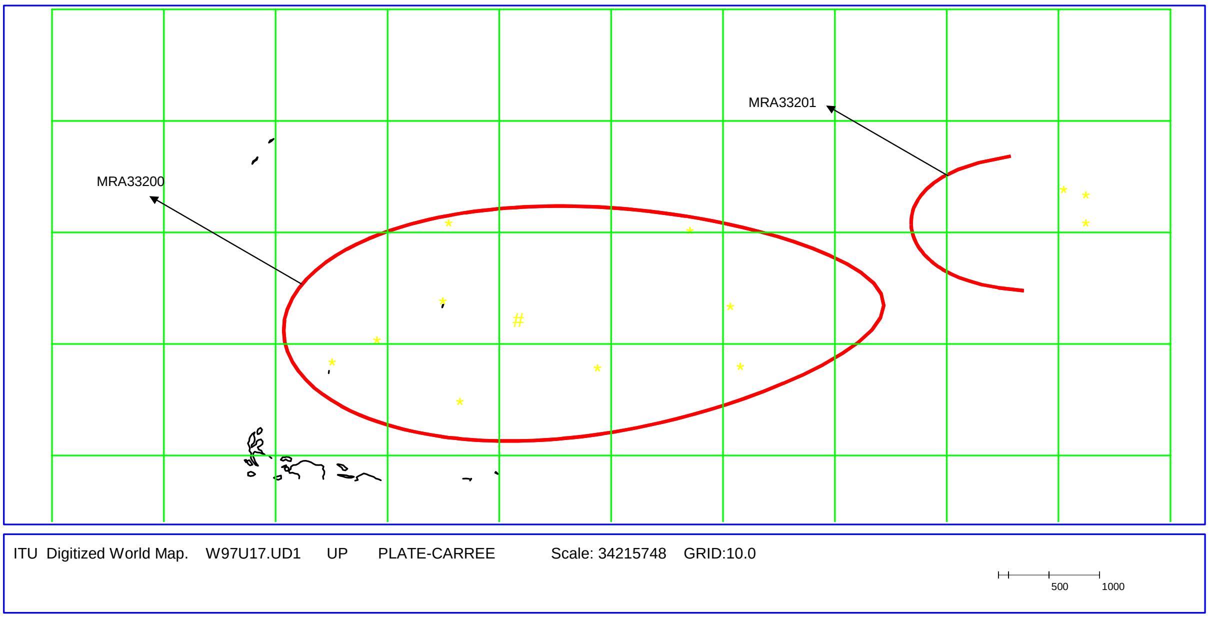
USA/SMA (170.0 E)



USA/GUM (122.0 E)



USA/MRA (122.0 E)



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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDY TO DETERMINE THE IMPACT OF AN ALTERNATIVE FEEDER-LINK ELLIPTICAL BEAM FOR BULGARIA

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Study to determine the impact of an alternative feeder-link elliptical beam for Bulgaria

ATTACHMENT

Director, Radiocommunication Bureau

STUDY TO DETERMINE THE IMPACT OF AN ALTERNATIVE
FEEDER-LINK ELLIPTICAL BEAM FOR BULGARIA

1 Introduction

The Administration of Bulgaria requested at the last IRG meeting to investigate the use of its Appendix S30 Plan beam (downlink) instead of its Appendix S30A Plan beam (feeder link) which was used in the basic feeder-link feasibility study (see Section 6.4.9 of the IRG Final Report (Document WRC2000/34)).

IRG-5 agreed to investigate the proposal and asked the Bureau to perform an additional study at the end of the basic study in order to determine the impact of the request (see Section 2.6.3 of Corrigendum 2 to Document WRC2000/34).

The Bureau has conducted a study based on this advice. This document provides the additional assumptions and the results of the study for consideration by WRC-2000.

2 Methodology

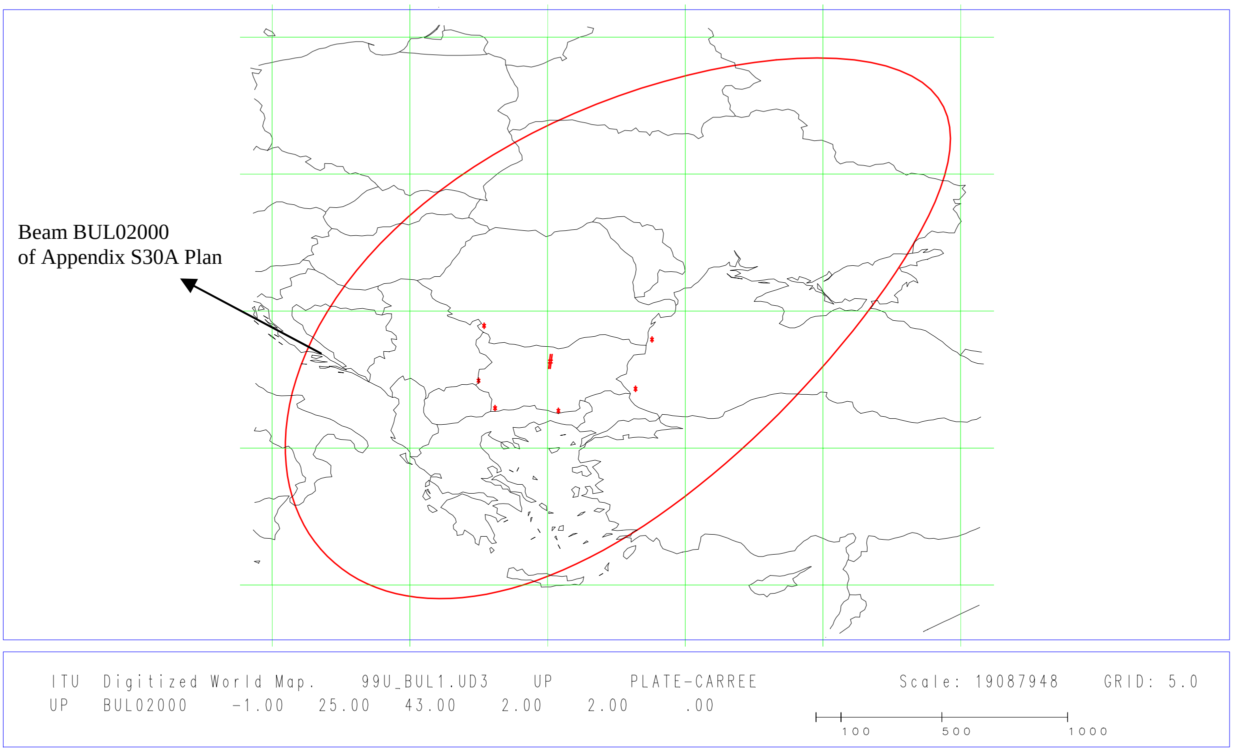
In accordance with the IRG decision on this issue, at the end of the basic feeder-link feasibility study, the feeder-link beam used for Bulgaria in this basic study at the orbital position 1º W is replaced with the Bulgarian Appendix S30 Plan beam (downlink) at the same orbital position.

The blocks of channels assigned as a result of the basic feeder-link feasibility study are maintained.

3 Technical assumptions

3.1 Characteristics of the Bulgarian Appendix S30A Plan beam (feeder link)

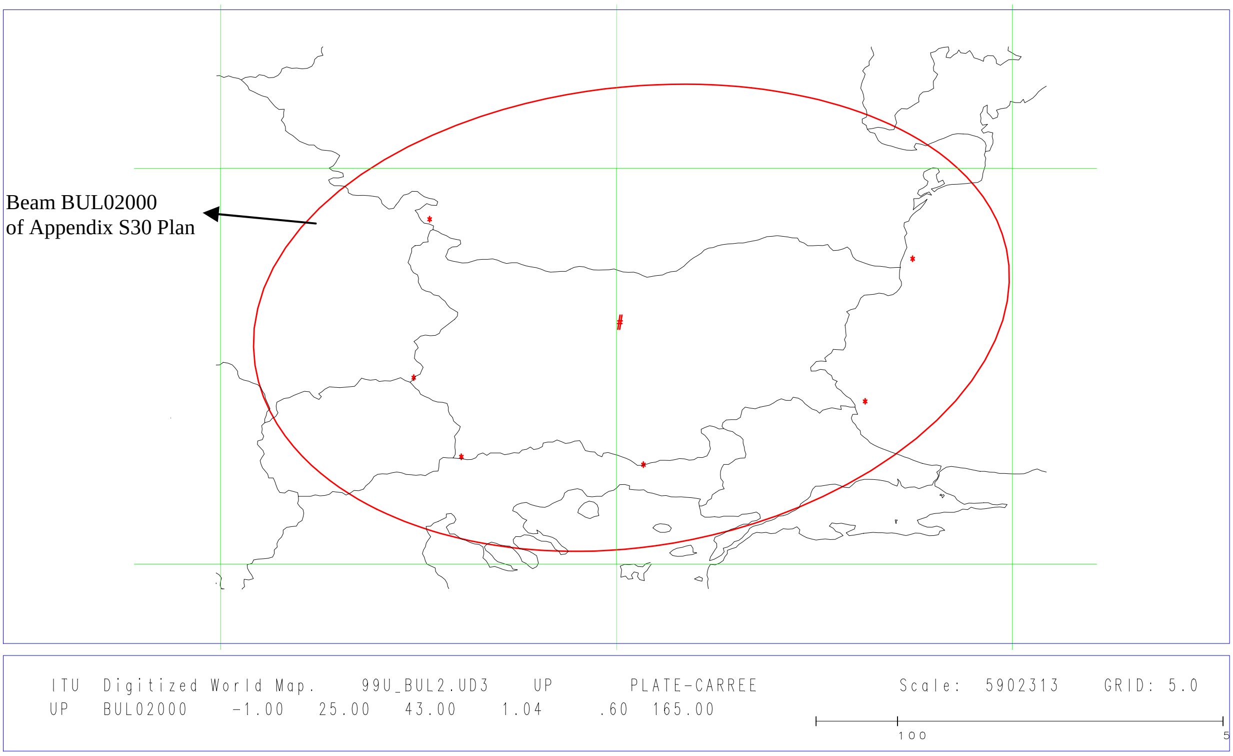
The characteristics of the feeder-link beam used for Bulgaria in the basic feeder-link feasibility study are as follows:



Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
38.43 dB	43.00° N	25.00° E	2.00°	2.00°	0.00°

3.2 Characteristics of the Bulgarian Appendix S30 Plan beam (downlink)

The characteristics of the Bulgarian Appendix S30 Plan beam (downlink) to be used as the alternative feeder-link beam for Bulgaria in this additional study are as follows:



Antenna gain	**Boresight latitude**	**Boresight longitude**	**Major axis half-power beamwidth**	**Minor axis half-power beamwidth**	**Major axis orientation**
46.50 dB	43.00° N	25.00° E	1.04°	0.60°	165.00°

3.3 Test-points

It should be noted that the test-points of both beams described in Sections 3.1 and 3.2 above are identical and defined as follows:

Reference	TP1	TP2	TP3	TP4	TP5	TP6
Latitude (in ° N)	41.20	41.30	42.00	42.30	43.80	44.30
Longitude (in ° E)	25.30	23.00	28.10	22.40	28.70	22.60

4 Results of the study

An MSPACE run was performed to assess the new interference situation resulting from the replacement of the Bulgarian Appendix S30A beam, as described in Section 3.1 above, with the Bulgarian Appendix S30 beam, as described in Section 3.2 above.

The results showed that the Bulgarian Appendix S30 beam and its associated test-points, as described in Section 3.2 above, can be accommodated in the draft 17 GHz feeder-link file without any EPM excess.

5 Summary

The results of this study show that it is possible to accommodate with ten channels the proposed Appendix S30 beam (downlink) for the Administration of Bulgaria, instead of its Appendix S30A Plan beam (feeder link), without any EPM excess.

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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDY TO DETERMINE THE IMPACT OF ALTERNATIVE FEEDER-LINK ELLIPTICAL BEAMS FOR CHINA

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Study to determine the impact of alternative feeder-link elliptical beams for China

ATTACHMENT

Director, Radiocommunication Bureau

STUDY TO DETERMINE THE IMPACT OF ALTERNATIVE FEEDER-LINK ELLIPTICAL BEAMS FOR CHINA

1 Introduction

After the last IRG meeting, the Administration of China requested the Radiocommunication Bureau to investigate the use of some of its WRC-97 feeder-link elliptical beams at the orbital positions 62º E, 92º E and 134º E (i.e. a new orbital position for the beam formerly located at 79.8º E) instead of the feeder-link composite beams used in the basic feeder-link feasibility study (see section 6.4.9 of the IRG Final Report (Document WRC2000/34)), and to assign 24 channels at each orbital position in order to provide the same amount of channels per orbital position in both downlink and feeder-link files.

This document provides the additional assumptions and the results of the study conducted by the Bureau for consideration by WRC-2000.

2 Methodology

At the end of the basic feeder-link feasibility study, the three composite beams and their associated test points used for China at the orbital positions 62º E, 92º E and 134º E are replaced with the three feeder-link elliptical beams and their associated test points requested by China at the orbital positions 62º E, 92º E and 79.8º E, respectively.

At each of these three orbital positions, the block of 12 channels assigned as a result of the basic feeder-link feasibility study is maintained. In addition, a new block of 12 channels is assessed.

3 Technical assumptions

The three feeder-link elliptical beams to be used in this study were referred to by the Administration of China in its request to IRG as being the Chinese Appendix S30A Plan beams defined by specific sets of test points.

In addition, after the last IRG meeting, this Administration requested to use 24 channels for its country at each orbital position: 62º E, 92º E and 134º E. This Administration also provided further clarifications on the beam characteristics located at 134º E.

3.1 Beams at the orbital position 62º E

The following set of test points was referred to by the Administration of China in its request to IRG:

Reference	TP1	TP2	TP3	TP4	TP5
Latitude (in ° N)	48.00	43.30	22.90	40.00	32.60
Longitude (in ° E)	118.00	128.20	112.30	116.40	86.50

Four Chinese Appendix S30A Plan beams at that orbital position are using this set of test points: CHN15400, CHN15500, CHN15600 and CHN15700.

All beams have the same beam characteristics:

Antenna gain	**Boresight latitude**	**Boresight longitude**	**Major axis half-power beamwidth**	**Minor axis half-power beamwidth**	**Major axis orientation**
32.90 dB	35.50° N	101.90° E	5.10°	2.80°	143.00°

After the last IRG meeting, this Administration indicated that beams CHN15400 and CHN15500 should be used each with a block of 12 different channels, in place of the composite beam CHNA_100, which was used in the basic feeder-link feasibility study.

As a first attempt for the purpose of this study, channels 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23 CL were assigned to beam CHN15400 and channels 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24 CR were assigned to beam CHN15500.

3.2 Beams at the orbital position 92º E

The following set of test points was referred to by the Administration of China in its request to IRG:

Reference	**TP1**	**TP2**	**TP3**	**TP4**
Latitude (in ° N)	40.00	45.40	23.10	33.40
Longitude (in ° E)	116.40	124.30	117.00	93.20

Three Chinese Appendix S30A Plan beams at that orbital position are using this set of test points: CHN16000, CHN16100 and CHN16200.

All beams have the same beam characteristics:

Antenna gain	**Boresight latitude**	**Boresight longitude**	**Major axis half-power beamwidth**	**Minor axis half-power beamwidth**	**Major axis orientation**
31.44 dB	33.70° N	108.10° E	5.00°	4.00°	148.00°

After the last IRG meeting, this Administration indicated that beams CHN16000 and CHN16100 should be used each with a block of 12 different channels, in place of the composite beam CHNC_100, which was used in the basic feeder-link feasibility study.

As a first attempt for the purpose of this study, channels 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23 CL were assigned to beam CHN16000 and channels 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24 CR were assigned to beam CHN16100.

3.3 For the beam to be located at the orbital position 134º E

The following set of test points was referred to by the Administration of China in its request to IRG:

Reference	**TP1**	**TP2**	**TP3**	**TP4**
Latitude (in ° N)	40.00	36.40	30.80	31.30
Longitude (in ° E)	116.40	102.00	104.00	121.30

Two Chinese Appendix S30A Plan beams at the orbital position 79.8º E are using this set of test points: CHN15800 and CHN15900.

Both beams have the same beam characteristics at the orbital position 79.8º E:

Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
31.78 dB	32.50° N	106.00° E	5.00°	3.70°	150.00°

After the last IRG meeting, this Administration indicated that beams CHN15800 and CHN15900 should be used each with a block of 12 different channels, in place of the composite beam CHNB_100, which was used in the basic feeder-link feasibility study.

In addition, this Administration requested to use for both beams the following characteristics:

Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
31.39 dB	34.27° N	113.21° E	6.40°	3.16°	10.74°

Annex A to this document contains a plot of revised beams CHN15800 and CHN15900.

As a first attempt for the purpose of this study, channels 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23 CR were assigned to revised beam CHN15800 and channels 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24 CL were assigned to revised beam CHN15900.

3.4 Feeder-link coverage of Chinese national territory

Annex B to this document contains a plot of the feeder-link coverage provided by all the Chinese feeder-link beams which were assumed in this feeder-link feasibility study.

4 Results of the study

An MSPACE run was performed to assess the new interference situation resulting from the replacement of the three composite beams with the corresponding elliptical beams, as described in section 3 above.

The results showed negative Equivalent Protection Margins (EPM) for the following beams:

- CHN15400 (–0.5 dB EPM) and CHN15500 (–0.5 dB EPM) at the orbital position 62º E;
- CHN16000 (–1.6 dB EPM) and CHN16100 (–8.1 dB EPM) at the orbital position 92º E;
- CHN15800 (–1.8 dB EPM) and CHN15900 (–2.4 dB EPM) at the orbital position 134º E.

In order to improve the interference situation at the orbital position 92º E, the polarization of the beams CHN16000 and CHN16100 was reversed. A new MSPACE run resulted in the following new situation at 92º E: CHN16000 (–6.3 dB EPM) and CHN16100 (–1.8 dB EPM).

A detailed analysis of the situation at 92º E indicated that both beams CHN16000 and CHN16100 created an excess of interference to each other and that the beam MLA__100 at 91.5º E (i.e. subsidiary beams MLA22700 and MLA22800) also created an excess of interference to beam CHN16000.

In order to overcome this situation at 92º E, two options would be possible:

– Option 1: assigned channels 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23 CL to beam CHN16000, and channels 29, 31, 33, 35, 37, 39 CL and 30, 32, 34, 36, 38, 40 CR to beam CHN16100, and group the adjacent channel's beam CHN16100.

– Option 2: assigned channels 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23 CR to beam CHN16000 and channels 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24 CL to beam CHN16100, move both beams CHN16000 and CHN16100 to the orbital position 92.2º E (i.e. application of a ±0.2° offset).

New MSPACE runs were performed. The following new situations at the orbital position 92º E were found:

– Option 1: both beams CHN16000 and CHN16100 at 92º E have EPM > 0 dB.

– Option 2: at 92.2º E, beams CHN16000 and CHN16100 have negative EPM: –2.2 dB and –1.5 dB, respectively. Another MSPACE analysis was performed to check that this shift of the Chinese beams to the orbital position 92.2º E has no impact on the downlink.

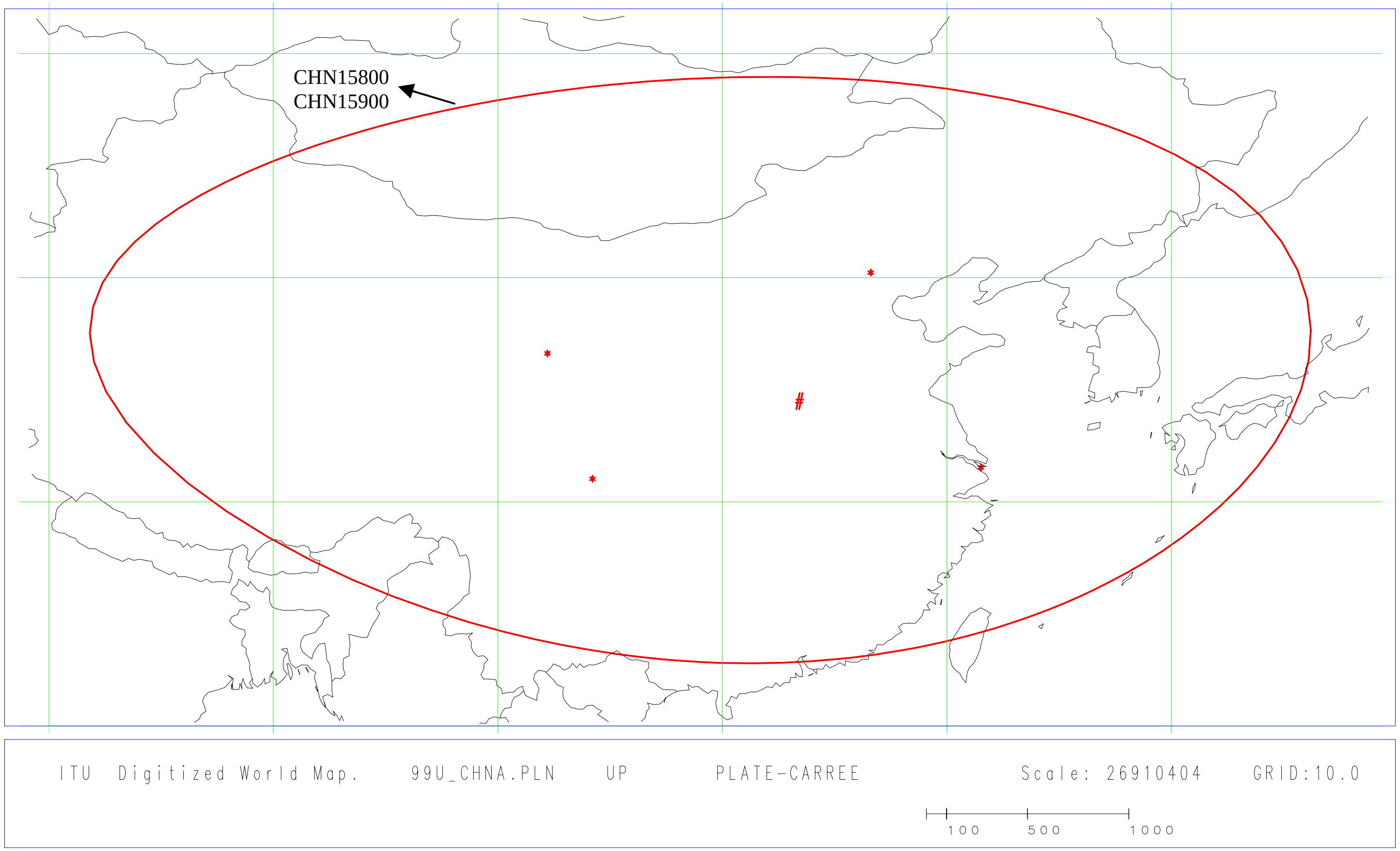
Alternatively, with respect to the second option at 92.2º E, as well as with respect to the orbital positions 62º E and 134º E, considering that the excesses of interference in these cases are mainly due to adjacent channel interference between two Chinese beams sharing the same orbital position, it would be possible to provide all beams with no EPM excess by grouping these Chinese beams at each orbital position.

7 Summary

The results of this study show that it is possible without any EPM excess to accommodate the feeder-link beams and channels requested by the Administration of China, instead of its three composite beams which were used in the basic feeder-link feasibility study.

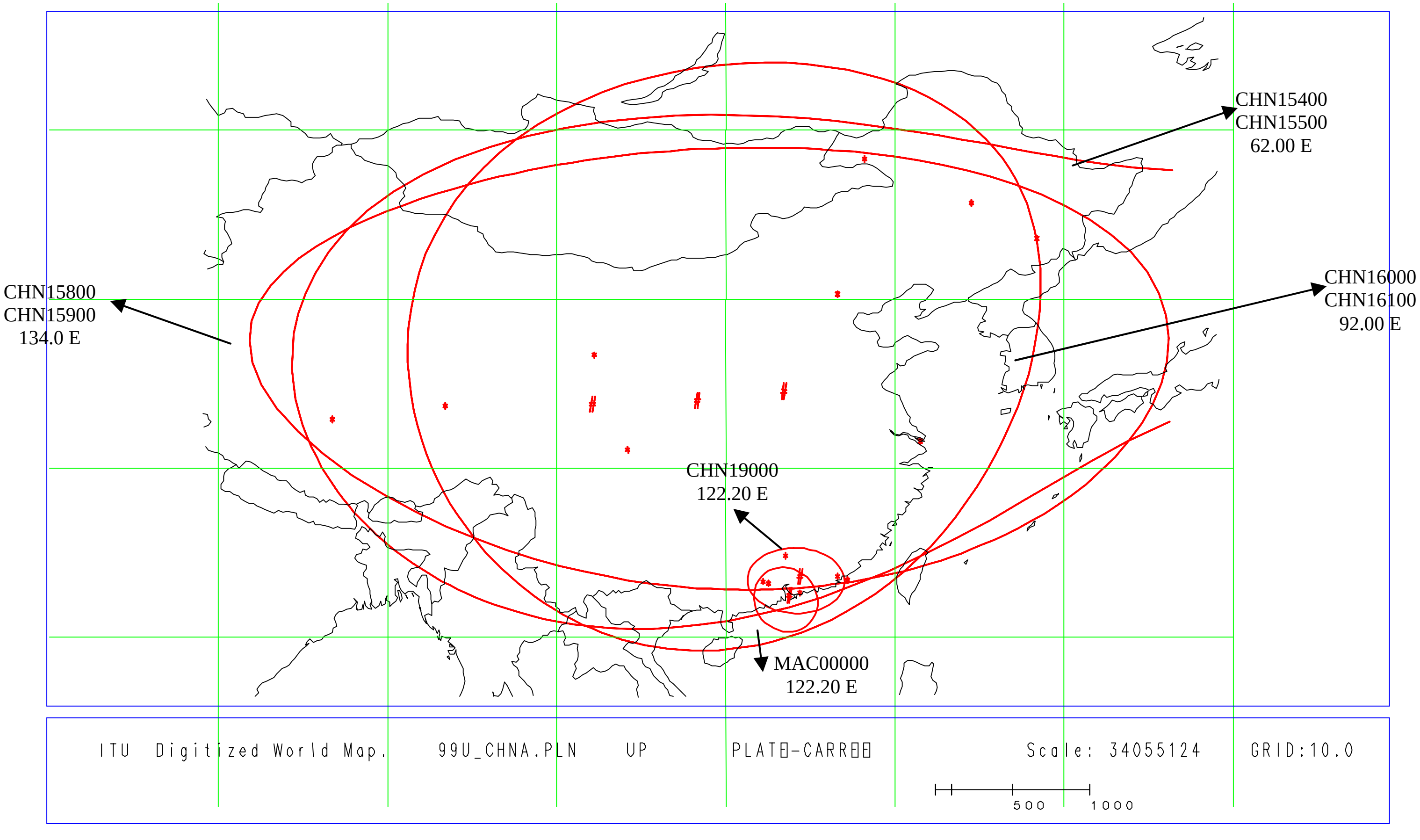
ANNEX A

Chinese feeder-link beams assumed in the feeder-link feasibility study at orbital positions 134° E



ANNEX B

Chinese feeder-link beams assumed in the feeder-link feasibility study at orbital positions: 62° E, 92° E, 122.2° E and 134° E



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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDY TO DETERMINE THE IMPACT OF ALTERNATIVE FEEDER-LINK ELLIPTICAL BEAMS FOR CHINA

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Study to determine the impact of alternative feeder-link elliptical beams for China

ATTACHMENT

Director, Radiocommunication Bureau

STUDY TO DETERMINE THE IMPACT OF ALTERNATIVE
FEEDER-LINK ELLIPTICAL BEAMS FOR CHINA

1 Introduction

The Administration of China requested at the last IRG meeting to investigate the use of some of its WRC-97 feeder-link elliptical beams at the orbital positions 62º E, 92º E and 134º E (i.e. a new orbital position for the beam formerly located at 79.8° E) instead of the feeder-link composite beams used in the basic feeder-link feasibility study (see Section 6.4.9 of the IRG Final Report (Document WRC2000/34)).

IRG-5 agreed to investigate the proposal and asked the Bureau to perform an additional study at the end of the basic study in order to determine the impact of the request (see Section 2.10.2.2 of Corrigendum 2 to Document WRC2000/34).

The Bureau has conducted a study based on this advice. This document provides the additional assumptions and the results of the study for consideration by WRC-2000.

2 Methodology

In accordance with the IRG decision on this issue, at the end of the basic feeder-link feasibility study, the three composite beams and their associated test-points used for China at the orbital positions 62º E, 92º E and 134º E are replaced with three feeder-link elliptical beams and their associated test-points used for China in the Appendix S30A Plan at the orbital positions 62º E, 92º E and 79.8º E respectively.

The blocks of channels assigned as a result of the basic feeder-link feasibility study are maintained.

3 Technical assumptions

The three feeder-link elliptical beams to be used in this study were referred to by the Administration of China in its request to IRG as being the Chinese Appendix S30A Plan beams defined by specific sets of test-points, as indicated in the following sections.

3.1 For the beam at the orbital position 62º E

The following set of test-points was referred to by China:

Reference	TP1	TP2	TP3	TP4	TP5
Latitude (in ° N)	48.00	43.30	22.90	40.00	32.60
Longitude (in ° E)	118.00	128.20	112.30	116.40	86.50

Four Chinese Appendix S30A Plan beams at that orbital position are using this set of test-points: CHN15400, CHN15500, CHN15600 and CHN15700.

All beams have the same beam characteristics:

Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
32.90 dB	35.50° N	101.90° E	5.10°	2.80°	143.00°

Beam CHN15400 was used for the purpose of this study in place of the composite beam CHNA_100, which was used in the basic feeder-link feasibility study.

3.2 For the beam at the orbital position 92º E

The following set of test-points was referred to by China:

Reference	TP1	TP2	TP3	TP4
Latitude (in ° N)	40.00	45.40	23.10	33.40
Longitude (in ° E)	116.40	124.30	117.00	93.20

Three Chinese Appendix S30A Plan beams at that orbital position are using this set of test-points: CHN16000, CHN16100 and CHN16200.

All beams have the same beam characteristics:

Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
31.44 dB	33.70° N	108.10° E	5.00°	4.00°	148.00°

Beam CHN16000 was used for the purpose of this study in place of the composite beam CHNC_100, which was used in the basic feeder-link feasibility study.

3.3 For the beam to be located at the orbital position 134º E

The following set of test-points was referred to by China:

Reference	TP1	TP2	TP3	TP4
Latitude (in ° N)	40.00	36.40	30.80	31.30
Longitude (in ° E)	116.40	102.00	104.00	121.30

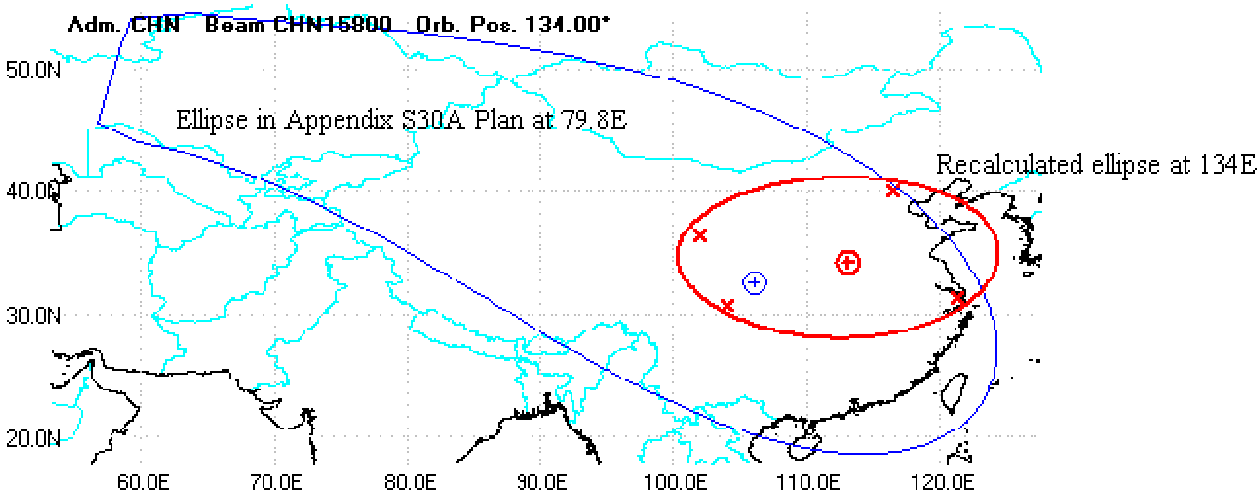
Two Chinese Appendix S30A Plan beams at the orbital position 79.8º E are using this set of test-points: CHN15800 and CHN15900.

Both beams have the same beam characteristics at the orbital position 79.8º E:

Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
31.78 dB	32.50° N	106.00° E	5.00°	3.70°	150.00°

Beam CHN15800 was assumed for the purpose of this study.

In accordance with the IRG decision on the change of orbital position (see Section 6.3.5 of Document WRC2000/34 and Section 2.6 of its Attachment 2), the ellipse parameters of beam CHN15800 were recalculated at its new orbital position 134.0º E.



Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
37.36 dB	34.19° N	113.08° E	3.13°	1.63°	10.97°

Beam CHN15800 with its new characteristics at the orbital position 134.0º E was thus used for the purpose of this study in place of the composite beam CHNB_100, which was used in the basic feeder-link feasibility study.

3.4 Feeder-link coverage of Chinese national territory

Annex A to this document contains a plot of the feeder-link coverage provided by all the Chinese feeder-link beams which were assumed in this feeder-link feasibility study.

4 Results of the study

An MSPACE run was performed to assess the new interference situation resulting from the replacement of the three composite beams with the corresponding three large elliptical beams, as described in Sections 3 and 4 above.

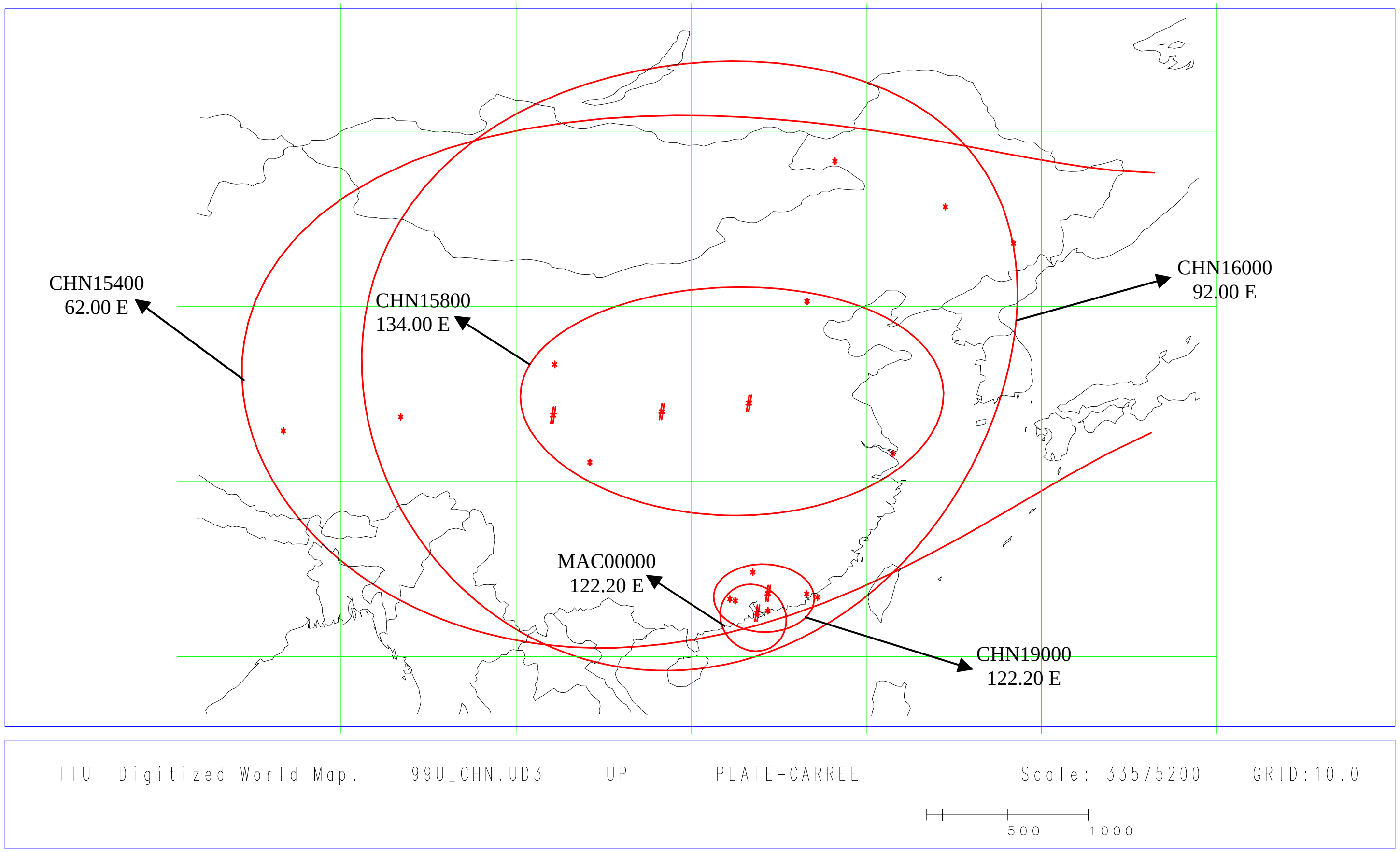
The results showed that, in the case of China, its three composite beams can be replaced with its three large elliptical beams in the draft 17 GHz feeder-link file without any EPM excess.

5 Summary

The results of this study show that it is possible to accommodate the proposed large feeder-link beams for the Administration of China, instead of its three composite beams, with twelve channels each without any EPM excess.

ANNEX A

Chinese feeder-link beams assumed in the feeder-link feasibility study at orbital positions: 62° E, 92° E, 122.2° E and 134° E



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INTERNATIONAL TELECOMMUNICATION UNION

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ISTANBUL, 8 MAY – 2 JUNE 2000

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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDY TO DETERMINE THE IMPACT OF A MULTINATIONAL BEAM FOR JORDAN, LEBANON AND SYRIA

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Study to determine the impact of a multinational beam for Jordan, Lebanon and Syria

ATTACHMENT

Director, Radiocommunication Bureau

STUDY TO DETERMINE THE IMPACT OF A MULTINATIONAL BEAM FOR JORDAN, LEBANON AND SYRIA

1 Introduction

The Administrations of Lebanon and the Syrian Arab Republic requested IRG-5 to investigate the inclusion of the multinational beam SYR33900 covering their territories with ten channels per country in the replanning feasibility studies replacing their national beams, with possible extension to two additional neighbouring countries if so requested by them. Those Administrations also requested that their current national beams continue to be taken into account in the ongoing feasibility studies until the final clarification of the acceptability of inclusion of the proposed multinational beam.

IRG-5 agreed to investigate the proposal and asked the Bureau to perform a study to determine the impact of the request. The Administration of Jordan (Hashemite Kingdom of) advised the Bureau of its intention to also be included in the proposal. The Bureau has conducted a study to determine the impact of a multinational beam for Jordan, Lebanon and Syria based on this advice. This document provides the results of the study for consideration by WRC-2000.

2 Methodology

The study was performed in accordance with these guidelines given in Section 6.4.8 of the IRG Final Report (Document WRC2000/34) and in Section 2.11.7 of Corrigendum 2 to Document WRC2000/34.

That is, three identical multinational beams covering the territory of Jordan, Lebanon and Syria, each with ten channels are to be substituted to the national beams of Jordan, Lebanon and Syria and the e.i.r.p. of this multinational beam be reduced if necessary to a level which does not create more interference than the previous situation (i.e. the three national beams with ten channels). The result of this modification i.e. the level of e.i.r.p. and the EPM associated to this new multinational beam is proposed to the Administrations of Jordan, Lebanon and Syria for agreement or otherwise.

3 Orbital position

It was requested to conduct the study with a preferred orbital position between 10.5° E and 11.5° E. If that orbital position was found to be incompatible, then any other orbital position that leads to a successful result would be accepted. As a result of the "basic" feasibility studies, it was possible to accommodate all three national beams (JOR22400, LBN27900 and SYR22900) at 11° E. Thus, the orbital position 11° W was used as a starting point in this study.

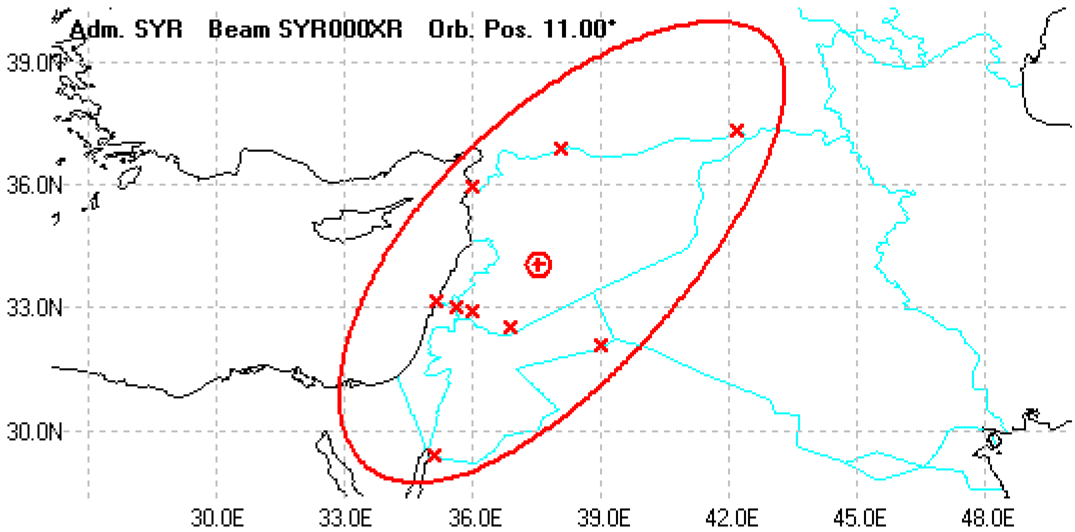
4 Technical assumptions

4.1 Downlink

The test points assumed in the study for a single-ellipse multinational beam for the downlink provided and agreed by the Administrations of Jordan, Lebanon and Syria were as follows:

Ref.	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9
Latitude	37.30	33.00	35.93	36.86	32.50	32.90	29.40	33.14	32.10
Longitude	42.19	35.60	35.98	38.08	36.90	36.00	35.10	35.15	39.00

The downlink ellipse parameters were calculated using the ITU/EBU ellipse software. The ellipse parameters and a plot of the resulting beam shape at 11° W are provided below.



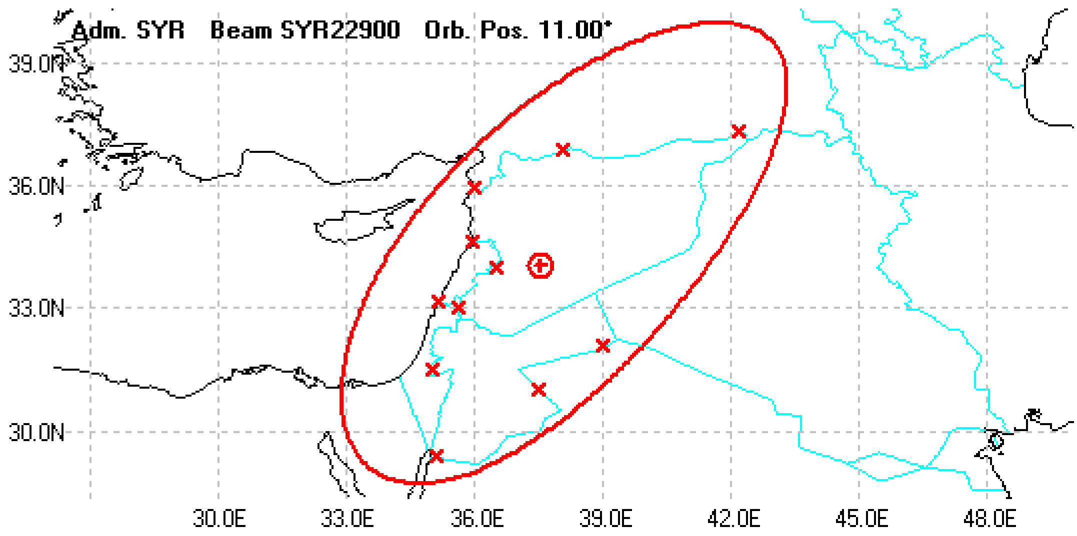
Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
43.19 dB	34.02° N	37.55° E	1.47°	0.91°	73.16°

4.2 Feeder link

The test points assumed in the study for a single-ellipse multinational beam for the feeder link provided and agreed by the Administrations of Jordan, Lebanon and Syria were as follows:

Ref.	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	TP10	TP11
Latitude	34.00	34.65	37.30	31.00	31.50	33.00	35.93	36.86	29.40	33.14	32.10
Longitude	36.50	35.97	42.19	37.50	35.00	35.60	35.98	38.08	35.10	35.15	39.00

The feeder-link ellipse parameters were calculated using the ITU/EBU ellipse software. The ellipse parameters and a plot of the resulting beam shape at 11° W are provided below.



Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
43.19 dB	34.02° N	37.55° E	1.47°	0.91°	73.16°

5 Downlink results

The national beams of Jordan, Lebanon and Syria (JOR22400, LBN27900 and SYR22900) were removed from the "basic" feasibility study downlink file. They were each replaced with the downlink multinational beam described in Section 4.1 above. The multinational beam SYR33900 with 1 channel at the orbital position 43.8° E was also removed from the "basic" feasibility study downlink file.

A Victim and Culprit study was then performed. The result of this exercise was that all three beams could not be accommodated. There were incompatibilities with other "planned" assignments, and, in particular, with an "existing" system at an adjacent orbital position.

The improved fast roll-off space station transmit antenna as described in Recommendation ITU-R BO.1445 was then applied to the three multinational beams. The result of this exercise was that all three beams could still not be accommodated. The e.i.r.p. of each beam was then adjusted to 55.5 dBW in order to resolve remaining incompatibilities. With these changes, all three multinational beams were accommodated into the draft downlink file without any EPM excess.

6 Feeder-link results

The national beams of Jordan, Lebanon and Syria (JOR22400, LBN27900 and SYR22900) were removed from the "basic" feasibility study 17 GHz feeder-link file. They were each replaced with the multinational beam described in Section 4.2 above. In order to be consistent with the downlink study described in Section 5 above, the multinational beam SYR33900 with 1 channel at the orbital position 43.8° E would have also to be removed from the "basic" feasibility study 14 GHz feeder-link file.

An MSPACE run was then performed to assess the new interference situation of the so revised 17 GHz feeder-link file. The results showed incompatibilities at the orbital position 11° E.

In order to resolve the EPM excess of the beam LBN27900 at 11° E, the feeder-link e.i.r.p. of the beam JOR22400 was reduced by 1 dB to bring it to the same level as the other beams sharing that orbital position (i.e. 84 dBW). The use of identical multinational feeder-link beams for the JOR22400, LBN27900 and SYR22900 beams can also justify this e.i.r.p. adjustment.

However, although this e.i.r.p. reduction resolved the EPM excess found on beam LBN27900, it resulted in a new EPM excess on beam JOR22400.

After several unsuccessful assessments of different combinations of blocks of channels, it was found necessary to apply a ±0.2° offset around the orbital position 11° E.

The beams JOR22400, LBN27900 and SYR22900 were thus shifted to the orbital position 10.8° E and beam RRW31000 was shifted to the orbital position 11.2° E.

A new MSPACE run was then performed to confirm that the multinational feeder-link beams for Jordan, Lebanon and Syria were accommodated into the draft 17 GHz feeder-link file without any EPM excess.

Another MSPACE run was then performed to check the impact of these ±0.2° orbital position adjustments on the downlink study. The results showed that there was still no EPM excess.

7 Summary

The results of this study show that it is possible to accommodate the proposed multinational downlink and feeder-link beams for the Administrations of Jordan, Lebanon and Syria with ten channels per country without any EPM excess. However, this is only possible with an e.i.r.p. of 55.5 dBW for each of the downlink multinational beams of these three countries, and with the application of a ±0.2° offset to all the beams at the nominal orbital position 11° E, together with the use of a feeder-link e.i.r.p. of 84 dBW for the feeder-link beam JOR22400.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

STUDY TO DETERMINE THE IMPACT OF A MULTINATIONAL BEAM FOR CROATIA, CZECH REPUBLIC, HUNGARY AND SLOVAK REPUBLIC

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Study to determine the impact of a multinational beam for Croatia, Czech Republic, Hungary and Slovak Republic

ATTACHMENT

Director, Radiocommunication Bureau

STUDY TO DETERMINE THE IMPACT OF A MULTINATIONAL BEAM FOR CROATIA, CZECH REPUBLIC, HUNGARY AND SLOVAK REPUBLIC

1 Introduction

The Administrations of Croatia, Czech Republic, Hungary and Slovak Republic requested IRG-5 to investigate the inclusion of a new multinational beam covering their territories with ten channels per country in the replanning feasibility studies replacing their national beams. Those four Administrations also requested that their current national beams (HRV14800, HNG10600, SVK14400, CZE14400) continue to be taken into account in the ongoing planning study until the final clarification of the acceptability of inclusion of the proposed multinational beam.

IRG-5 agreed to investigate the proposal and asked the Bureau to perform a study to determine the impact of the proposal on the replanning process. The Bureau has conducted a study based on this advice. This document provides the results of the study for consideration by WRC-2000.

2 Methodology

In Section 6.4.7 of the IRG Final Report (Document WRC2000/34), the following guidelines were given:

"2) At the end of this exercise, four identical multinational beams covering the territory of Croatia, Hungary, Slovak Republic and Czech Republic, each with ten channels will be substituted to the national beams of Croatia, Hungary, Slovak Republic and Czech Republic and the e.i.r.p. of this multinational beam be reduced if necessary to a level which does not create more interference than the previous situation (i.e. the four national beams with ten channels). The result of this modification i.e. the level of e.i.r.p. and the EPM associated to this new multinational beam is proposed to the Administrations of Croatia, Hungary, Slovak Republic and Czech Republic for agreement or otherwise."

(See also Section 2.11.6 of Corrigendum 2 to Document WRC2000/34).

The study was performed in accordance with these guidelines.

3 Orbital position

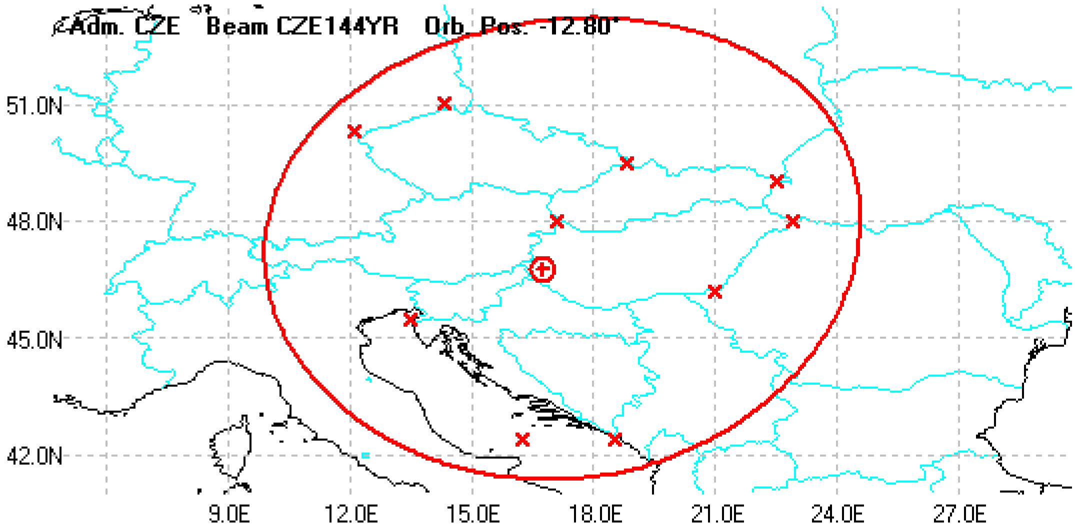
The requested preferred orbital position for the study was 34° E. If that position was found to be not possible, then an appropriate position within the range 13° W to 34° E should be found. As a result of the "basic" feasibility studies, it was not possible to accommodate the four national beams (HRV14800, HNG10600, SVK14400, CZE14400) at 34° E. However, a common orbital position was found at 12.8° W. Thus, the orbital position 12.8° W was used in this study in accordance with IRG guidelines.

4 Technical assumptions

The test points assumed in the study for a single-ellipse multinational beam for both the downlink and feeder-link were as per telefaxes from the Administrations of Croatia, Czech Republic, Hungary and Slovak Republic as follows:

Ref.	TP1	TP2	TP3	TP4	TP5	TP6	TP7	TP8	TP9	TP10
Latitude	50.32	51.05	49.52	49.05	48.00	46.20	42.39	42.39	45.50	48.03
Longitude	12.11	14.32	18.84	22.50	22.90	21.00	18.54	16.26	13.51	17.10

The downlink and feeder-link ellipse parameters were calculated using the ITU/EBU ellipse software. The ellipse parameters and a plot of the resulting beam shape at 12.8° W are provided below.



Antenna gain	Boresight latitude	Boresight longitude	Major axis half-power beamwidth	Minor axis half-power beamwidth	Major axis orientation
42.64 dB	46.78° N	16.77° E	1.71°	0.89°	149.15°

5 Downlink results

The Croatia, Czech Republic, Hungary and Slovak Republic national beams (HRV14800, CZE14400, HNG10600, SVK14400) were removed from the “basic” feasibility study downlink file. They were each replaced with the multinational beam described in Section 4 above.

A Victim and Culprit study was then performed. The result of this exercise was that all four beams could not be accommodated. There were still incompatibilities with other “planned” assignments, in particular with the beam MLT14700.

As a second option, the four single-ellipse multinational beams were replaced with four identical composite beams each consisting of four ellipses using the test points provided by the four Administrations. Another Victim and Culprit study was performed. The result of this exercise was that all four beams could not be accommodated. There were still incompatibilities with other “planned” assignments, in particular with the beam MLT14700.

The improved fast roll-off space station transmit antenna as described in Recommendation ITU-R BO.1445 was then applied to the four single-ellipse multinational beams. The result of this exercise was that all four beams could still not be accommodated. The e.i.r.p. of each beam was also adjusted but could not resolve incompatibilities.

The only other possible solution was to change the parameters of the beam MLT14700. A solution was found by moving the beam MLT14700 to 1° W (using Step 4 methodology), reducing the e.i.r.p. of the D 087 multinational beam from 60.5 dBW to 59.8 dBW, and by applying the improved fast roll-off space station transmit antenna with e.i.r.p. adjustments to the four multinational beams under consideration. With these changes, all four single-ellipse multinational beams were accommodated into the draft downlink file without any EPM excess.

6 Feeder-link results

The Croatia, Czech Republic, Hungary and Slovak Republic national beams (HRV14800, HNG10600, SVK14400, CZE14400) were removed from the "basic" feasibility study 17 GHz feeder-link file. They were each replaced with the multinational beam described in Section 4 above. In addition, in order to be in line with the downlink study, the beam MLT14700 was moved from orbital position 13.2° W to 1° W.

An MSPACE run was then performed to assess the interference situation. The results showed incompatibilities for beams located within ±0.2° around both orbital positions 13° W and 1° W.

In order to resolve the EPM excess found on beam HNG10600 at 12.8° W, its e.i.r.p. was re-adjusted back to 84 dBW, i.e. the e.i.r.p. reduction applied on that beam in the basic feasibility study (see Addendum 3 to Document WRC2000/34), was no longer appropriate.

In order to resolve the EPM excesses of interference found on beams located within ±0.2° around orbital position 1° W, a new block of channels (block D' instead of block B) was assigned to beam MLT14700. In addition, it was necessary to shift beams BOT29700, MLT14700 and ZWE13500 by 0.2° to orbital position 1.2° W, and to reduce by 0.6 dB the e.i.r.p. of beam ZWE13500 (i.e. use of 84.4 dBW instead of 85.0 dBW). As an alternative to that e.i.r.p. reduction, channel 40 of beam BIFROS22 would have to accept an EPM excess of 0.02 dB.

A new MSPACE run was then performed to confirm that all multinational beams of the four Administrations mentioned above were accommodated into the draft 17 GHz feeder-link file without any EPM excess.

Another MSPACE run was then performed to check the impact of these ±0.2° orbital position adjustments on the downlink study. The results showed that there was still no EPM excess.

7 Summary

The results of this study show that it is possible to accommodate the proposed multinational beam for the Administrations of Croatia, Czech Republic, Hungary and Slovak Republic with ten channels per country without any EPM excess. However, this is only possible with the beam MLT14700 moved from 13.2° W to 1.2° W, the beams BOT29700 and ZWE13500 shifted by 0.2° to 1.2° W, and the e.i.r.p. of the D 087 multinational beam reduced to 59.8 dBW.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to Addendum 4 to Document 34-E
7 May 2000
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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

COMPATIBILITY ANALYSES WITH OTHER SERVICES AND THE REGION 2 PLAN

Please replace corresponding row(s) in pages 5, 9, 14, 18, 19, 27 to 30, 32 to 36, 38, 39, 42, 43, 53, 58, 61 and 68 of Addendum 4 to Document CMR2000/34 with the attached.

Yoshio UTSUMI
Secretary-General

- Page 5 replace row(s)

Terrestrial service (all three Regions)	93	59
Space station of FSS (all three Regions)	13	111

with

Terrestrial service (all three Regions)	98	62
Space station of FSS (all three Regions)	14	111

- Page 9 replace row(s)

ALG25100* ALG25200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARS00300* ARS27500*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none

with

ALG25100 ALG25200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARS00300 ARS27500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none

- Page 14 replace row(s)

LBY28000* LBY32100*	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

with

LBY28000 LBY32100	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

- Pages 18 and 19 replace row(s)

(AUS0040A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	1, 5	none
(AUS0070A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	4, 8	none

with

(AUS0040A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	1, 5, 9	none
(AUS0070A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	4, 8, 12	none

- Page 27 replace row(s)

ALG25100* ALG25200*	2, 6	ARS 1.9 BHR 2.6 IRN 2.4 IRQ 1.5 KWT 2.9 OMA 1.7 UAE 2.2 YEM 0.5
ALG25100* ALG25200*	10	ARS 1.8 BHR 2.6 IRN 2.4 IRQ 1.4 KWT 2.7 OMA 1.7 UAE 2.2 YEM 0.5
ALG25100* ALG25200*	14, 18	ARS 1.7 BHR 2.6 IRN 2.4 IRQ 1.3 KWT 2.6 OMA 1.7 UAE 2.2 YEM 0.5

with

ALG25100* ALG25200*	2, 6	ARS 1.2 BHR 3.7 IRN 3.6 IRQ 2.7 KWT 4.1 OMA 2.8 UAE 3.4 YEM 1.5
ALG25100* ALG25200*	10	ARS 1.1 BHR 3.7 IRN 3.6 IRQ 2.6 KWT 3.8 OMA 2.8 UAE 3.4 YEM 1.5
ALG25100* ALG25200*	14, 18	ARS 1.0 BHR 3.7 IRN 3.6 IRQ 2.5 KWT 3.7 OMA 2.8 UAE 3.4 YEM 1.5

- Page 28 replace row(s)

(AUS0040A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	1, 5, 9	CLN 5.3 F/AMS 11.8 G/DGA 8.3 IND 4.3 MLD 6.8
(AUS0070A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	4, 8, 12	BGD 0.7 BRM 4.1 IND 7.6

with

AUS0040A* (Feeder link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	1, 5, 9	CLN 5.7 F/AMS 12.3 G/DGA 8.7 IND 4.7 MLD 7.2
AUS0070A* (Feeder link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	4, 8, 12	BGD 1.5 BRM 4.7 IND 8.0

- Page 29 replace row(s)

CHN15400* CHN15600*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	KOR 6.4 KRE 8.6 RUS 10.1
CHN15700* CHN15900*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	UZB 0.5
CHN15700* CHN15900*	21, 23	KAZ 1.3 UZB 0.5
CHN16100* CHN17500* CHN17900* CHN18000*	1, 3, 5, 7, 9, 11, 15, 17, 21, 23	RUS 0.2
CHN16100* CHN17500* CHN17900* CHN18000*	19	RUS 0.2
CHN16600* CHN16800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	MNG 0.5 RUS 13.2
CHN16600* CHN16800*	24	RUS 13.2

with

CHN15400* CHN15600*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	KOR 7.9 KRE 10.1 MNG 0.6 RUS 11.2
CHN15400* CHN15600*	21, 23	KOR 7.9 KRE 10.1 RUS 11.2
CHN15700* CHN15900*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	AFG 0.2 RUS 0.5 TKM 0.2 UZB 2.3
CHN15700* CHN15900*	21, 23	AFG 0.2 KAZ 3.1 RUS 0.5 TJK 1.6 UZB 2.3
CHN16100* CHN17500* CHN17900* CHN18000*	1, 3, 5, 7, 9, 11, 15, 17, 19, 21, 23	RUS 1.1
CHN16600* CHN16800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	MNG 0.9 RUS 15.3
CHN16600* CHN16800*	24	RUS 15.3

- Page 30 replace row(s)

DNK08900* DNKFRO*	1	NOR 14.2 RUS 6.4 S 7.2
DNK08900* DNKFRO*	3, 5, 7, 9, 11, 13, 15, 17, 19	FIN 7.8 NOR 14.2 RUS 6.4 S 7.2
E 12900* CNR13000*	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

with

DNK08900* DNKFRO*	1	NOR 16.4 RUS 10.4 S 11.0
DNK08900* DNKFRO*	3, 5, 7, 9, 11, 13, 15, 17, 19	FIN 11.6 NOR 16.4 RUS 10.4 S 11.0
E 12900* CNR13000*	21, 23	BLR 1.1 EST 0.5 LTU 1.0 LVA 0.9 RUS 0.0 UKR 0.6
E 12900* CNR13000*	25, 27, 29, 31, 33, 35, 37, 39	BLR 1.1 EST 0.5 LTU 1.0 LVA 0.9 UKR 0.6

- Page 32 replace row(s)

IND03800* IND04000*	1, 3, 5, 7, 9, 11, 13, 15	PAK 0.4
INS02800* INS03000* INS03200*	1, 3, 5, 7, 9, 11, 13, 15	F/NCL 3.2 MLA 0.2 PNG 7.5 SLM 6.7
INS02800* INS03000* INS03200*	17	F/NCL 3.2 PNG 3.2 SLM 3.5
INS02800* INS03000* INS03200*	19, 21, 23	F/NCL 3.2 PNG 3.1 SLM 3.4

with

IND03800* IND04000*	1, 3, 5, 7, 9, 11, 13, 15	CHN 0.2 PAK 0.6
INS02800* INS03000* INS03200*	1, 3, 5, 7, 9, 11, 13, 15	AUS 0.7 F/NCL 4.6 MLA 0.2 PNG 8.4 SLM 7.6
INS02800* INS03000* INS03200*	17	AUS 0.7 F/NCL 4.6 PNG 4.1 SLM 4.4

INS02800* INS03000* INS03200*	19, 21, 23	AUS 0.7 F/NCL 4.6 PNG 4.0 SLM 4.3

- Page 33 replace row(s)

LBY28000* LBY32100*	22, 24	ARM 6.2 AZE 5.9 IRN 6.1 KAZ 4.3 QAT 1.0 RUS 6.5 SYR 7.3 TKM 4.3 TUR 7.5 UAE 0.4 UKR 4.7
LBY28000* LBY32100*	26, 28, 30, 32, 34, 36, 38, 40	ARM 6.2 AZE 5.9 IRN 6.1 KAZ 4.3 QAT 1.0 RUS 5.8 SYR 7.3 TKM 4.3 TUR 7.5 UAE 0.4 UKR 4.7

with

LBY28000* LBY32100*	22, 24	ARM 8.2 AZE 7.9 IRN 8.3 KAZ 6.5 OMA 1.9 QAT 3.7 RUS 8.2 SYR 9.4 TKM 6.5 TUR 9.5 UAE 3.0 UKR 6.3 YEM 1.8
LBY28000* LBY32100*	26, 28, 30, 32, 34, 36, 38, 40	ARM 8.2 AZE 7.9 IRN 8.3 KAZ 6.5 OMA 1.9 QAT 3.7 RUS 7.7 SYR 9.4 TKM 6.5 TUR 9.5 UAE 3.0 UKR 6.3 YEM 1.8

- Page 34 replace row(s)

MLI32700* MLI32800*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MYT09800* REU09700*	22	MAU/ROD 4.5

with

MLI32700* MLI32800*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	GUI 0.0 MTN 0.1
MYT09800* REU09700*	22	MAU/ROD 6.2

- Page 35 replace row(s)

MYT09800* REU09700*	24, 28, 32, 36, 40	MAU/ROD 17.2
MYT09800* REU09700*	26	MAU/ROD 4.4
MYT09800* REU09700*	30, 34	MAU/ROD 4.3

MYT09800* REU09700*	38	MAU/ROD 4.2

with

MYT09800* REU09700*	24, 28, 32, 36, 40	MAU/ROD 18.9
MYT09800* REU09700*	26	MAU/ROD 6.1
MYT09800* REU09700*	30, 34	MAU/ROD 6.0
MYT09800* REU09700*	38	MAU/ROD 5.9

- Page 36 replace row(s)

SDN23000* SDN23100* SDN23200*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	IND 7.5 IRN 7.4

with

SDN23000* SDN23100* SDN23200*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	CAF 0.1 IND 8.6 IRN 8.7

- Page 38 replace row(s)

YEM26600* YEM26700*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ZAI32200* ZAI32300*	2, 6, 10, 14, 18	IRN 4.2 KAZ 4.2 RUS 4.2 SOM 1.3 TKM 4.2 UZB 4.2 YEM 2.1
ZAI32200* ZAI32300*	4, 8, 12, 16, 20	F/REU 12.1 IRN 4.2 KAZ 4.2 MAU 8.4 MDG 7.7 RUS 4.2 TKM 4.2 UZB 4.2

with

YEM26600* YEM26700*	2, 6, 10, 14, 18	none
YEM26600* YEM26700*	4, 8, 12, 16, 20	ARS 0.1
ZAI32200* ZAI32300*	2, 6, 10, 14, 18	IRN 5.4 KAZ 5.4 RUS 5.4 SOM 2.6 TKM 5.4 UZB 5.4 YEM 3.5

ZAI32200* ZAI32300*	4, 8, 12, 16, 20	F/REU 12.9 IRN 5.4 KAZ 5.4 MAU 9.5 MDG 8.4 RUS 5.4 TKM 5.4 UZB 5.4

- Page 39 replace row(s)

ALG25100* ALG25200*	2, 6, 10	ARG B CAN HOL J MEX USA USA/IT VEN/ASA
ALG25100* ALG25200*	4, 8, 12, 16, 20	CAN HOL J MEX USA USA/IT VEN/ASA

with

ALG25100* ALG25200*	2, 4, 6, 8, 10	ARG B CAN HOL J MEX USA USA/IT VEN/ASA
ALG25100* ALG25200*	12, 16, 20	CAN HOL J MEX USA USA/IT VEN/ASA

- Page 42 replace row(s)

CKH05200* CKH05300* NIU05400* NZL05500* TKL05800*	1, 5, 9, 13	HOL J TON USA USA/IT
CKH05200* CKH05300* NIU05400* NZL05500* TKL05800*	3, 7, 11	HOL J MHL TON USA USA/IT

with

CKH05200* CKH05300* NIU05400* NZL05500* TKL05800*	1, 3, 7, 11	HOL J MHL TON USA USA/IT
CKH05200* CKH05300* NIU05400* NZL05500* TKL05800*	5, 9, 13	HOL J TON USA USA/IT

- Page 43 replace row(s)

DNK08900* DNKFRO*	1, 3, 5, 7, 9, 11	CAN HOL USA USA/IT VEN/ASA
DNK08900* DNKFRO*	13, 15, 17, 19	HOL USA USA/IT VEN/ASA

with

DNK08900* DNKFRO*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	CAN HOL USA USA/IT VEN/ASA

- Page 53 replace row(s)

ALG25100* ALG25200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARS00300* ARS27500*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none

with

ALG25100 ALG25200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARS00300 ARS27500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none

- Page 58 replace row(s)

LBY28000* LBY32100*	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

with

LBY28000 LBY32100	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

- Page 61 replace row(s)

ALG25100* ALG25200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARS00300* ARS27500*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA

with

ALG25100 ALG25200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARS00300 ARS27500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA

- Page 68 replace row(s)

LBY28000* LBY32100*	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
MAU24200* MAU24300*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
MTN22300* MTN28800*	20	USA

with

LBY28000 LBY32100	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
MAU24200* MAU24300*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	ARS/ARB USA
MTN22300* MTN28800*	20	F F/EUT USA

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 4 to
Document 34-E
13 April 2000
Original: English

PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

COMPATIBILITY ANALYSES WITH OTHER SERVICES AND THE REGION 2 PLAN

Please find attached to this document complementary/updated information to that contained in Section 6.5 and Attachment 5 to Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Compatibility analyses with other services and the Region 2 Plan

ATTACHMENT

Director, Radiocommunication Bureau

COMPATIBILITY ANALYSES WITH OTHER SERVICES
AND THE REGION 2 PLAN

1 Introduction

In addition to the Regions 1 and 3 BSS-BSS compatibility analysis, planning principles 7 and 8 of Annex 1 to Resolution 532 (WRC-97) require a compatibility examination to ensure protection of the Region 2 Plan and not to require more protection from assignments in Region 2. Moreover, it is further necessary to ensure the compatibility between the draft Regions 1 and 3 Plan and those services sharing the same frequency bands (FSS and terrestrial services) in all three Regions.

This document provides the result of compatibility analyses performed by BR for proposed BSS assignments for Regions 1 and 3 except assignments which are considered as “existing” systems as per Resolution 532 existing assignments.

The analyses comprise both:

- compatibility studies from proposed Regions 1 and 3 BSS Plan assignments into other services or into Region 2 BSS; and
- compatibility studies into the proposed Regions 1 and 3 BSS Plan assignments from other services or from Region 2 BSS.

Both feeder-link and downlink conditions have been investigated.

The input data used for the compatibility analyses was obtained from the results of the downlink and feeder-link feasibility studies contained in Addenda 2 and 3 to Document WRC2000/34 for downlink and feeder-link respectively.

The satellite systems data that were contained in the SNS database as of 25 February 2000 were used in the calculation, i.e. all networks which have been received by the Bureau before 30 April 1998 have been taken into account, as well as those networks for which the complete information has been received between 30 April 1998 and 19 August 1999. It is to be noted that those satellite networks not yet processed by the Bureau have not been taken into account in these compatibility analyses.

Compatibility analysis between the draft Regions 1 and 3 BSS Plan and the Region 2 BSS Plan has been based on the present Region 2 BSS Plan assignments and the modifications of the Region 2 Plan already processed and published by the Bureau (up to 25 February 2000).

Two important points should be taken into account in interpreting the results contained in this document.

1) The results of the compatibility analyses will change if the list of satellite systems contained in the SNS database is modified, i.e. new satellite systems/assignments are included in the list or cancelled as a result of application of relevant provisions of Article S11 (FSS and non-planned BSS in Regions 2 and 3) or Articles 4/5 of Appendices S30/S30A (BSS of Region 2).

2) The tables of identified administrations show cases where there is a possibility of harmful interference if various additional circumstances apply. Such tables do not imply that harmful interference will actually occur, they merely provide a warning flag that further investigation of the necessity of actual coordination may be required.

2 Criteria and methodology for assessment of compatibility with the Region 2 Plan and other services

Sharing criteria and methodologies for the compatibility analyses have been developed by IRG based on those in Appendices S30 or S30A and their associated Rules of Procedure. The criteria that have been applied are summarized in Table 1 below. The details of the calculation basis for each compatibility condition are explained in Attachment 3 to Document WRC2000/34 and its Corrigendum 3.

TABLE 1

Criteria for assessing compatibility between Plans and services

Interference source: Feeder-link assignments in the draft Regions 1 and 3 BSS Plan

Protected assignments/service	RR provision	Criteria/methodology
Region 2 Plan assignments	4.2.1.4 of Article 4 of APS30A	APS8 (section 5 of Annex 1 of APS30A)
Receiving station of the terrestrial service	4.2.1.3 of Article 4 of APS30A	APS7 (section 2 of Annex 1 of APS30A)/list of existing stations
Receiving FSS specific earth station	4.2.1.2 of Article 4 of APS30A	Annex 4 of AP30A (section 1 of Annex 1 of AP30A)/list of existing stations

Interference source: Downlink assignments in the draft Regions 1 and 3 BSS Plan

Protected assignments/service	RR provision	Criteria/methodology
Region 2 Plan assignments	4.3.1.2 of Article 4 of APS30	pfd (section 3 of Annex 1 of APS30)
Receiving station of the terrestrial service	4.3.1.4 of Article 4 of APS30	pfd (sections 4, 8 of Annex 1 of APS30)
FSS space station associated with a receiving FSS earth station that may suffer interference	4.3.1.5 of Article 4 of APS30	pfd (section 6 of Annex 1 of APS30)

Protected assignments: Feeder-link assignments in the draft Regions 1 and 3 BSS Plan

Interference source	RR provision	Criteria/methodology
Region 2 Plan assignments	4.2.3.4 of Article 4 of APS30A	APS8 (section 5 of Annex 1 of APS30A)
Space station of FSS (Regions 1 and 3)	7.1 of Article 7 of APS30A	Annex 4 of APS30A with modification of satellite system noise temperature 600 K and ΔTs/Ts 6%
Space station of unplanned BSS (Region 2)	7.1 of Article 7 of APS30A	Annex 4 of APS30A with modification of satellite system noise temperature 600 K and ΔTs/Ts 6%

Protected assignments: Downlink assignments for in the draft Regions 1 and 3 BSS Plan

Interference source	RR provision	Criteria/methodology
Region 2 Plan assignments	4.3.3.2 of Article 4 of APS30	pfd (section 3 of Annex 1 of APS30)
Terrestrial service	6.1.1 of Article 6 of APS30	Frequency overlap and Annex 3 of APS30
Space station of FSS	7.2.1 of Article 7 of APS30	Frequency overlap and Annex 4 of APS30

3 Compatibility analysis results

A summary of compatibility analysis results obtained are included in Table 2 below. Further details of the results are contained in the Annex to this document.

TABLE 2

Compatibility analyses

The results below apply to the assignments in “the draft Regions 1 and 3 BSS Plan” except assignments which are considered as “existing” as per Resolution 532.

1 Compatibility with respect to the draft Regions 1 and 3 Plan assignments causing interference

1.1 Feeder link

Protected assignments/service	Number of administrations receiving interference from the draft Regions 1 and 3 Plan assignments	Number of administrations in the draft Regions 1 and 3 Plan causing interference to the subject assignments/service
Region 2 Plan assignments	2	3

Protected assignments/service	Number of existing stations sharing the same frequency bands with the draft Regions 1 and 3 Plan assignments
Terrestrial service (all three Regions)	1 142 (14 GHz)* 489 (17 GHz)*
Earth station of FSS (all three Regions)	34
* In addition, there are transmitting terrestrial stations which do not have corresponding receiving terrestrial stations recorded in MIFR (e.g. Typical stations).	

1.2 Downlink

Protected assignments/service	Number of administrations/organizations receiving interference from the draft Regions 1 and 3 Plan assignments	Number of administrations in the draft Regions 1 and 3 Plan causing interference to the subject assignments/service
Region 2 Plan assignments	3	2
Terrestrial service (all three Regions)	93	59
FSS space station associated with a receiving FSS earth station that may suffer interference (Region 2 11.7-12.2 GHz) (Region 3 12.2-12.5 GHz)	25	102

2 Compatibility with respect to the draft Regions 1 and 3 Plan assignments receiving interference

2.1 Feeder link

Assignment/service causing interference to draft Regions 1 and 3 Plan assignments	Number of administrations/organizations causing interference to the draft Regions 1 and 3 Plan assignments	Number of administrations in the draft Regions 1 and 3 Plan receiving interference from the subject assignments/service
Region 2 Plan assignments	3	4
Space station of FSS (all three Regions)	13	111
Space station of unplanned BSS (Region 2)	0	0

2.2 Downlink

Assignment/service causing interference to draft Regions 1 and 3 Plan assignments	Number of administrations/organizations causing interference to the draft Regions 1 and 3 Plan assignments	Number of administrations in the draft Regions 1 and 3 Plan receiving interference from the subject assignments/service
Region 2 Plan assignments	0	0
Terrestrial service (all three Regions)	0	0
Space station of FSS (Region 2 11.7-12.2 GHz) (Region 3 12.2-12.5 GHz)	18	128

ANNEX

Detailed result of the compatibility analyses with other services and the Region 2 Plan

1 Feeder link causing interference

1.1 Compatibility analysis for BSS feeder link into FSS (space-to-Earth) (paragraph 4.2.1.2 of Article 4 of Appendix S30A)

Country	The name of earth station using assignments in the frequency band 17.7-18.1 GHz	Latitude	Longitude	Associated space station name	Orbital position
J	FUKUOKA	33N3506	130E2401	CS-3A	132.00
J	FUKUOKA	33N3506	130E2401	CS-3B	136.00
J	HIROSHIMA	34N2213	130E2401	CS-3A	132.00
J	HIROSHIMA	34N2213	130E2401	CS-3B	136.00
J	INUISHI	34N5603	139E5104	CS-3A	132.00
J	INUISHI	34N5603	139E5104	CS-3B	136.00
J	ISHIGAKI	24N2039	124E0922	CS-3A	132.00
J	ISHIGAKI	24N2039	124E0922	CS-3B	136.00
J	IZUHARA	34N1207	129E1731	CS-3A	132.00
J	IZUHARA	34N1207	129E1731	CS-3B	136.00
J	KANAZAWA	36N3508	136E3819	CS-3A	132.00
J	KANAZAWA	36N3508	136E3819	CS-3B	136.00
J	MINAMI DAITO	25N4925	131E1245	CS-3A	132.00
J	MINAMI DAITO	25N4925	131E1245	CS-3B	136.00
J	NAGOYA	35N1059	137E0057	CS-3A	132.00
J	NAGOYA	35N1059	137E0057	CS-3B	136.00
J	OITA	33N1448	131E3904	CS-3A	132.00
J	OITA	33N1448	131E3904	CS-3B	136.00
J	OSAKA	34N4527	135E3754	CS-3A	132.00
J	OSAKA	34N4527	135E3754	CS-3B	136.00
J	SAPPORO	43N0549	141E2021	CS-3A	132.00
J	SAPPORO	43N0549	141E2021	CS-3B	136.00

J	SENDAI	38N1537	140E5410	CS-3A	132.00
J	SENDAI	38N1537	140E5410	CS-3B	136.00
J	TOKYO 6	35N4136	139E4330	SUPERBIRD-A	158.00
J	TOKYO 6	35N4136	139E4330	SUPERBIRD-B	162.00
J	TOKYO 7	35N4136	139E4330	SUPERBIRD-A	158.00
J	TOKYO 7	35N4136	139E4330	SUPERBIRD-B	162.00
J	TOKYO 8	35N4136	139E4330	SUPERBIRD-A	158.00
J	TOKYO 8	35N4136	139E4330	SUPERBIRD-B	162.00
J	TOKYO-3	35N4146	139E5153	CS-3A	132.00
J	TOKYO-3	35N4146	139E5159	CS-3B	136.00
J	WAKKANAI-1	45N2442	141E4038	CS-3A	132.00
J	WAKKANAI-1	45N2442	141E4038	CS-3B	136.00

1.2 Compatibility analysis for BSS feeder link into terrestrial service (paragraph 4.2.1.3 of Article 4 of Appendix S30A)

NOTE 1 - In addition, there are transmitting terrestrial stations which do not have corresponding receiving terrestrial stations recorded in MIFR (e.g. Typical stations).

Country/Area	**Number of receiving terrestrial stations**	
	Using 14.5-14.8 GHz	**Using 17.7-18.1 GHz**
ARM	7	0
AUT	7	0
BEL	209	16
CAN	13	38
CNR	6	0
D	3	0
E	134	3
EST	35	2
F	24	13
FIN	4	0
G	0	17
I	0	306
IRL	0	15
ISL	343	0
LIE	1	0

MDA	4	0
MEX	31	8
OMA	83	17
RUS	149	1
SUI	85	12
SYR	2	0
TUR	0	31
YEM	2	0
USA	0	10

The BSS feeder link beams (* indicates subsidiary beams of a composite beam) using the 14 GHz band are:

AFS02100, ARS34000, CME30000, CPV30100, ETH09200, MLI32700*, MLI32800*, MOZ30700, MRC20900, NIG11900, NMB02500, PAK12700, PNG13100, SDN23000*, SDN23200*, SYR33900, TGO22600, TUN27200, WAK33400*, WAK33401*, YEM26600*,YEM26700*, YYY00000.

The BSS feeder link beams using the 17 GHz band are listed in paragraph 1.3 below.

1.3 Compatibility analysis for BSS feeder link into Region 2 BSS Plan (paragraph 4.2.1.4 of Article 4 of Appendix S30A)

NOTE 1 - * indicates subsidiary beams of a composite beam.

NOTE 2 - This compatibility analysis applies to 17 GHz band only.

Beam Name	channels	Affected administrations
AFG24500	29, 31, 33, 35, 37, 39	none
AFG24500	30, 32, 34, 36, 38, 40	none
AGL29500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ALB29600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ALG25100* ALG25200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
AND34100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ARM06400	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
ARS00300* ARS27500*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
AUS00400	3, 7, 11, 15, 19, 23	none
AUS0040A	3, 7, 11, 15, 19, 23	none
AUS00500	4, 8, 12, 16, 20, 24	none

AUS00600	26, 28, 30, 32, 36, 40	none
AUS0060G	1, 35, 39	none
AUS00700	3, 7, 11, 15, 19, 23	none
AUS0070A	3, 7, 11, 15, 19, 23	none
AUS0070G	32, 36, 40	none
AUS00800	2, 6, 10, 14, 18, 22	none
AUS00900	25, 27, 29, 31, 35, 39	none
AUS0090A	25, 27, 29, 31, 35, 39	none
AUT01600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
AZE06400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
AZR13400* POR13300*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BDI27000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BEL01800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
BEN23300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
BFA10700	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BGD22000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BHR25500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BIH14800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
BLR06200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BOT29700	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
BRM29800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BRU3300A	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
BTN03100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BUL02000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CAF25800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
CBG29900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none

CHN15401* CHN15501* CHN18400* CHN18500* CHN18600* CHN18800*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CHN16300* CHN16500* CHN17600* CHN17700* CHN17800* CHN18100* CHN18200* CHN18700*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CHN16600* CHN16700* CHN16800* CHN16900* CHN17000* CHN17100* CHN17200* CHN17300* CHN17400* CHN17500* CHN17900*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CHN19000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CKH05200* CKH05201* CKH05300* CKH05301* NIU05400* NIU05401* NZL05500* TKL05800* TKL05801*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CLN21900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
COG23500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
COM20700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CTI23700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
CVA08300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CVA08500	40	none
CYP08600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

CZE14400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
D 08700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
DJI09900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
DNK08900* DNKFRO*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
DNK09000	33, 37	none
DNK09100	27, 35	none
E 12900* CNR13000*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
EGY02600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ERI09200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
EST06100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
F 09300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
FIN10300	25	none
FIN10300	22, 24, 26, 28, 30, 32, 34, 36, 38	none
FJI19300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
FSM00000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
G 02700	2, 4, 8, 10, 12	GUY JMC
G 02700	6	JMC
G 02700	14, 16, 18, 20	none
GAB26000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GEO06400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
GHA10800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GMB30200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
GNB30400	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
GNE30300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
GRC10500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GUI19200	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none

GUM33100* GUM33101* MRA33200* MRA33201*	29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
HNG10600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
HOL21300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
HRV14800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
I 08200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
IND03700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
IND03800* IND04000*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IND03900* IND04100* IND04300* IND04500*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
IND04200* IND04600* IND04800*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IND04700	29, 31, 33, 35, 37, 39	none
IND04700	30, 32, 34, 36, 38, 40	none
INS02800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
INS03500	29, 31, 33, 35, 37, 39	none
INS03500	30, 32, 34, 36, 38, 40	none
IRL21100	1	GUY
IRL21100	3, 9, 13	JMC
IRL21100	5, 7, 11	GUY JMC
IRL21100	15, 17, 19	none
IRN10900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IRQ25600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ISL04900	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
ISL05000	23, 29, 31	none
ISR11000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
J 11100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none

JOR22400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
KAZ06600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
KEN24900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
KGZ07000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
KIR00001* KIR00002*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
KOR11200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
KRE28600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
KWT11300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
LAO28400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
LBN27900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LBR24400	1	GUY
LBR24400	3, 9, 13	JMC
LBR24400	5, 7, 11	GUY JMC
LBR24400	15, 17, 19	none
LBY28000* LBY32100*	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
LIE25300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LSO30500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
LTU06100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
LUX11400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LVA06100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MAC00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MAU24200* MAU24300*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MCO11600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
MDA06300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MDG23600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

MHL00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MKD14800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MLA22700* MLA22800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MLD30600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MLT14700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MNG24800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MTN22300* MTN28800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MWI30800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MYT09800* MYT09801* REU09700* REU09701*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
NCL10000* NCL10001*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
NGR11500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NOR12000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NPL12200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
NRU30900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
OCE10100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
OMA12300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
PHL28500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PLM33700* PLM33701* SMA33500* SMA33501	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PLW00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
POL13200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
QAT24700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none

ROU13600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
RRW31000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
RST-1	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-2	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-3	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-5	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RUS-4	25, 26, 27, 28, 29, 31, 33, 35, 37, 39	none
S 13800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SEN22200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
SEY00000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
SLM00000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SMO05700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SMR31100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SNG15100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SOM31200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SRL25900	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
STP24100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SUI14000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SVK14400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
SVN14800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
SWZ31300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
SYR22900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
TCD14300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none

THA14200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
TJK06900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
TKM06800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
TON21500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
TUN15000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
TUR14500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TUV00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
TZA22500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
UAE27400	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
UGA05100	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
UKR06300	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
UZB07100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
VTN32500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
VUT12800	29, 31, 33, 35, 37, 39	none
VUT12800	30, 32, 34, 36, 38, 40	none
WAL10200* WAL10201*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
YUG14800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ZAI32200* ZAI32300*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ZMB31400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ZWE13500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none

2 Downlink causing interference

2.1 Compatibility analysis for BSS downlink into Region 2 Plan (paragraph 4.3.1.2 of Article 4 of Appendix S30)

Beam Name	channels	Affected administrations
AFG24500* AFG24600*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
AFS02100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
AGL29500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ALB29600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ALG25100* ALG25200*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
AND34100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARM06400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARS00300* ARS27500*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ARS34000	24	none
AUS00400 AUS0040A AUS0040B AUS0040C	3, 7, 11, 15, 19, 23	none
AUS00500	4, 8, 12, 16, 20, 24	none
AUS00600	2, 6, 10, 14, 18, 22	none
AUS00700 AUS0070A	3, 7, 11, 15, 19, 23	none
AUS00800	2, 6, 10, 14, 18, 22	none
AUS00900 AUS0090A AUS0090B	1, 5, 9, 13, 17, 21	none
(AUS0040A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	1, 5	none
(AUS0070A* Feeder-link) AUS0040A* AUS0040B*	4, 8	none

AUS0040C* AUS0070A* AUS0090A* AUS0090B*		
AUT01600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
AZE06400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
AZR13400* POR13300*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BDI27000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BEL01800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BEN23300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BFA10700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BGD22000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BHR25500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BIH14800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BLR06200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BOT29700	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BRM29800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BRU3300A	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
BTN03100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BUL02000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CAF25800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
CBG29900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CHN15400* CHN15600*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CHN15500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CHN15700* CHN15900*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none

CHN15800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CHN16100* CHN17500* CHN17900* CHN18000*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CHN16600* CHN16800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CHN19000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CKH05200* CKH05300* NIU05400* NZL05500* TKL05800*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CLN21900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CME30000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
COG23500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
COM20700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CPV30100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CTI23700	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
CVA08300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CVA08500	20	none
CYP08600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CZE14400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
D 08700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
DJI09900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
DNK08900* DNKFRO*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
DNK09000	33, 37	none
DNK09100	27, 35	none
E 12900* CNR13000*	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
EGY02600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none

ERI09200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
EST06100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ETH09200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
F 09300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
FIN10300	1, 22, 24, 26, 28, 30, 32, 34, 36, 38	none
FJI19300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
FSM00000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
G 02700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
GAB26000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GEO06400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
GHA10800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
GMB30200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GNB30400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
GNE30300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
GRC10500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GUI19200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
GUM33100* MRA33200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
HNG10600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
HOL21300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
HRV14800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
I 08200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
IND03700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
IND03800* IND04000*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IND03900* IND04100* IND04300* IND04500*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none

IND04200* IND04600* IND04800*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IND04700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
INS02800* INS03000* INS03200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
INS03500* INS03600*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
IRL21100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
IRN10900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IRQ25600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ISL04900	21, 23, 25	none
ISL04900	27	GUY 0.4
ISL04900	29	DNK/GRL 1.9 JMC 1.1
ISL04900	31, 35, 37	DNK/GRL 1.9 GUY 0.4 JMC 1.1
ISL04900	33	GUY 0.4 JMC 1.1
ISL04900	39	JMC 1.1
ISL05000	23, 31, 39	none
ISR11000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
J 11100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
JOR22400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
KAZ06600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
KEN24900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
KGZ07000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
KIR00001* KIR00002*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
KOR11200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
KRE28600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none

KWT11300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LAO28400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
LBN27900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LBR24400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LBY28000* LBY32100*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LIE25300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LSO30500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LTU06100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LUX11400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LVA06100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MAC00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MAU24200* MAU24300*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MCO11600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MDA06300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MDG23600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MHL00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MKD14800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MLA22700* MLA22800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MLD30600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MLI32700* MLI32800*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MLT14700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MNG24800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

MOZ30700	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MRC20900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
MTN22300* MTN28800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MWI30800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MYT09800* REU09700*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NCL10000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
NGR11500	22, 24, 26, 40	none
NGR11500	28, 30, 32, 34, 36, 38	GUY 8.8 JMC 6.4
NIG11900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NMB02500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
NOR12000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NPL12200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
NRU30900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
OCE10100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
OMA12300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
PAK12700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PHL28500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PLM33700* SMA33500* SMA33000*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PLW00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PNG13100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
POL13200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
QAT24700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ROU13600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none

RRW31000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
RST-1	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-2	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-3	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-5	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RUS00401	25, 27, 29, 31, 33, 35, 37, 39	none
RUS00402	26, 28	none
S 13800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SDN23000* SDN23100* SDN23200*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SEN22200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
SEY00000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
SLM00000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SMO05700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SMR31100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SNG15100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SOM31200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SRL25900	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
STP24100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
SUI14000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SVK14400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SVN14800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SWZ31300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
SYR22900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SYR33900	21	none
TCD14300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

TGO22600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
THA14200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
TJK06900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TKM06800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
TON21500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
TUN15000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
TUN27200	1	none
TUR14500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TUV00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
TZA22500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
UAE27400	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
UGA05100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
UKR06300	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
UZB07100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
VTN32500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
VUT12800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
WAK33400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
WAL10200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
YEM26600* YEM26700*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
YUG14800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
YYY00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ZAI32200* ZAI32300*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ZMB31400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ZWE13500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

2.2 Compatibility analysis for BSS downlink into terrestrial service (paragraph 4.3.1.4 of Article 4 of Appendix S30)

NOTE 1 - The number appearing after affected administrations indicates the excess in pfd (dB).

NOTE 2 - Comparison between a corresponding former assignment (on the same channel) of the WRC-97 Plan and a new proposed assignment was implemented. The pending coordination from the WRC-97 Plan was incorporated in the list of the identification of affected/affecting administration.

NOTE 3 - A check was made on whether or not the administrations identified have frequency assignments in the broadcasting-satellite service for the channel concerned.

NOTE 4 - * indicates subsidiary beams of a composite beam.

Beam Name	channels	Affected administrations
AFG24500* AFG24600*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
AFS02100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	BOT 0.2 LSO 0.1
AGL29500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	COM 4.8 ETH 0.4 F/MYT 8.2 F/REU 11.5 MDG 12.8 SEY 10.7
ALB29600	22, 24	KAZ 4.8 RUS 8.9 UKR 9.8
ALB29600	26, 28, 30, 32, 34, 36, 38, 40	KAZ 4.8 RUS 4.6 UKR 9.8
ALG25100* ALG25200*	2, 6	ARS 1.9 BHR 2.6 IRN 2.4 IRQ 1.5 KWT 2.9 OMA 1.7 UAE 2.2 YEM 0.5
ALG25100* ALG25200*	4, 8, 12, 16, 20	None
ALG25100* ALG25200*	10	ARS 1.8 BHR 2.6 IRN 2.4 IRQ 1.4 KWT 2.7 OMA 1.7 UAE 2.2 YEM 0.5
ALG25100* ALG25200*	14, 18	ARS 1.7 BHR 2.6 IRN 2.4 IRQ 1.3 KWT 2.6 OMA 1.7 UAE 2.2 YEM 0.5
AND34100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARM06400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	AZE 0.0 IRN 0.0
ARS00300* ARS27500*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ARS34000	24	none
AUS00400 AUS0040A AUS0040B AUS0040C	3, 7, 11, 15, 19, 23	none
AUS00500	4, 8, 12, 16, 20, 24	none
AUS00600	2, 6, 10, 14, 18, 22	none
AUS00700 AUS0070A	3, 7, 11, 15, 19, 23	none
AUS00800	2, 6, 10, 14, 18, 22	none

AUS00900 AUS0090A AUS0090B	1, 5, 9, 13, 17, 21	none
(AUS0040A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	1, 5, 9	CLN 5.3 F/AMS 11.8 G/DGA 8.3 IND 4.3 MLD 6.8
(AUS0070A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	4, 8, 12	BGD 0.7 BRM 4.1 IND 7.6
AUT01600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
AZE06400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
AZR13400* POR13300*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BDI27000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BEL01800	22, 24	BLR 6.3 EST 12.1 FIN 8.0 LTU 9.4 RUS 9.9 S 8.8
BEL01800	26, 28, 30, 32, 34, 36, 38	BLR 6.3 EST 12.1 FIN 8.0 LTU 9.4 RUS 1.9 S 8.8
BEL0180	40	BLR 6.3 EST 12.1 FIN 11.5 LTU 9.4 RUS 1.9 S 8.8
BEN23300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BFA10700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	GHA 0.1
BGD22000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BHR25500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BIH14800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BLR06200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BOT29700	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none

BRM29800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BRU3300A	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
BTN03100	1, 3, 7, 11, 15, 19, 21, 23	CHN 0.2
BTN03100	5, 9, 13, 17	none
BUL02000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CAF25800	22, 26, 30, 34, 38	COD 0.4 SDN 0.0
CAF25800	24, 28, 32, 36, 40	none
CBG29900	2, 4, 6, 8, 10, 12, 14, 16	THA 0.2
CBG29900	18, 20, 22, 24	none
CHN15400* CHN15600*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	KOR 6.4 KRE 8.6 RUS 10.1
CHN15500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	J 2.1
CHN15700* CHN15900*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	UZB 0.5
CHN15700* CHN15900*	21, 23	KAZ 1.3 UZB 0.5
CHN15800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	KAZ 1.5 RUS 7.2
CHN16100* CHN17500* CHN17900* CHN18000*	1, 3, 5, 7, 9, 11, 15, 17, 21, 23	RUS 0.2
CHN16100* CHN17500* CHN17900* CHN18000*	13	none
CHN16100* CHN17500* CHN17900* CHN18000*	19	RUS 0.2
CHN16600* CHN16800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	MNG 0.5 RUS 13.2
CHN16600* CHN16800*	22	none
CHN16600* CHN16800*	24	RUS 13.2
CHN19000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CKH05200* CKH05300* NIU054000* NZL055000* TKL058000*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none

CLN21900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CME30000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
COG23500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	GAB 0.0
COM20700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CPV30100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CTI23700	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
CVA08300	21, 23	BIH 0.6 BLR 5.9 F 0.6 GRC 0.8 HNG 10.4 I 0.8 POL 7.6 ROU 17.6 RUS 13.7 SVK 7.5 TUR 3.8 UKR 16.0 YUG 7.8
CVA08300	25, 29, 33, 37	BIH 0.6 BLR 5.9 F 0.6 GRC 0.8 HNG 10.4 I 0.8 POL 7.6 ROU 17.6 SVK 7.5 TUR 3.8 UKR 16.0 YUG 7.8
CVA08300	27, 31, 35, 39	none
CVA08500	20	BLR 12.8 BUL 13.3 CYP 5.8 CZE 3.4 DNK 2.4 EGY 2.2 FIN 6.8 GEO 7.6 GRC 8.8 IRQ 3.5 ISR 2.2 JOR 1.4 LBN 3.4 LTU 11.4 LVA 10.3 MDA 13.3 MKD 0.9 NOR 3.1 ROU 14.3 RUS 11.8 SVK 10.9 TUR 12.1 YUG 5.0
CYP08600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CZE14400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
D 08700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
DJI09900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
DNK08900* DNKFRO*	1	NOR 14.2 RUS 6.4 S 7.2
DNK08900* DNKFRO*	3, 5, 7, 9, 11, 13, 15, 17, 19	FIN 7.8 NOR 14.2 RUS 6.4 S 7.2
DNK09000	33, 37	FIN 17.7 NOR 17.7 RUS 15.3 S 11.0
DNK09100	27, 35	none
E 12900* CNR13000*	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
EGY02600	22, 24	IND 3.3 IRN 7.9 KAZ 5.6 KGZ 5.8 RUS 0.6 TJK 6.1 TKM 7.8
EGY02600	26, 28, 30, 32, 34, 36, 38, 40	AFG 7.7 IND 3.3 IRN 7.9 KAZ 5.6 KGZ 5.8 PAK 6.2 RUS 0.5 TJK 6.1 TKM 7.8
ERI09200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

EST06100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	FIN 11.2 NOR 15.6
ETH09200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
F 09300	1, 5, 9, 13, 17	none
F 09300	3, 7, 11, 15, 19	FIN 0.4 NOR 1.5 S 0.5
FIN10300	1	NOR 18.0 RUS 17.8 S 10.8
FIN10300	22, 24	NOR 15.7 RUS 17.8 S 10.8
FIN10300	26, 28, 30, 32, 34, 36, 38	NOR 15.7 RUS 15.6 S 10.8
FJI19300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
FSM00000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
G 02700	2, 6, 10, 14, 18	F 0.1 FIN 16.2 IRL 0.7 LTU 5.1 LVA 6.7 NOR 18.0 RUS 15.3
G 02700	4, 8, 12, 16, 20	none
GAB26000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GEO06400	22, 26, 30, 34, 38	none
GEO06400	24, 28, 32, 36, 40	TUR 0.0
GHA10800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
GMB30200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GNB30400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
GNE30300	21, 25, 29, 33, 37	GAB 0.1
GNE30300	23, 27, 31, 35, 39	none
GRC10500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GUI19200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
GUM33100* MRA33200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
HNG10600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
HOL21300	22, 24	D 0.1 EST 9.4 F 0.1 FIN 8.1 RUS 9.0 S 8.6
HOL21300	26, 28, 30, 32, 34, 36, 38	D 0.1 EST 9.4 F 0.1 FIN 8.1 S 8.6
HOL21300	40	D 0.1 EST 9.4 F 0.1 FIN 11.6 S 8.6
HRV14800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
I 08200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
IND03700	2, 6, 10, 14	none

IND03700	4, 8, 12, 16, 18, 20, 22, 24	BGD 0.1
IND03800* IND04000*	1, 3, 5, 7, 9, 11, 13, 15	PAK 0.4
IND03800* IND04000*	17, 19, 21, 23	none
IND03900* IND04100* IND04300* IND04500*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
IND04200* IND04600* IND04800*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IND04700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
INS02800* INS03000* INS03200*	1, 3, 5, 7, 9, 11, 13, 15	F/NCL 3.2 MLA 0.2 PNG 7.5 SLM 6.7
INS02800* INS03000* INS03200*	17	F/NCL 3.2 PNG 3.2 SLM 3.5
INS02800* INS03000* INS03200*	19, 21, 23	F/NCL 3.2 PNG 3.1 SLM 3.4
INS03500* INS03600*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
IRL21100	22, 24	G 0.0 NOR 0.3 RUS 3.3 S 8.0
IRL21100	26, 28, 30, 32, 34, 36, 38	G 0.0 NOR 0.3 RUS 3.2 S 8.0
IRL21100	40	FIN 4.2 G 0.0 NOR 0.3 RUS 3.2 S 8.0
IRN10900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IRQ25600	22	CHN 2.0 IND 1.8 KAZ 3.6 KGZ 3.3 TJK 4.8 TKM 6.0
IRQ25600	24	CHN 2.0 IND 1.8 KAZ 1.3 KGZ 3.1 TJK 2.5 TKM 1.0
IRQ25600	26, 30, 34, 38	AFG 6.1 CHN 2.0 IND 1.8 KAZ 3.6 KGZ 3.3 PAK 3.8 TJK 4.8 TKM 6.0
IRQ25600	28, 32	AFG 2.5 CHN 2.0 IND 1.8 KAZ 1.3 KGZ 3.0 PAK 2.6 TJK 2.5 TKM 0.9
IRQ25600	36, 40	AFG 2.5 CHN 2.0 IND 1.8 KAZ 1.3 KGZ 2.9 PAK 2.6 TJK 2.5 TKM 0.8
ISL04900	21, 25, 29, 33, 37	none

ISL04900	23, 27, 31, 35, 39	NOR 21.1
ISL05000	23, 31, 39	none
ISR11000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
J 11100	1	RUS 13.3
J 11100	3, 5, 7	RUS 14.3
J 11100	9, 11, 13	RUS 14.4
J 11100	15, 17, 19, 21, 23	RUS 14.5
JOR22400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
KAZ06600	1	CHN 14.3 DNK/FRO 0.3 ISL 0.8 MNG 15.6 NOR 8.5 RUS 16.2 S 5.2
KAZ06600	3, 5, 7, 9, 11, 13, 15, 17, 19	CHN 14.3 DNK/FRO 0.3 FIN 6.2 ISL 0.8 MNG 15.6 NOR 8.5 RUS 16.2 S 5.2
KEN24900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
KGZ07000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	MNG 0.9 RUS 0.8
KIR00001* KIR00002*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
KOR11200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
KRE28600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
KWT11300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LAO28400	2, 4, 6, 8, 10	none
LAO28400	12, 14, 16, 18, 20, 22, 24	THA 0.2
LBN27900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LBR24400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LBY28000* LBY32100*	22, 24	ARM 6.2 AZE 5.9 IRN 6.1 KAZ 4.3 QAT 1.0 RUS 6.5 SYR 7.3 TKM 4.3 TUR 7.5 UAE 0.4 UKR 4.7
LBY28000* LBY32100*	26, 28, 30, 32, 34, 36, 38, 40	ARM 6.2 AZE 5.9 IRN 6.1 KAZ 4.3 QAT 1.0 RUS 5.8 SYR 7.3 TKM 4.3 TUR 7.5 UAE 0.4 UKR 4.7
LIE25300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LSO30500	22, 26, 30, 34, 38	AFS 0.3
LSO30500	24, 28, 32, 36, 40	none

LTU06100	1, 5, 9, 13, 17	NOR 3.4
LTU06100	3, 7, 11, 15, 19	none
LUX11400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LVA06100	22, 24, 26, 28, 30, 32, 34, 36, 38	ISL 0.8 NOR 14.1 S 12.4
LVA06100	40	FIN 5.5 ISL 0.8 NOR 14.1 S 12.4
MAC00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	CHN/MAC 0.2
MAU24200* MAU24300*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MCO11600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MDA06300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MDG23600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MHL00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MKD14800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	GRC 0.0
MLA22700* MLA22800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MLD30600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MLI32700* MLI32800*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MLT14700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MNG24800	21, 23	CHN 14.2 RUS 16.2
MNG24800	25, 29, 33, 37, 39	none
MNG24800	27, 31, 35	CHN 14.2 J 13.9 RUS 12.6
MOZ30700	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	MWI 0.4 ZWE 0.4
MRC20900	1	EST 5.9 FIN 0.6 LVA 5.5 RUS 10.0 UKR 9.4
MRC20900	3, 5, 7, 9, 11, 13, 15, 17, 19	EST 5.9 FIN 2.3 LVA 5.5 RUS 10.0 UKR 9.4
MTN22300* MTN28800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MWI30800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	MOZ 0.1 ZMB 0.1
MYT09800* REU09700*	22	MAU/ROD 4.5

MYT09800* REU09700*	24, 28, 32, 36, 40	MAU/ROD 17.2
MYT09800* REU09700*	26	MAU/ROD 4.4
MYT09800* REU09700*	30, 34	MAU/ROD 4.3
MYT09800* REU09700*	38	MAU/ROD 4.2
NCL10000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
NGR11500	22, 26, 30, 34, 38	ALG 0.0 ARM 1.9 AZE 2.5 CYP 6.8 DJI 3.4 ERI 9.1 ETH 7.0 IRN 7.8 ISR 10.6 JOR 8.7 LBN 8.4 MLI 0.3 SDN 11.5 SOM 2.0 SYR 8.8 TUR 5.7 YEM 7.5
NGR11500	24, 28, 32, 36, 40	SOM 0.6
NIG11900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NMB02500	21, 25, 29, 33, 37	none
NMB02500	23, 27, 31, 35, 39	AFS 0.7 AGL 0.2 BOT 0.7 F/CRO 0.8 F/REU 5.6 MAU 4.9
NOR12000	22, 24, 26, 28, 30, 32, 34, 36	RUS 20.0 S 17.0
NOR12000	38	none
NOR12000	40	FIN 17.8 RUS 17.3 S 14.3
NPL12200	1, 3, 5, 7, 9, 11, 13, 15	CHN 0.7
NPL12200	17, 19, 21, 23	none
NRU30900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
OCE10100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
OMA12300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
PAK12700	2, 6, 10	none
PAK12700	4, 8, 12, 14, 16, 18, 20, 22, 24	CHN 11.3 MNG 11.4 RUS 9.4
PHL28500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PLM33700* SMA33500* SMA33000*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PLW00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none

PNG13100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
POL13200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	DNK/FRO 10.1 IRL 2.3 ISL 8.9 NOR 10.0
QAT24700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ROU13600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
RRW31000	2, 6, 10, 14, 18	BDI 1.2 TZA 1.2 UGA 1.2
RRW31000	4, 8, 12, 16, 20	none
RST-1	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-2	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-3	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-5	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RUS00401	25, 27, 29, 31, 33, 35, 37, 39	none
RUS00402	26, 28	none
S 13800	2, 6, 10, 12, 14, 16, 18, 20	FIN 14.9 NOR 15.5 RUS 14.0
S 13800	4, 8	none
SDN23000* SDN23100* SDN23200*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	IND 7.5 IRN 7.4
SEN22200	21, 25, 29, 33, 37	none
SEN22200	23, 27, 31, 35, 39	GMB 0.0
SEY00000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
SLM00000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SMO05700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SMR31100	1, 5, 9, 13, 17	none
SMR31100	3, 7, 11, 15, 19	BUL 5.7 HNG 11.8 MDA 15.4 POL 12.4 ROU 16.1 RUS 13.0 UKR 16.1 YUG 3.0
SNG15100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SOM31200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SRL25900	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

STP24100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
SUI14000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SVK14400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SVN14800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SWZ31300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
SYR22900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SYR33900	21	none
TCD14300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	ARS 6.7 AZE 5.7 BHR 3.1 GEO 5.2 IRN 5.8 IRQ 7.2 KWT 5.2 QAT 2.8 RUS 4.8 SYR 7.0 TKM 5.1 UAE 2.2 YEM 1.5
TGO22600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
THA14200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
TJK06900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TKM06800	21, 23, 27, 31, 35, 39	none
TKM06800	25, 29, 33, 37	IRN 0.0
TON21500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
TUN15000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	BLR 1.1
TUN27200	1	ARS 10.3 AZE 11.9 CYP 4.7 GEO 11.9 IRN 12.0 IRQ 11.9 JOR 11.1 KWT 7.1 MDA 3.0 ROU 1.1 RUS 11.8 SYR 12.6 UKR 11.3
TUR14500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TUV00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
TZA22500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
UAE27400	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
UGA05100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	SEY 1.8 SOM 1.7 YEM 0.5
UKR06300	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
UZB07100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
VTN32500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none

VUT12800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
WAK33400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
WAL10200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
YEM26600* YEM26700*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
YUG14800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
YYY00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	IRN 2.7 TKM 2.8
ZAI32200* ZAI32300*	2, 6, 10, 14, 18	IRN 4.2 KAZ 4.2 RUS 4.2 SOM 1.3 TKM 4.2 UZB 4.2 YEM 2.1
ZAI32200* ZAI32300*	4, 8, 12, 16, 20	F/REU 12.1 IRN 4.2 KAZ 4.2 MAU 8.4 MDG 7.7 RUS 4.2 TKM 4.2 UZB 4.2
ZMB31400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ZWE13500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	ZMB 0.1

2.3 Compatibility analysis for BSS downlink into FSS (space-to-Earth) (paragraph 4.3.1.5 of Article 4 of Appendix S30)

NOTE 1 - Comparison between a corresponding former assignment (on the same channel) of the WRC-97 Plan and a new proposed assignment was implemented. The pending coordination from the WRC-97 Plan was incorporated in the list of the identification.

NOTE 2 - * indicates subsidiary beams of a composite beam.

Beam Name	channels	Affected administrations
AFG24500* AFG24600*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
AFS02100	1, 3, 5, 7	ARG B CAN HOL J USA USA/IT VEN/ASA
AFS02100	9, 11	ARG B CAN HOL J MEX USA USA/IT VEN/ASA
AFS02100	13, 15, 17, 19	ARG B CAN E HOL J MEX USA USA/IT VEN/ASA
AGL29500	1, 3, 5, 7	ARG B CAN HOL J USA USA/IT VEN/ASA
AGL29500	9, 11	ARG B CAN HOL J MEX USA USA/IT VEN/ASA
AGL29500	13, 15, 17, 19	ARG B CAN E HOL J MEX USA USA/IT VEN/ASA
ALB29600	22, 24	none
ALB29600	26	PAK THA TON UAE

ALB29600	28, 30, 32, 34, 36, 38, 40	CHN INS MLA PAK THA TON UAE
ALG25100* ALG25200*	2, 6, 10	ARG B CAN HOL J MEX USA USA/IT VEN/ASA
ALG25100* ALG25200*	4, 8, 12, 16, 20	CAN HOL J MEX USA USA/IT VEN/ASA
ALG25100* ALG25200*	14, 18	ARG B CAN E HOL J MEX USA USA/IT VEN/ASA
AND34100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARM06400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARS00300* ARS27500*	22, 24	CAN HOL J USA USA/IT VEN/ASA
ARS00300* ARS27500*	26	HOL IND MLA PAK SNG THA TON UAE USA/IT
ARS00300* ARS27500*	28, 30, 32, 34, 36, 38, 40	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
ARS34000	24	HOL USA/IT
AUS00400 AUS0040A AUS0040B AUS0040C	3, 7, 11, 15, 19, 23	none
AUS00500	4, 8, 12, 16, 20, 24	none
AUS00600	2, 6, 10, 14, 18, 22	none
AUS00700 AUS0070A	3, 7, 11, 15, 19, 23	none
AUS00800	2, 6, 10, 14, 18, 22	none
AUS00900 AUS0090A AUS0090B	1, 5, 9, 13, 17, 21	none
(AUS0040A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	1, 5, 9	CAN HOL J MHL TON USA USA/IT
(AUS0070A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	4, 8, 12	CAN HOL J MEX MHL TON USA USA/IT

AUT01600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
AZE06400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
AZR13400* POR13300*	1, 3, 5, 7, 9, 11	CAN HOL J USA USA/IT VEN/ASA
AZR13400* POR13300*	13	CAN E HOL J USA USA/IT VEN/ASA
AZR13400* POR13300*	15, 17, 19	CAN E HOL J MEX USA USA/IT VEN/ASA
BDI27000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BEL01800	22, 24	HOL USA USA/IT VEN/ASA
BEL01800	26, 28, 30, 32, 34, 36, 38, 40	none
BEN23300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BFA10700	1, 3, 5, 7, 9, 11	ARG B CAN HOL USA USA/IT VEN/ASA
BFA10700	13, 15, 17, 19	ARG B CAN E HOL USA USA/IT VEN/ASA
BGD22000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BHR25500	22, 24	none
BHR25500	26	HOL PAK SNG THA TON UAE USA/IT
BHR25500	28, 30, 32, 34, 36, 38, 40	CHN G HOL INS MLA PAK SNG THA TON UAE USA/IT
BIH14800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	HOL USA/IT
BLR06200	1, 5, 9, 13, 17	none
BLR06200	3, 7, 11, 15, 19	HOL USA/IT VEN/ASA
BOT29700	22, 24	ARG E HOL J USA USA/IT VEN/ASA
BOT29700	26	HOL IND MLA PAK SNG THA TON UAE USA/IT
BOT29700	28, 30, 32, 34, 36, 38, 40	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
BRM29800	1, 3, 5, 7, 9, 11, 13	HOL J MHL TON USA USA/IT
BRM29800	15	J MHL TON USA
BRM29800	17, 19, 21, 23	none
BRU3300A	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
BTN03100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BUL02000	21, 23	HOL USA/IT

BUL02000	25	HOL MLA PAK SNG TON USA/IT
BUL02000	27	HOL IND MLA PAK SNG TON UAE USA/IT
BUL02000	29, 31, 33, 35, 37, 39	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA/IT
CAF25800	22	ARG B CAN E HOL USA USA/IT VEN/ASA
CAF25800	24, 28, 32, 36, 40	none
CAF25800	26	HOL PAK SNG THA TON UAE USA/IT
CAF25800	30, 34, 38	CHN G HOL INS MLA PAK SNG THA TON UAE USA/IT
CBG29900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CHN15400* CHN15600*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CHN15500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CHN15700* CHN15900*	1, 5, 9, 13	HOL J MHL TON USA USA/IT
CHN15700* CHN15900*	3, 7, 11	none
CHN15700* CHN15900*	15, 17, 19, 21, 23	J MHL TON USA
CHN15800	2, 4, 6, 8, 10, 12	HOL J MHL TON USA USA/IT
CHN15800	14, 16, 18, 20, 22, 24	J MHL TON USA
CHN16100* CHN17500* CHN17900* CHN18000*	1, 3, 5, 7, 9, 11	HOL J MHL TON USA USA/IT
CHN16100* CHN17500* CHN17900* CHN18000*	13	none
CHN16100* CHN17500* CHN17900* CHN18000*	15, 17, 19, 21, 23	J MHL TON USA
CHN16600* CHN16800*	2, 4, 6, 8, 10, 12	HOL J MHL TON USA USA/IT
CHN16600* CHN16800*	14, 16, 18, 20, 24	J MHL TON USA
CHN16600* CHN16800*	22	none

CHN19000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CKH05200* CKH05300* NIU05400* NZL05500* TKL05800*	1, 5, 9, 13	HOL J TON USA USA/IT
CKH05200* CKH05300* NIU05400* NZL05500* TKL05800*	3, 7, 11	HOL J MHL TON USA USA/IT
CKH05200* CKH05300* NIU05400* NZL05500* TKL05800*	15, 17, 19, 21, 23	J MHL TON USA USA/IT
CLN21900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CME30000	21, 23	ARG B HOL USA USA/IT VEN/ASA
CME30000	25	HOL PAK SNG TON USA/IT
CME30000	27	HOL MLA PAK SNG TON UAE USA/IT
CME30000	29, 31, 33, 35, 37, 39	CHN G HOL INS MLA PAK SNG THA TON UAE USA/IT
COG23500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	ARG HOL USA USA/IT VEN/ASA
COM20700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CPV30100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	ARG HOL USA USA/IT VEN/ASA
CTI23700	22, 26, 30, 34, 38	none
CTI23700	24	ARG B CAN E HOL USA USA/IT VEN/ASA
CTI23700	28, 32, 36, 40	CHN MLA PAK THA TON UAE
CVA08300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CVA08500	20	HOL USA USA/IT VEN/ASA
CYP08600	21, 23, 25, 29, 33, 37	none
CYP08600	27	HOL MLA PAK SNG TON UAE
CYP08600	31, 35, 39	CHN G HOL INS MLA PAK SNG THA TON UAE
CZE14400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
D 08700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
DJI09900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

DNK08900* DNKFRO*	1, 3, 5, 7, 9, 11	CAN HOL USA USA/IT VEN/ASA
DNK08900* DNKFRO*	13, 15, 17, 19	HOL USA USA/IT VEN/ASA
DNK09000	33, 37	CHN G HOL MLA PAK SNG THA TON UAE
DNK09100	27, 35	none
E 12900* CNR13000*	21, 23	CAN HOL J USA USA/IT VEN/ASA
E 12900* CNR13000*	25	PAK TON
E 12900* CNR13000*	27	MLA PAK TON UAE
E 12900* CNR13000*	29, 31, 33, 35, 37, 39	CHN MLA PAK THA TON UAE
EGY02600	22, 24	CAN HOL J USA USA/IT VEN/ASA
EGY02600	26	HOL IND MLA PAK SNG THA TON UAE USA/IT
EGY02600	28, 30, 32, 34, 36, 38, 40	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
ERI09200	21, 23, 27, 31, 35, 39	none
ERI09200	25	HOL MLA PAK SNG TON USA/IT
ERI09200	29, 33, 37	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
EST06100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	HOL USA/IT
ETH09200	21, 23	CAN HOL J USA USA/IT VEN/ASA
ETH09200	25	HOL MLA PAK SNG TON USA/IT
ETH09200	27	HOL IND MLA PAK SNG TON UAE USA/IT
ETH09200	29, 31, 33, 35, 37, 39	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
F 09300	1, 5, 9, 13, 17	none
F 09300	3, 7, 11	CAN HOL J USA USA/IT VEN/ASA
F 09300	15, 19	CAN E HOL J MEX USA USA/IT VEN/ASA
FIN10300	1, 22, 24	CAN HOL J USA USA/IT VEN/ASA
FIN10300	26	PAK TON UAE
FIN10300	28, 30, 32, 34, 36, 38	CHN MLA PAK THA TON UAE
FJI19300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
FSM00000	1, 5, 9, 13	HOL J MHL TON USA USA/IT

FSM00000	3, 7, 11, 15, 19	none
FSM00000	17, 21, 23	J MHL TON USA USA/IT
G 02700	2, 6, 10, 14, 18	CAN HOL J USA USA/IT VEN/ASA
G 02700	4, 8, 12, 16, 20	none
GAB26000	1, 5, 9, 13, 17	HOL USA USA/IT
GAB26000	3, 7, 11, 15, 19	none
GEO06400	22, 26, 30, 34, 38	none
GEO06400	24	HOL USA/IT VEN/ASA
GEO06400	28, 32, 36, 40	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
GHA10800	21	ARG HOL USA USA/IT VEN/ASA
GHA10800	23, 27, 31, 35, 39	none
GHA10800	25	PAK SNG TON
GHA10800	29, 33, 37	CHN G INS MLA PAK SNG THA TON UAE
GMB30200	1, 5, 9, 13, 17	ARG HOL USA USA/IT VEN/ASA
GMB30200	3, 7, 11, 15, 19	none
GNB30400	2, 6, 10, 14, 18	none
GNB30400	4, 8, 12, 16, 20	ARG HOL USA USA/IT VEN/ASA
GNE30300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
GRC10500	1, 5, 9	CAN HOL USA USA/IT VEN/ASA
GRC10500	3, 7, 11	CAN HOL USA USA/IT
GRC10500	13, 17	HOL USA USA/IT VEN/ASA
GRC10500	15, 19	HOL USA USA/IT
GUI19200	2, 4, 6, 8, 10, 12	ARG B CAN HOL J USA USA/IT VEN/ASA
GUI19200	14, 16, 18, 20	ARG B CAN E HOL J USA USA/IT VEN/ASA
GUM33100* MRA33200*	1, 3, 5, 7, 9, 11, 13	HOL J MHL TON USA/IT
GUM33100* MRA33200*	15, 17, 19, 21, 23	J MHL TON
HNG10600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
HOL21300	22, 24	USA USA/IT VEN/ASA
HOL21300	26, 28, 30, 32, 34, 36, 38, 40	none
HRV14800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

I 08200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
IND03700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
IND03800* IND04000*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IND03900* IND04100* IND04300* IND04500*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
IND04200* IND04600* IND04800*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IND04700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
INS02800* INS03000* INS03200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
INS03500* INS03600*	2, 4, 6, 8, 10, 12	HOL J MHL TON USA USA/IT
INS03500* INS03600*	14, 16, 18, 20, 22, 24	J MHL TON USA
IRL21100	22, 24	CAN HOL USA USA/IT VEN/ASA
IRL21100	26, 28, 30, 32, 34, 36, 38, 40	none
IRN10900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IRQ25600	22	HOL USA/IT
IRQ25600	24	none
IRQ25600	26	HOL IND MLA PAK SNG THA TON UAE USA/IT
IRQ25600	28, 30, 32, 34, 36, 38, 40	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
ISL04900	21, 25, 27, 29, 31, 33, 35, 37, 39	none
ISL04900	23	CAN HOL J USA USA/IT VEN/ASA
ISL05000	23, 31, 39	none
ISR11000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
J 11100	1, 3, 5, 7, 9, 11, 13	HOL MHL TON USA USA/IT
J 11100	15, 17, 19, 21, 23	MHL TON USA
JOR22400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
KAZ06600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	HOL USA USA/IT
KEN24900	22, 24	none

KEN24900	26	HOL IND MLA PAK SNG THA TON UAE USA/IT
KEN24900	28, 30, 32, 34, 36, 38, 40	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
KGZ07000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
KIR00001* KIR00002*	1, 5, 9, 13, 17, 21	CAN HOL J MEX MHL TON USA USA/IT
KIR00001* KIR00002*	3, 7, 11	CAN HOL J MHL TON USA USA/IT
KIR00001* KIR00002*	15, 19, 23	HOL J MEX MHL TON USA USA/IT
KOR11200	2, 4, 6, 8, 10, 12	none
KOR11200	14, 16, 18, 20, 22, 24	J MHL TON USA
KRE28600	2, 4, 6, 8, 10, 12	HOL J MHL TON USA USA/IT
KRE28600	14, 16, 18, 20, 22, 24	J MHL TON USA
KWT11300	22, 24, 26, 30, 34, 38	none
KWT11300	28, 32, 36, 40	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
LAO28400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
LBN27900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LBR24400	1, 5, 9, 13, 17	ARG HOL USA USA/IT
LBR24400	3, 7, 11, 15, 19	none
LBY28000* LBY32100*	22, 24	CAN HOL J MEX USA USA/IT VEN/ASA
LBY28000* LBY32100*	26	PAK SNG THA TON UAE
LBY28000* LBY32100*	28, 30, 32, 34, 36, 38, 40	CHN G INS MLA PAK SNG THA TON UAE
LIE25300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LSO30500	22, 24, 28, 32, 36, 40	none
LSO30500	26, 30, 34, 38	THA TON
LTU06100	1, 5, 9, 13, 17	HOL USA USA/IT VEN/ASA
LTU06100	3, 7, 11, 15, 19	none
LUX11400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	CAN HOL USA USA/IT VEN/ASA
LVA06100	22, 24	none
LVA06100	26	PAK THA TON UAE
LVA06100	28, 30, 32, 34, 36, 38, 40	CHN MLA PAK THA TON UAE

MAC00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MAU24200* MAU24300*	22, 24	none
MAU24200* MAU24300*	26	HOL IND MLA PAK SNG THA TON UAE USA/IT
MAU24200* MAU24300*	28, 30, 32, 34, 36, 38, 40	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
MCO11600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MDA06300	22, 24	none
MDA06300	26	PAK THA TON UAE
MDA06300	28, 30, 32, 34, 36, 38, 40	CHN MLA PAK THA TON UAE
MDG23600	21, 23	HOL USA/IT
MDG23600	25	HOL MLA PAK SNG TON USA/IT
MDG23600	27	HOL IND MLA PAK SNG TON UAE USA/IT
MDG23600	29, 31, 33, 35, 37, 39	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
MHL00000	2, 6, 10, 14, 18	none
MHL00000	4, 8, 12	HOL J TON USA USA/IT
MHL00000	16, 20, 22, 24	J TON USA USA/IT
MKD14800	22, 24	HOL USA/IT VEN/ASA
MKD14800	26, 28, 30, 32, 34, 36, 38, 40	none
MLA22700* MLA22800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MLD30600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MLI32700* MLI32800*	22, 24	ARG B CAN E HOL J MEX USA USA/IT VEN/ASA
MLI32700* MLI32800*	26	HOL IND MLA PAK SNG THA TON UAE USA/IT
MLI32700* MLI32800*	28, 30, 32, 34, 36, 38, 40	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
MLT14700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MNG24800	21, 23, 25, 29, 33, 37, 39	none
MNG24800	27	HOL IND J MLA PAK SNG TON UAE USA/IT
MNG24800	31, 35	CHN G HOL IND INS J MLA PAK SNG THA TON UAE USA USA/IT
MOZ30700	21	ARG HOL J USA USA/IT VEN/ASA
MOZ30700	23	ARG E HOL J USA USA/IT VEN/ASA

MOZ30700	25	HOL MLA PAK SNG TON USA/IT
MOZ30700	27	HOL IND MLA PAK SNG TON UAE USA/IT
MOZ30700	29, 31, 33, 35, 37, 39	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
MRC20900	1, 3, 5, 7	ARG B CAN HOL J USA USA/IT VEN/ASA
MRC20900	9, 11	ARG B CAN HOL J MEX USA USA/IT VEN/ASA
MRC20900	13, 15, 17, 19	ARG B CAN E HOL J MEX USA USA/IT VEN/ASA
MTN22300* MTN28800*	2, 4, 6, 8, 10	ARG B CAN HOL J MEX USA USA/IT VEN/ASA
MTN22300* MTN28800*	12, 14, 16, 18, 20	ARG B CAN E HOL J MEX USA USA/IT VEN/ASA
MWI30800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MYT09800* REU09700*	22, 24	none
MYT09800* REU09700*	26	HOL MLA SNG THA TON UAE USA/IT
MYT09800* REU09700*	28, 30, 32, 34, 36, 38, 40	G HOL INS MLA SNG THA TON UAE USA/IT
NCL10000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
NGR11500	22	ARG B CAN E HOL J USA USA/IT VEN/ASA
NGR11500	24	none
NGR11500	26	PAK THA TON UAE
NGR11500	28, 32, 36, 40	CHN MLA PAK THA UAE
NGR11500	30, 34, 38	CHN MLA PAK THA TON UAE
NIG11900	22, 26, 30, 34, 38	none
NIG11900	24	ARG B CAN E HOL J USA USA/IT VEN/ASA
NIG11900	28, 32, 36, 40	CHN G INS MLA PAK SNG THA TON UAE
NMB02500	21, 25, 29, 33, 37	none
NMB02500	23	ARG B CAN E HOL J MEX USA USA/IT VEN/ASA
NMB02500	27	MLA PAK SNG TON UAE
NMB02500	31, 35, 39	CHN G INS MLA PAK SNG THA TON UAE
NOR12000	22, 24	CAN HOL J USA USA/IT VEN/ASA
NOR12000	26, 28, 30, 32, 34, 36, 38, 40	none

NPL12200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
NRU30900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
OCE10100	2, 6, 10	ARG B CAN HOL J MEX MHL TON USA USA/IT VEN/ASA
OCE10100	4, 8, 12, 16	none
OCE10100	14, 18, 20, 22, 24	ARG B CAN E HOL J MEX MHL TON USA USA/IT VEN/ASA
OMA12300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
PAK12700	2, 6, 10	none
PAK12700	4, 8, 12, 14, 16, 18, 20, 22, 24	HOL USA/IT VEN/ASA
PHL28500	2, 4, 6, 8, 10, 12	HOL J MHL TON USA USA/IT
PHL28500	14	J MHL TON USA
PHL28500	16, 18, 20, 22, 24	none
PLM33700* SMA33500* SMA33000*	2, 4, 6, 8, 10, 12	HOL J MHL TON USA/IT
PLM33700* SMA33500* SMA33000*	14, 16, 18, 20, 22, 24	J MHL TON
PLW00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PNG13100	2, 4, 6, 8, 10, 12	HOL J MHL TON USA USA/IT
PNG13100	14, 16, 18, 20, 22, 24	J MHL TON USA
POL13200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
QAT24700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ROU13600	22, 24	HOL USA/IT
ROU13600	26	HOL PAK SNG THA TON UAE USA/IT
ROU13600	28, 30, 32, 34, 36, 38, 40	CHN G HOL INS MLA PAK SNG THA TON UAE USA/IT
RRW31000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
RST-1	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-2	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-3	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none

RST-5	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RUS00401	25	G HOL J MLA PAK SNG TON USA USA/IT
RUS00401	27	AUS CHN G HOL IND INS J MLA PAK PNG SNG THA TON UAE USA USA/IT
RUS00401	29, 31, 33, 35, 37, 39	AUS CHN G HOL IND INS J KOR LAO MLA PAK PNG SNG THA TON UAE USA USA/IT
RUS00402	26	CHN G HOL IND INS J MLA PAK SNG THA TON UAE USA USA/IT
RUS00402	28	AUS CHN G HOL IND INS J KOR LAO MLA PAK PNG SNG THA TON UAE USA USA/IT
S 13800	2, 6, 10, 12, 14, 16, 18, 20	HOL USA USA/IT VEN/ASA
S 13800	4, 8	none
SDN23000* SDN23100* SDN23200*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	ARG CAN HOL J MEX USA USA/IT VEN/ASA
SEN22200	21, 25, 27, 29, 31, 33, 35, 37, 39	none
SEN22200	23	ARG B CAN E HOL J USA USA/IT VEN/ASA
SEY00000	21, 23	ARG E HOL USA USA/IT VEN/ASA
SEY00000	25	HOL MLA PAK SNG TON USA/IT
SEY00000	27	HOL IND MLA PAK SNG TON UAE USA/IT
SEY00000	29, 31, 33, 35, 37, 39	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
SLM00000	1, 3, 5, 7, 9, 11, 13	HOL J MHL TON USA USA/IT
SLM00000	15, 17, 19, 21, 23	J MHL TON USA
SMO05700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SMR31100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SNG15100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SOM31200	1, 5, 9, 13, 17	HOL USA/IT
SOM31200	3, 7, 11, 15, 19	none
SRL25900	21	ARG HOL USA USA/IT
SRL25900	23, 25, 27, 29, 31, 33, 35, 37, 39	none
STP24100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
SUI14000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SVK14400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

SVN14800	2, 6, 10	CAN HOL USA USA/IT VEN/ASA
SVN14800	4, 8, 12, 16, 20	none
SVN14800	14, 18	HOL USA USA/IT VEN/ASA
SWZ31300	22, 24	none
SWZ31300	26, 28, 30, 32, 34, 36, 38, 40	THA TON
SYR22900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SYR33900	21	HOL USA/IT
TCD14300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	ARG HOL USA USA/IT VEN/ASA
TGO22600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
THA14200	1, 3, 7, 11	HOL J MHL TON USA USA/IT
THA14200	5, 9	USA USA/IT
THA14200	13	none
THA14200	15, 17, 19, 21, 23	J MHL TON USA
TJK06900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TKM06800	21	HOL USA/IT
TKM06800	23, 27, 31, 35, 39	none
TKM06800	25	HOL MLA PAK SNG TON USA/IT
TKM06800	29, 33, 37	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
TON21500	2, 6, 10	HOL J MHL USA USA/IT
TON21500	4, 8, 12, 16	none
TON21500	14, 18, 20, 22, 24	J MHL USA USA/IT
TUN15000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	HOL USA/IT
TUN27200	1	ARG B CAN HOL J MEX USA USA/IT VEN/ASA
TUR14500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TUV00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
TZA22500	21, 23, 27, 31, 35, 39	none
TZA22500	25	HOL MLA PAK SNG TON USA/IT
TZA22500	29, 33, 37	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
UAE27400	21, 23	none
UAE27400	25	HOL MLA PAK SNG TON USA/IT
UAE27400	27	HOL IND MLA PAK SNG TON USA/IT

UAE27400	29, 31, 33, 35, 37, 39	CHN G HOL IND INS MLA PAK SNG THA TON USA USA/IT
UGA05100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
UKR06300	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	HOL USA/IT VEN/ASA
UZB07100	22, 24	HOL USA/IT
UZB07100	26	HOL IND MLA PAK SNG THA TON UAE USA/IT
UZB07100	28, 30, 32, 34, 36, 38, 40	CHN G HOL IND INS MLA PAK SNG THA TON UAE USA USA/IT
VTN32500	2, 4, 6, 8, 10, 12	HOL J MHL USA USA/IT
VTN32500	14, 16, 18, 20, 22, 24	J MHL USA
VUT12800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
WAK33400	1, 5, 9, 13, 17	none
WAK33400	3, 7, 11	HOL J MHL TON USA/IT
WAK33400	15, 19, 21, 23	J MHL TON
WAL10200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
YEM26600* YEM26700*	2, 4, 6, 8, 10, 12	ARG B CAN HOL USA USA/IT VEN/ASA
YEM26600* YEM26700*	14, 16, 18, 20	ARG B CAN E HOL USA USA/IT VEN/ASA
YUG14800	22, 24	HOL USA/IT
YUG14800	26	HOL PAK SNG THA TON UAE
YUG14800	28, 30, 32, 34, 36, 38, 40	CHN G HOL INS MLA PAK SNG THA TON UAE
YYY00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ZAI32200* ZAI32300*	2, 4, 6, 8, 10	ARG B CAN HOL J MEX USA USA/IT VEN/ASA
ZAI32200* ZAI32300*	12, 14, 16, 18, 20	ARG B CAN E HOL J MEX USA USA/IT VEN/ASA
ZMB31400	2, 4, 6, 8, 10	ARG HOL J USA USA/IT VEN/ASA
ZMB31400	12, 14, 16, 18, 20	ARG E HOL J USA USA/IT VEN/ASA
ZWE13500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

3 Feeder link receiving interference

3.1 Compatibility analysis for Region 2 Plan into BSS feeder link (paragraph 4.2.3.4 of Article 4 of Appendix S30)

NOTE 1 - * indicates subsidiary beams of a composite beam.

Beam Name	channels	Affecting administrations
AFG24500	29, 31, 33, 35, 37, 39	none
AFG24500	30, 32, 34, 36, 38, 40	none
AGL29500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ALB29600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ALG25100* ALG25200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
AND34100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ARM06400	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
ARS00300* ARS27500*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
AUS00400	3, 7, 11, 15, 19, 23	none
AUS0040A	3, 7, 11, 15, 19, 23	none
AUS00500	4, 8, 12, 16, 20, 24	none
AUS00600	26, 28, 30, 32, 36, 40	none
AUS0060G	1, 35, 39	none
AUS00700	3, 7, 11, 15, 19, 23	none
AUS0070A	3, 7, 11, 15, 19, 23	none
AUS0070G	32, 36, 40	none
AUS00800	2, 6, 10, 14, 18, 22	none
AUS00900	25, 27, 29, 31, 35, 39	none
AUS0090A	25, 27, 29, 31, 35, 39	none
AUT01600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
AZE06400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
AZR13400* POR13300*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BDI27000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BEL01800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

BEN23300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
BFA10700	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BGD22000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BHR25500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BIH14800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
BLR06200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BOT29700	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
BRM29800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BRU3300A	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
BTN03100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BUL02000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CAF25800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
CBG29900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CHN15401* CHN15501* CHN18400* CHN18500* CHN18600* CHN18800*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CHN16300* CHN16500* CHN17600* CHN17700* CHN17800* CHN18100* CHN18200* CHN18700*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CHN16600* CHN16700* CHN16800* CHN16900* CHN17000* CHN17100* CHN17200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none

CHN17300* CHN17400* CHN17500* CHN17900*		
CHN19000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CKH05200* CKH05201* CKH05300* CKH05301* NIU05400* NIU05401* NZL05500* TKL05800* TKL05801*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CLN21900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
COG23500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
COM20700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CTI23700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
CVA08300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CVA08500	40	none
CYP08600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CZE14400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
D 08700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
DJI09900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
DNK08900* DNKFRO*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
DNK09000	33, 37	none
DNK09100	27, 35	none
E 12900* CNR13000*	1, 3, 5, 7, 9, 11, 13	G
E 12900* CNR13000*	15, 17, 19	none
EGY02600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ERI09200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
EST06100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

F 09300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
FIN10300	25	none
FIN10300	22, 24, 26, 28, 30, 32, 34, 36, 38	none
FJI19300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
FSM00000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
G 02700	2, 4, 8, 10, 12	GUY JMC
G 02700	6	JMC
G 02700	14, 16, 18, 20	none
GAB26000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GEO06400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
GHA10800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GMB30200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
GNB30400	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
GNE30300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
GRC10500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GUI19200	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
GUM33100* GUM33101* MRA33200* MRA33201*	29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
HNG10600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
HOL21300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
HRV14800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
I 08200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
IND03700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
IND03800* IND04000*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IND03900* IND04100* IND04300* IND04500*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none

IND04200* IND04600* IND04800*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IND04700	29, 31, 33, 35, 37, 39	none
IND04700	30, 32, 34, 36, 38, 40	none
INS02800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
INS03500	29, 31, 33, 35, 37, 39	none
INS03500	30, 32, 34, 36, 38, 40	none
IRL21100	1	GUY
IRL21100	3, 9, 13	JMC
IRL21100	5, 7, 11	GUY JMC
IRL21100	15, 17, 19	none
IRN10900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IRQ25600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ISL04900	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
ISL05000	23, 29, 31	none
ISR11000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
J 11100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
JOR22400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
KAZ06600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
KEN24900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
KGZ07000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
KIR00001* KIR00002*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
KOR11200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
KRE28600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
KWT11300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
LAO28400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
LBN27900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LBR24400	1	GUY

LBR24400	3, 9, 13	JMC
LBR24400	5, 7, 11	GUY JMC
LBR24400	15, 17, 19	none
LBY28000* LBY32100*	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
LIE25300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LSO30500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
LTU06100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
LUX11400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LVA06100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MAC00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MAU24200* MAU24300*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MCO11600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
MDA06300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MDG23600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MHL00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MKD14800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MLA22700* MLA22800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MLD30600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MLT14700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MNG24800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MTN22300* MTN28800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MWI30800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MYT09800* MYT09801* REU09700* REU09701*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

NCL10000* NCL10001*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
NGR11500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NOR12000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NPL12200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
NRU30900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
OCE10100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
OMA12300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
PHL28500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PLM33700* PLM33701* SMA33500* SMA33501*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PLW00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
POL13200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
QAT24700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ROU13600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
RRW31000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
RST-1	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-2	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-3	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-5	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RUS-4	25, 26, 27, 28, 29, 31, 33, 35, 37, 39	none
S 13800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SEN22200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
SEY00000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

SLM00000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SMO05700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SMR31100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SNG15100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SOM31200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SRL25900	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
STP24100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SUI14000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SVK14400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
SVN14800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
SWZ31300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
SYR22900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
TCD14300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
THA14200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
TJK06900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
TKM06800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
TON21500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
TUN15000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
TUR14500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TUV00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
TZA22500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
UAE27400	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

UGA05100	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
UKR06300	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
UZB07100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
VTN32500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
VUT12800	29, 31, 33, 35, 37, 39	none
VUT12800	30, 32, 34, 36, 38, 40	none
WAL10200* WAL10201*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
YUG14800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ZAI32200* ZAI32300*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ZMB31400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ZWE13500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none

3.2 Compatibility analysis for FSS (space-to-Earth) into BSS feeder link (paragraph 7.1 of Article 7 of Appendix S30A)

NOTE 1 - * indicates subsidiary beams of a composite beam.

Beam Name	channels	Affecting administrations
AFG24500	29, 31, 33, 35, 37, 39	IND TUR USA
AFG24500	30, 32, 34, 36, 38, 40	IND TUR USA
AGL29500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
ALB29600	2, 4, 6, 8, 10, 12, 14, 16, 18	none
ALB29600	20	USA
ALG25100* ALG25200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
AND34100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
ARM06400	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
ARS00300* ARS27500*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
AUS00400	3, 7, 11, 15, 19	none
AUS00400	23	USA

AUS0040A	3, 7, 11, 15, 19	none
AUS0040A	23	USA
AUS00500	4, 8, 12, 16	none
AUS00500	20, 24	USA
AUS00600	26, 28, 30, 32, 36, 40	USA
AUS0060G	1	none
AUS0060G	35, 39	USA
AUS00700	3, 7, 11, 15, 19	none
AUS00700	23	USA
AUS0070A	3, 7, 11, 15, 19	none
AUS0070A	23	USA
AUS0070G	32, 36, 40	USA
AUS00800	2, 6, 10, 14, 18	none
AUS00800	22	USA
AUS00900	25, 27, 29, 31, 35, 39	USA
AUS0090A	25, 27, 29, 31, 35, 39	USA
AUT01600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
AZE06400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
AZR13400* POR13300*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BDI27000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
BEL01800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
BEN23300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
BFA10700	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
BGD22000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BGD22000	21, 23	IND USA
BHR25500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
BIH14800	2, 4, 6, 8, 10, 12, 14, 16, 18	none
BIH14800	20	F/EUT USA
BLR06200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

BOT29700	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA USA/IT
BRM29800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BRM29800	21, 23	USA
BRU3300A	2, 4, 6, 8, 10, 12, 14, 16, 18	none
BRU3300A	20, 22, 24	IND USA
BTN03100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BTN03100	21, 23	MLA USA
BUL02000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CAF25800	2, 4, 6, 8, 10, 12, 14, 16, 18	none
CAF25800	20	F/EUT IND USA
CBG29900	2, 4, 6, 8, 10, 12, 14, 16, 18	none
CBG29900	20, 22, 24	MLA USA
CHN15401* CHN15501* CHN18400* CHN18500* CHN18600* CHN18800*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CHN15401* CHN15501* CHN18400* CHN18500* CHN18600* CHN18800*	21, 23	USA
CHN16300* CHN16500* CHN17600* CHN17700* CHN17800* CHN18100* CHN18200* CHN18700*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CHN16300* CHN16500* CHN17600* CHN17700* CHN17800* CHN18100* CHN18200* CHN18700*	21, 23	USA

CHN16600* CHN16700* CHN16800* CHN16900* CHN17000* CHN17100* CHN17200* CHN17300* CHN17400* CHN17500* CHN17900*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CHN16600* CHN16700* CHN16800* CHN16900* CHN17000* CHN17100* CHN17200* CHN17300* CHN17400* CHN17500* CHN17900*	21, 23	USA
CHN19000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CHN19000	21, 23	USA
CKH05200* CKH05201* CKH05300* CKH05301* NIU05400* NIU05401* NZL05500* TKL05800* TKL05801*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CKH05200* CKH05201* CKH05300* CKH05301* NIU05400* NIU05401* NZL05500* TKL05800* TKL05801*	21, 23	J USA
CLN21900	2, 4, 6, 8, 10, 12, 14, 16, 18	none
CLN21900	20, 22, 24	IND TUR USA
COG23500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	F/EUT IND USA
COM20700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

CTI23700	2, 4, 6, 8, 10, 12, 14, 16, 18	none
CTI23700	20	USA
CVA08300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	F/EUT USA
CVA08500	40	F/EUT USA
CYP08600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	MLT USA
CZE14400	2, 4, 6, 8, 10, 12, 14, 16, 18	none
CZE14400	20	F/EUT IND USA
D 08700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
DJI09900	2, 4, 6, 8, 10, 12, 14, 16, 18	none
DJI09900	20	USA
DNK08900* DNKFRO*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
DNK09000	33, 37	USA
DNK09100	27, 35	USA
E 12900* CNR13000*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
EGY02600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
ERI09200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
EST06100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
F 09300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
FIN10300	25	USA
FIN10300	22, 24, 26, 28, 30, 32, 34, 36, 38	USA
FJI19300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
FJI19300	21, 23	USA
FSM00000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
FSM00000	21, 23	USA
G 02700	2, 4, 6, 8, 10, 12, 14, 16, 18	none
G 02700	20	USA
GAB26000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GEO06400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
GHA10800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

GMB30200	2, 4, 6, 8, 10, 12, 14, 16, 18	none
GMB30200	20	F/EUT USA
GNB30400	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
GNE30300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
GRC10500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GUI19200	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	F/EUT USA
GUM33100* GUM33101* MRA33200* MRA33201*	29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	CHN
HNG10600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
HOL21300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
HRV14800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	F/EUT IND USA
I 08200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
IND03700	2, 4, 6, 8, 10, 12, 14, 16, 18	none
IND03700	20, 22	USA
IND03700	24	J USA
IND03800* IND04000*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
IND03800* IND04000*	21, 23	USA
IND03900* IND04100* IND04300* IND04500*	2, 4, 6, 8, 10, 12, 14, 16, 18	none
IND03900* IND04100* IND04300* IND04500*	20, 22, 24	ARS/ARB TUR USA
IND04200* IND04600* IND04800*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
IND04200* IND04600* IND04800*	21, 23	ARS/ARB TUR USA
IND04700	29, 31, 33, 35, 37, 39	J USA
IND04700	30, 32, 34, 36, 38, 40	J USA

INS02800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
INS02800	21, 23	F/EUT USA
INS03500	29, 31, 33, 35, 37, 39	J USA
INS03500	30, 32, 34, 36, 38, 40	J USA
IRL21100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
IRN10900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
IRN10900	21, 23	USA
IRQ25600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ISL04900	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
ISL05000	23, 29, 31	USA
ISR11000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
J 11100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
J 11100	21, 23	USA
JOR22400	2, 4, 6, 8, 10, 12, 14, 16, 18	none
JOR22400	20	USA
KAZ06600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
KEN24900	2, 4, 6, 8, 10, 12, 14, 16, 18	none
KEN24900	20	USA
KGZ07000	2, 4, 6, 8, 10, 12, 14, 16, 18	none
KGZ07000	20	F/EUT USA
KIR00001* KIR00002*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
KIR00001* KIR00002*	21, 23	USA
KOR11200	2, 4, 6, 8, 10, 12, 14, 16, 18	none
KOR11200	20, 22	CHN USA
KOR11200	24	CHN J USA
KRE28600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
KRE28600	21, 23	J USA
KWT11300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
LAO28400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LAO28400	21, 23	USA
LBN27900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

LBR24400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LBY28000* LBY32100*	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
LIE25300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
LSO30500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	MLT USA
LTU06100	2, 4, 6, 8, 10, 12, 14, 16, 18	none
LTU06100	20	USA
LUX11400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LVA06100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	IND TUR USA
MAC00000	2, 4, 6, 8, 10, 12, 14, 16, 18	none
MAC00000	20, 22, 24	USA
MAU24200* MAU24300*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
MCO11600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
MDA06300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	IND TUR USA
MDG23600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
MHL00000	2, 4, 6, 8, 10, 12, 14, 16, 18	none
MHL00000	20, 22, 24	USA
MKD14800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
MLA22700* MLA22800*	2, 4, 6, 8, 10, 12, 14, 16, 18	none
MLA22700* MLA22800*	20, 22, 24	USA
MLD30600	2, 4, 6, 8, 10, 12, 14, 16, 18	none
MLD30600	20, 22, 24	F/EUT USA
MLT14700	2, 4, 6, 8, 10, 12, 14, 16, 18	none
MLT14700	20	F/EUT IND USA
MNG24800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	IND USA
MTN22300* MTN28800*	2, 4, 6, 8, 10, 12, 14, 16, 18	none
MTN22300* MTN28800*	20	USA

MWI30800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	F/EUT IND USA
MYT09800* MYT09801* REU09700* REU09701*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
NCL10000* NCL10001*	2, 4, 6, 8, 10, 12, 14, 16, 18	none
NCL10000* NCL10001*	20, 22, 24	J USA
NGR11500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
NOR12000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
NPL12200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
NPL12200	21, 23	IND TUR USA
NRU30900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
NRU30900	21, 23	USA
OCE10100	2, 4, 6, 8, 10, 12, 14, 16, 18	none
OCE10100	20, 22, 24	USA
OMA12300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
PHL28500	2, 4, 6, 8, 10, 12, 14, 16, 18	none
PHL28500	20, 22, 24	CHN IND USA
PLM33700* PLM33701* SMA33500* SMA33501*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PLW00000	2, 4, 6, 8, 10, 12, 14, 16, 18	none
PLW00000	20, 22, 24	J USA
POL13200	2, 4, 6, 8, 10, 12, 14, 16, 18	none
POL13200	20	IND TUR USA
QAT24700	2, 4, 6, 8, 10, 12, 14, 16, 18	none
QAT24700	20	USA
ROU13600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	F/EUT USA
RRW31000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
RST-1	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	F/EUT USA

RST-2	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	ARS/ARB TUR USA
RST-3	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	MLA USA
RST-5	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	J USA
RUS-4	25, 26, 27, 28, 29, 31, 33, 35, 37, 39	USA
S 13800	2, 4, 6, 8, 10, 12, 14, 16, 18	none
S 13800	20	I USA
SEN22200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	F/EUT USA
SEY00000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
SLM00000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SLM00000	21, 23	USA
SMO05700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SMO05700	21, 23	USA
SMR31100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SNG15100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SNG15100	21, 23	IND USA
SOM31200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SRL25900	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
STP24100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SUI14000	2, 4, 6, 8, 10, 12, 14, 16, 18	none
SUI14000	20	USA
SVK14400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	F/EUT IND USA
SVN14800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
SWZ31300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
SYR22900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
TCD14300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
THA14200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

THA14200	21, 23	CHN IND USA
TJK06900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	G PAK USA
TKM06800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	F/EUT USA
TON21500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TON21500	21, 23	USA
TUN15000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA
TUR14500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TUV00000	2, 4, 6, 8, 10, 12, 14, 16, 18	none
TUV00000	20, 22, 24	USA
TZA22500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
UAE27400	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
UGA05100	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	USA
UKR06300	2, 4, 6, 8, 10, 12, 14, 16, 18	none
UKR06300	20	G PAK USA
UZB07100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	F/EUT USA
VTN32500	2, 4, 6, 8, 10, 12, 14, 16, 18	none
VTN32500	20, 22	USA
VTN32500	24	J USA
VUT12800	29, 31, 33, 35, 37, 39	J USA
VUT12800	30, 32, 34, 36, 38, 40	J USA
WAL10200* WAL10201*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
WAL10200* WAL10201*	21, 23	J USA
YUG14800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ZAI32200* ZAI32300*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ZMB31400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ZWE13500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	USA USA/IT

3.3 Compatibility analysis for Region 2 unplanned BSS into BSS feeder link (paragraph 7.1 of Article 7 of Appendix S30A)

Due to the fact that in Region 2 the allocation to the broadcasting-satellite service in the band 17.3-17.8 GHz (downlink) shall come into effect on 1 April 2007, it is not necessary, at this time, to perform compatibility analyses with respect to the Region 2 unplanned BSS.

4 Downlink receiving interference

4.1 Compatibility analysis for Region 2 Plan into BSS downlink (paragraph 4.3.3.2 of Article 4 of Appendix S30)

Beam Name	channels	Affecting administrations
AFG24500* AFG24600*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
AFS02100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
AGL29500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ALB29600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ALG25100* ALG25200*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
AND34100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARM06400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
ARS00300* ARS27500*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ARS34000	24	none
AUS00400 AUS0040A AUS0040B AUS0040C	3, 7, 11, 15, 19, 23	none
AUS00500	4, 8, 12, 16, 20, 24	none
AUS00600	2, 6, 10, 14, 18, 22	none
AUS00700 AUS0070A	3, 7, 11, 15, 19, 23	none
AUS00800	2, 6, 10, 14, 18, 22	none
AUS00900 AUS0090A AUS0090B	1, 5, 9, 13, 17, 21	none
(AUS0040A* Feeder-link) AUS0040A* AUS0040B*	1, 5, 9	none

AUS0040C* AUS0070A* AUS0090A* AUS0090B*		
(AUS0070A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	4, 8, 12	none
AUT01600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
AZE06400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
AZR13400* POR13300*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BDI27000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BEL01800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BEN23300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BFA10700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BGD22000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BHR25500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BIH14800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BLR06200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
BOT29700	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BRM29800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BRU3300A	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
BTN03100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
BUL02000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CAF25800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none

CBG29900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CHN15400* CHN15600*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CHN15500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CHN15700* CHN15900*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CHN15800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CHN16100* CHN17500* CHN17900* CHN18000*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CHN16600* CHN16800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CHN19000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CKH05200* CKH05300* NIU05400* NZL05500* TKL05800*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
CLN21900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
CME30000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
COG23500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
COM20700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CPV30100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
CTI23700	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
CVA08300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CVA08500	20	none
CYP08600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CZE14400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
D 08700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
DJI09900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

DNK08900* DNKFRO*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
DNK09000	33, 37	none
DNK09100	27, 35	none
E 12900* CNR13000*	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
EGY02600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ERI09200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
EST06100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ETH09200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
F 09300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
FIN10300	1, 22, 24, 26, 28, 30, 32, 34, 36, 38	none
FJI19300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
FSM00000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
G 02700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
GAB26000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GEO06400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
GHA10800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
GMB30200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GNB30400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
GNE30300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
GRC10500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
GUI19200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
GUM33100* MRA33200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
HNG10600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
HOL21300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
HRV14800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none

I 08200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
IND03700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
IND03800* IND04000*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IND03900* IND04100* IND04300* IND04500*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
IND04200* IND04600* IND04800*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IND04700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
INS02800* INS03000* INS03200*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
INS03500* INS03600*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
IRL21100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
IRN10900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
IRQ25600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ISL04900	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
ISL05000	23, 31, 39	none
ISR11000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
J 11100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
JOR22400	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
KAZ06600	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
KEN24900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
KGZ07000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
KIR00001* KIR00002*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
KOR11200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none

KRE28600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
KWT11300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LAO28400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
LBN27900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LBR24400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LBY28000* LBY32100*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LIE25300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LSO30500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LTU06100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LUX11400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
LVA06100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MAC00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MAU24200* MAU24300*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MCO11600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MDA06300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MDG23600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MHL00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MKD14800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MLA22700* MLA22800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MLD30600	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
MLI32700* MLI32800*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MLT14700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none

MNG24800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MOZ30700	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MRC20900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
MTN22300* MTN28800*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MWI30800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
MYT09800* REU09700*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NCL10000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
NGR11500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NIG11900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NMB02500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
NOR12000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NPL12200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
NRU30900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
OCE10100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
OMA12300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
PAK12700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PHL28500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PLM33700* SMA33500* SMA33000*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PLW00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
PNG13100	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
POL13200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
QAT24700	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none

ROU13600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
RRW31000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
RST-1	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-2	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-3	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RST-5	25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RUS00401	25, 27, 29, 31, 33, 35, 37, 39	none
RUS00402	26, 28	none
S 13800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SDN23000* SDN23100* SDN23200*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SEN22200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
SEY00000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
SLM00000	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SMO05700	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SMR31100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SNG15100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
SOM31200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SRL25900	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
STP24100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
SUI14000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SVK14400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
SVN14800	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
SWZ31300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
SYR22900	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none

SYR33900	21	none
TCD14300	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TGO22600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
THA14200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
TJK06900	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TKM06800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
TON21500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
TUN15000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
TUN27200	1	none
TUR14500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
TUV00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
TZA22500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
UAE27400	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
UGA05100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none
UKR06300	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
UZB07100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
VTN32500	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
VUT12800	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
WAK33400	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23	none
WAL10200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	none
YEM26600* YEM26700*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
YUG14800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
YYY00000	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none

ZAI32200* ZAI32300*	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ZMB31400	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	none
ZWE13500	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	none

4.2 Compatibility analysis for terrestrial stations into BSS downlink (paragraph 6.1.1 of Article 6 of Appendix S30)

No incompatibilities were found.

4.3 Compatibility analysis for FSS (space-to-Earth) into BSS downlink (paragraph 7.2.1 of Article 7 of Appendix S30)

NOTE 1 - * indicates subsidiary beams of a composite beam.

Beam Name	channels	Affecting administrations
AFG24500* AFG24600*	2, 4, 6, 8, 10, 12	USA/IT
AFG24500* AFG24600*	14, 16, 18, 20, 22, 24	none
AFS02100	1, 3, 5, 7, 9, 11, 13	USA/IT
AFS02100	15, 17, 19	none
AGL29500	1, 3, 5, 7, 9, 11, 13	HOL USA/IT
AGL29500	15, 17, 19	none
ALB29600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ALG25100* ALG25200*	2, 4, 6, 8, 10, 12	HOL USA/IT
ALG25100* ALG25200*	14, 16, 18, 20	none
AND34100	1, 3, 5, 7, 9, 11, 13	HOL USA/IT
AND34100	15, 17, 19	HOL
ARM06400	1, 3, 5, 7, 9, 11, 13	USA/IT
ARM06400	15, 17, 19	none
ARS00300* ARS27500*	22, 24, 26	none
ARS00300* ARS27500*	28, 30, 32, 34, 36, 38, 40	MLA
ARS34000	24	none

AUS00400 AUS0040A AUS0040B AUS0040C	3, 7, 11	USA USA/IT
AUS00400 AUS0040A AUS0040B AUS0040C	15, 19, 23	USA
AUS00500	4, 8, 12	USA USA/IT
AUS00500	16, 20, 24	USA
AUS00600	2, 6, 10	USA USA/IT
AUS00600	14, 18, 22	USA
AUS00700 AUS0070A	3, 7, 11	J USA/IT
AUS00700 AUS0070A	15, 19, 23	J
AUS00800	2, 6, 10	J USA/IT
AUS00800	14, 18, 22	J
AUS00900 AUS0090A AUS0090B	1, 5, 9, 13	J USA USA/IT
AUS00900 AUS0090A AUS0090B	17, 21	J USA
(AUS0040A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	1, 5, 9	USA USA/IT
(AUS0070A* Feeder-link) AUS0040A* AUS0040B* AUS0040C* AUS0070A* AUS0090A* AUS0090B*	4, 8, 12	J USA/IT
AUT01600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
AZE06400	2, 4, 6, 8, 10, 12	USA/IT
AZE06400	14, 16, 18, 20	none

AZR13400* POR13300*	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	HOL USA USA/IT
BDI27000	22, 24, 26	none
BDI27000	28, 30, 32, 34, 36, 38, 40	MLA
BEL01800	22, 24	E
BEL01800	26, 28, 30, 32, 34, 36, 38, 40	none
BEN23300	1, 3, 5, 7, 9, 11, 13	HOL USA/IT
BEN23300	15, 17, 19	none
BFA10700	1, 3, 5, 7, 9, 11	HOL USA/IT
BFA10700	13	E HOL USA/IT
BFA10700	15, 17, 19	E
BGD22000	1, 3, 5, 7, 9, 11, 13	USA/IT
BGD22000	15, 17, 19, 21, 23	none
BHR25500	22, 24	none
BHR25500	26, 28, 30, 32, 34, 36, 38, 40	PAK
BIH14800	1, 3, 5, 7, 9, 11, 13	USA/IT
BIH14800	15, 17, 19	none
BLR06200	1, 3, 5, 7, 9, 11, 13	USA/IT
BLR06200	15, 17, 19	none
BOT29700	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
BRM29800	1, 3, 5, 7, 9, 11, 13	USA/IT
BRM29800	15, 17, 19, 21, 23	none
BRU3300A	2, 4, 6, 8, 10, 12	USA/IT
BRU3300A	14, 16, 18, 20, 22, 24	none
BTN03100	1, 3, 5, 7, 9, 11, 13	USA/IT
BTN03100	15, 17, 19, 21, 23	none
BUL02000	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
CAF25800	22, 24, 26	USA
CAF25800	28, 30, 32, 34, 36, 38, 40	none
CBG29900	2, 4, 6, 8, 10, 12	USA/IT
CBG29900	14, 16, 18, 20, 22, 24	none
CHN15400* CHN15600*	1, 3, 5, 7, 9, 11, 13	USA/IT

CHN15400* CHN15600*	15, 17, 19, 21, 23	none
CHN15500	2, 4, 6, 8, 10, 12	USA/IT
CHN15500	14, 16, 18, 20, 22, 24	none
CHN15700* CHN15900*	1, 3, 5, 7, 9, 11, 13	USA/IT
CHN15700* CHN15900*	15, 17, 19, 21, 23	none
CHN15800	2, 4, 6, 8, 10, 12	USA/IT
CHN15800	14, 16, 18, 20, 22, 24	none
CHN16100* CHN17500* CHN17900* CHN18000*	1, 3, 5, 7, 9, 11, 13	USA/IT
CHN16100* CHN17500* CHN17900* CHN18000*	15, 17, 19, 21, 23	none
CHN16600* CHN16800*	2, 4, 6, 8, 10, 12	USA/IT
CHN16600* CHN16800*	14, 16, 18, 20, 22, 24	none
CHN19000	1, 3, 5, 7, 9, 11, 13	USA USA/IT
CHN19000	15, 17, 19, 21, 23	USA
CKH05200* CKH05300* NIU05400* NZL05500* TKL05800*	1, 3, 5, 7, 9, 11, 13	USA USA/IT
CKH05200* CKH05300* NIU05400* NZL05500* TKL05800*	15, 17, 19, 21, 23	USA
CLN21900	2, 4, 6, 8, 10, 12	USA/IT
CLN21900	14, 16, 18, 20, 22, 24	none
CME30000	21, 23, 25	USA
CME30000	27, 29, 31, 33, 35, 37, 39	none
COG23500	1, 3, 5, 7, 9, 11, 13	HOL USA USA/IT
COG23500	15, 17, 19	USA
COM20700	1, 3, 5, 7, 9, 11, 13	USA/IT

COM20700	15, 17, 19	none
CPV30100	1, 3, 5, 7, 9, 11	HOL USA/IT
CPV30100	13	E HOL USA/IT
CPV30100	15, 17, 19	E HOL
CTI23700	22, 24	E HOL
CTI23700	26	HOL
CTI23700	28, 30, 32, 34, 36, 38, 40	none
CVA08300	21, 23, 25	HOL USA USA/IT
CVA08300	27, 29, 31, 33, 35, 37, 39	none
CVA08500	20	HOL USA USA/IT
CYP08600	21, 23, 25	none
CYP08600	27, 29, 31, 33, 35, 37, 39	MLA
CZE14400	22, 24, 26	USA
CZE14400	28, 30, 32, 34, 36, 38, 40	none
D 08700	1, 3, 5, 7, 9, 11, 13	HOL USA/IT
D 08700	15, 17, 19	none
DJI09900	1, 3, 5, 7, 9, 11, 13	USA/IT
DJI09900	15, 17, 19	none
DNK08900* DNKFRO*	1, 3, 5, 7, 9, 11, 13	HOL USA/IT
DNK08900* DNKFRO*	15, 17, 19	none
DNK09000	33, 37	none
DNK09100	27, 35	none
E 12900* CNR13000*	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
EGY02600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ERI09200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
EST06100	2, 4, 6, 8, 10, 12	USA/IT
EST06100	14, 16, 18, 20	none
ETH09200	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
F 09300	1, 3, 5, 7, 9, 11, 13	HOL USA/IT
F 09300	15, 17, 19	none

FIN10300	1	USA/IT
FIN10300	22, 24, 26, 28, 30, 32, 34, 36, 38	none
FJI19300	1, 3, 5, 7, 9, 11, 13	HOL J USA USA/IT
FJI19300	15, 17, 19, 21, 23	J USA
FSM00000	1, 3, 5, 7, 9, 11	USA/IT
FSM00000	13	MHL USA USA/IT
FSM00000	15, 17, 19, 21, 23	none
G 02700	2, 4, 6, 8, 10, 12	HOL USA/IT
G 02700	14, 16, 18, 20	HOL
GAB26000	1, 3, 5, 7, 9, 11, 13	HOL USA USA/IT
GAB26000	15, 17, 19	USA
GEO06400	22, 24	none
GEO06400	26, 28, 30, 32, 34, 36, 38, 40	PAK
GHA10800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
GMB30200	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	HOL USA USA/IT
GNB30400	2, 4, 6, 8, 10, 12	HOL USA/IT
GNB30400	14, 16, 18, 20	E HOL
GNE30300	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
GRC10500	1, 3, 5, 7, 9, 11, 13	USA/IT
GRC10500	15, 17, 19	none
GUI19200	2, 4, 6, 8, 10, 12, 14, 16, 18, 20	HOL USA USA/IT
GUM33100* MRA33200*	1, 3, 5, 7, 9, 11, 13	USA/IT
GUM33100* MRA33200*	15, 17, 19, 21, 23	none
HNG10600	2, 4, 6, 8, 10, 12	HOL USA USA/IT
HNG10600	14, 16, 18, 20	USA
HOL21300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
HRV14800	21, 23, 25	USA
HRV14800	27, 29, 31, 33, 35, 37, 39	none
I 08200	1, 3, 5, 7, 9, 11, 13	USA/IT
I 08200	15, 17, 19	none

IND03700	2, 4, 6, 8, 10, 12	USA/IT
IND03700	14, 16, 18, 20, 22, 24	none
IND03800* IND04000*	1, 3, 5, 7, 9, 11, 13	USA/IT
IND03800* IND04000*	15, 17, 19, 21, 23	none
IND03900* IND04100* IND04300* IND04500*	2, 4, 6, 8, 10, 12	USA/IT
IND03900* IND04100* IND04300* IND04500*	14, 16, 18, 20, 22, 24	none
IND04200* IND04600* IND04800*	1, 3, 5, 7, 9, 11, 13	USA/IT
IND04200* IND04600* IND04800*	15, 17, 19, 21, 23	none
IND04700	1, 3, 5, 7, 9, 11, 13	USA/IT
IND04700	15, 17, 19, 21, 23	none
INS02800* INS03000* INS03200*	1, 3, 5, 7, 9, 11, 13	USA/IT
INS02800* INS03000* INS03200*	15, 17, 19, 21, 23	none
INS03500* INS03600*	2, 4, 6, 8, 10, 12	USA/IT
INS03500* INS03600*	14, 16, 18, 20, 22, 24	none
IRL21100	22, 24, 26	HOL
IRL21100	28, 30, 32, 34, 36, 38, 40	none
IRN10900	1, 3, 5, 7, 9, 11, 13	USA/IT
IRN10900	15, 17, 19, 21, 23	none
IRQ25600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
ISL04900	21, 23, 25	HOL
ISL04900	27, 29, 31, 33, 35, 37, 39	none
ISL05000	23, 31, 39	none

ISR11000	1, 3, 5, 7, 9, 11, 13	USA/IT
ISR11000	15, 17, 19	none
J 11100	1, 3, 5, 7, 9, 11	USA/IT
J 11100	13	USA USA/IT
J 11100	15, 17, 19, 21, 23	none
JOR22400	22, 24, 26	none
JOR22400	28, 30, 32, 34, 36, 38, 40	MLA
KAZ06600	1, 3, 5, 7, 9, 11, 13	USA/IT
KAZ06600	15, 17, 19	none
KEN24900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
KGZ07000	1, 3, 5, 7, 9, 11, 13	USA/IT
KGZ07000	15, 17, 19	none
KIR00001* KIR00002*	1, 3, 5, 7, 9, 11, 13	HOL J USA USA/IT
KIR00001* KIR00002*	15, 17, 19, 21, 23	J USA
KOR11200	2, 4, 6, 8, 10, 12	USA USA/IT
KOR11200	14, 16, 18, 20, 22, 24	USA
KRE28600	2, 4, 6, 8, 10, 12	MHL USA/IT
KRE28600	14, 16, 18, 20, 22, 24	MHL
KWT11300	22, 24, 26	none
KWT11300	28, 30, 32, 34, 36, 38, 40	MLA
LAO28400	2, 4, 6, 8, 10, 12	USA USA/IT
LAO28400	14, 16, 18, 20, 22, 24	USA
LBN27900	1, 3, 5, 7, 9, 11, 13	USA/IT
LBN27900	15, 17, 19	none
LBR24400	1, 3, 5, 7, 9, 11, 13	HOL USA/IT
LBR24400	15, 17, 19	HOL
LBY28000* LBY32100*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LIE25300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LSO30500	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
LTU06100	1, 3, 5, 7, 9, 11, 13	USA/IT

LTU06100	15, 17, 19	none
LUX11400	1, 3, 5, 7, 9, 11, 13	USA/IT
LUX11400	15, 17, 19	none
LVA06100	22, 24	none
LVA06100	26	IND UAE
LVA06100	28, 30, 32, 34, 36, 38	IND THA UAE
LVA06100	40	THA UAE
MAC00000	2, 4, 6, 8, 10, 12	USA USA/IT
MAC00000	14, 16, 18, 20, 22, 24	USA
MAU24200* MAU24300*	22, 24	none
MAU24200* MAU24300*	26, 28, 30, 32, 34, 36, 38, 40	PAK
MCO11600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MDA06300	22, 24	none
MDA06300	26	IND UAE
MDA06300	28, 30, 32, 34, 36, 38	IND THA UAE
MDA06300	40	THA UAE
MDG23600	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MHL00000	2, 4, 6, 8, 10, 12	USA USA/IT
MHL00000	14, 16, 18, 20, 22, 24	USA
MKD14800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MLA22700* MLA22800*	2, 4, 6, 8, 10, 12	USA/IT
MLA22700* MLA22800*	14, 16, 18, 20, 22, 24	none
MLD30600	2, 4, 6, 8, 10, 12	USA/IT
MLD30600	14, 16, 18, 20, 22, 24	none
MLI32700* MLI32800*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
MLT14700	2, 4, 6, 8, 10, 12	HOL USA USA/IT
MLT14700	14, 16, 18, 20	USA
MNG24800	21, 23	none
MNG24800	25	G J TON USA/IT

MNG24800	27	CHN G IND J TON USA/IT
MNG24800	29, 31, 33, 35, 37, 39	CHN G IND INS J KOR LAO MLA THA TON USA/IT
MOZ30700	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
MRC20900	1, 3, 5, 7, 9, 11, 13	HOL USA/IT
MRC20900	15, 17, 19	none
MTN22300* MTN28800*	2, 4, 6, 8, 10, 12	HOL USA/IT
MTN22300* MTN28800*	14, 16, 18, 20	none
MWI30800	2, 4, 6, 8, 10, 12	HOL USA USA/IT
MWI30800	14, 16, 18, 20	USA
MYT09800* REU09700*	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NCL10000	2, 4, 6, 8, 10, 12	MHL USA/IT
NCL10000	14, 16, 18, 20, 22, 24	MHL
NGR11500	22, 24, 26	HOL
NGR11500	28, 30, 32, 34, 36, 38, 40	none
NIG11900	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NMB02500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
NOR12000	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
NPL12200	1, 3, 5, 7, 9, 11, 13	USA/IT
NPL12200	15, 17, 19, 21, 23	none
NRU30900	1, 3, 5, 7, 9, 11, 13	USA/IT
NRU30900	15, 17, 19, 21, 23	none
OCE10100	2, 4, 6, 8, 10, 12	J USA USA/IT
OCE10100	14, 16, 18, 20, 22, 24	J USA
OMA12300	1, 3, 5, 7, 9, 11, 13	USA/IT
OMA12300	15, 17, 19	none
PAK12700	2, 4, 6, 8, 10, 12	USA/IT
PAK12700	14, 16, 18, 20, 22, 24	none
PHL28500	2, 4, 6, 8, 10, 12	USA/IT
PHL28500	14, 16, 18, 20, 22, 24	none

PLM33700* SMA33500* SMA33000*	2, 4, 6, 8, 10, 12	HOL J TON USA/IT
PLM33700* SMA33500* SMA33000*	14, 16, 18, 20, 22, 24	J TON
PLW00000	2, 4, 6, 8, 10, 12	MHL USA/IT
PLW00000	14, 16, 18, 20, 22, 24	MHL
PNG13100	2, 4, 6, 8, 10	USA/IT
PNG13100	12	USA USA/IT
PNG13100	14, 16, 18, 20, 22, 24	none
POL13200	2, 4, 6, 8, 10, 12	USA/IT
POL13200	14, 16, 18, 20	none
QAT24700	2, 4, 6, 8, 10, 12	USA/IT
QAT24700	14, 16, 18, 20	none
ROU13600	22, 24	none
ROU13600	26	PAK UAE
ROU13600	28, 30, 32, 34, 36, 38, 40	PAK THA UAE
RRW31000	2, 4, 6, 8, 10, 12	USA/IT
RRW31000	14, 16, 18, 20	none
RST-1	25	PAK
RST-1	26	PAK UAE
RST-1	27	MLA PAK UAE
RST-1	28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	MLA PAK THA UAE
RST-2	25	none
RST-2	26, 27	IND SNG UAE
RST-2	28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38	IND SNG THA UAE
RST-2	39	IND THA UAE
RST-2	40	THA UAE
RST-3	25	G HOL PAK TON
RST-3	26, 27	CHN G HOL IND PAK SNG TON
RST-3	28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38	CHN G HOL IND KOR LAO MLA PAK SNG THA TON
RST-3	39	CHN G HOL IND KOR LAO MLA PAK THA TON

RST-3	40	CHN G HOL KOR LAO MLA PAK THA TON
RST-5	25, 26	MHL USA
RST-5	27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40	none
RUS00401	25	G J USA
RUS00401	27	CHN G IND J SNG
RUS00401	29, 31, 33, 35, 37	CHN G IND INS J KOR LAO MLA SNG THA
RUS00401	39	CHN G IND INS J KOR LAO MLA THA
RUS00402	26	CHN G IND J SNG USA
RUS00402	28	CHN G IND INS J KOR LAO MLA SNG THA
S 13800	2, 4, 6, 8, 10, 12	USA/IT
S 13800	14, 16, 18, 20	none
SDN23000* SDN23100* SDN23200*	2, 4, 6, 8, 10, 12	HOL USA/IT
SDN23000* SDN23100* SDN23200*	14, 16, 18, 20	none
SEN22200	21, 23, 25	HOL USA USA/IT
SEN22200	27, 29, 31, 33, 35, 37, 39	UAE
SEY00000	21, 23, 25	none
SEY00000	27	UAE
SEY00000	29, 31, 33, 35, 37, 39	THA UAE
SLM00000	1, 3, 5, 7, 9, 11	USA/IT
SLM00000	13	USA USA/IT
SLM00000	15, 17, 19, 21, 23	none
SMO05700	1, 3, 5, 7, 9, 11, 13	HOL J USA USA/IT
SMO05700	15, 17, 19, 21, 23	J USA
SMR31100	1, 3, 5, 7, 9, 11, 13, 15, 17, 19	HOL USA USA/IT
SNG15100	1, 3, 5, 7, 9, 11, 13	USA/IT
SNG15100	15, 17, 19, 21, 23	none
SOM31200	1, 3, 5, 7, 9, 11, 13	USA/IT
SOM31200	15, 17, 19	none
SRL25900	21, 23, 25	HOL
SRL25900	27, 29, 31, 33, 35, 37, 39	none

STP24100	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
SUI14000	2, 4, 6, 8, 10, 12	HOL USA/IT
SUI14000	14, 16, 18, 20	none
SVK14400	1, 3, 5, 7, 9, 11, 13	HOL USA USA/IT
SVK14400	15, 17, 19	USA
SVN14800	2, 4, 6, 8, 10, 12	USA/IT
SVN14800	14, 16, 18, 20	none
SWZ31300	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
SYR22900	2, 4, 6, 8, 10, 12	USA/IT
SYR22900	14, 16, 18, 20	none
SYR33900	21	none
TCD14300	1, 3, 5, 7, 9, 11, 13	HOL USA/IT
TCD14300	15, 17, 19	none
TGO22600	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
THA14200	1, 3, 5, 7, 9, 11, 13	USA/IT
THA14200	15, 17, 19, 21, 23	none
TJK06900	1, 3, 5, 7, 9, 11, 13	USA/IT
TJK06900	15, 17, 19	none
TKM06800	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
TON21500	2, 4, 6, 8, 10, 12	HOL J USA USA/IT
TON21500	14, 16, 18, 20, 22, 24	J USA
TUN15000	2, 4, 6, 8, 10, 12	HOL USA/IT
TUN15000	14, 16, 18, 20	E
TUN27200	1	HOL USA/IT
TUR14500	1, 3, 5, 7, 9, 11, 13	USA/IT
TUR14500	15, 17, 19	none
TUV00000	2, 4, 6, 8, 10, 12	HOL J USA USA/IT
TUV00000	14, 16, 18, 20, 22, 24	J USA
TZA22500	21, 23, 25, 27, 29, 31, 33, 35, 37, 39	none
UAE27400	21, 23, 25	none

UAE27400	27	IND
UAE27400	29, 31, 33, 35, 37, 39	IND THA
UGA05100	1, 3, 5, 7, 9, 11, 13	HOL USA/IT
UGA05100	15, 17, 19	none
UKR06300	2, 4, 6, 8, 10, 12	USA/IT
UKR06300	14, 16, 18, 20	none
UZB07100	22, 24	none
UZB07100	26	IND PAK UAE
UZB07100	28, 30, 32, 34, 36, 38	IND MLA PAK THA UAE
UZB07100	40	MLA PAK THA UAE
VTN32500	2, 4, 6, 8, 10, 12	USA/IT
VTN32500	14, 16, 18, 20, 22, 24	none
VUT12800	1, 3, 5, 7, 9, 11, 13	MHL USA/IT
VUT12800	15, 17, 19, 21, 23	MHL
WAK33400	1, 3, 5, 7, 9, 11, 13	MHL USA/IT
WAK33400	15, 17, 19, 21, 23	MHL
WAL10200	2, 4, 6, 8, 10, 12	MHL USA USA/IT
WAL10200	14, 16, 18, 20, 22, 24	MHL USA
YEM26600* YEM26700*	2, 4, 6, 8, 10, 12	USA/IT
YEM26600* YEM26700*	14, 16, 18, 20	none
YUG14800	22, 24, 26, 28, 30, 32, 34, 36, 38, 40	none
YYY00000	2, 4, 6, 8, 10, 12	HOL USA USA/IT
YYY00000	14, 16, 18, 20	USA
ZAI32200* ZAI32300*	2, 4, 6, 8, 10, 12	HOL USA/IT
ZAI32200* ZAI32300*	14, 16, 18, 20	none
ZMB31400	2, 4, 6, 8, 10, 12	USA/IT
ZMB31400	14, 16, 18, 20	none
ZWE13500	1, 3, 5, 7, 9, 11, 13	USA/IT
ZWE13500	15, 17, 19	none

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

RESULTS OF THE FEEDER-LINK FEASIBILITY STUDY

Please find attached to this document complementary/updated information to that contained in Attachment 4 to Document CMR2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Results of the feeder-link feasibility study

ATTACHMENT

Director, Radiocommunication Bureau

RESULTS OF THE FEEDER-LINK FEASIBILITY STUDY

0 Summary

A feeder-link feasibility study on the “Planning Approach” has been conducted in accordance with the methodology and the technical assumptions described in Attachments 1 and 2 of Document CMR2000/34 respectively.

The results indicate that:

- all national beams can be accommodated in the “example Plans” with 10 channels in Region 1 and 12 channels in Region 3 and no excess of interference; and
- eight of the eleven multinational beams (i.e. one “existing”[1] beams and ten “planned”[2] beams) can be accommodated with the required number of channels.

1 Introduction

For the purpose of carrying out feeder-link feasibility study associated with the downlink feasibility study, the IRG developed specific methodology and technical assumptions which are described in Attachments 1 and 2 of Document CMR2000/34 respectively, and complemented by information contained in Corrigenda 1 and 2 to Document CMR2000/34 respectively.

In accordance with Principle 3 of Annex 1 to Resolution 532 (WRC-97), thirteen “existing” systems were included in the feeder-link feasibility study, i.e. ten which were considered in the study for IRG-5 (Beam J 11100 renamed J 1110E, HISPASAT-1 (27 MHz Analogue and Digital), KOREASAT-1 (Analogue and Digital), BS-3N, Beam S 13902, SIRIUS, RST-1 (8 channels), BIFROST-2) plus three additional networks that became “existing” systems after IRG-5 (HISPASAT-1 (33 MHz Digital), BIFROST and EUTELSAT B-13E) (see also Annex A of Corrigendum 2 to Document CMR2000/34).

The results of the feeder-link feasibility study conducted by the Radiocommunication Bureau at the request of the IRG are presented in this document for consideration by WRC-2000.

2 Description of Annex 2 tables

The results of the feeder-link feasibility study of the “Planning Approach” are provided in the order of orbital position as appearing in Annex 2 of this document.

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[1] Whenever the term “existing” is used in this document, it refers to notified assignments that are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau.

[2] Whenever the term “planned” is used in this document, it refers to assignments/beams other than those of "existing" systems.

- The column titled "**ADM**" contains, generally, the ITU symbol of the Administration responsible for the proposed draft new assignments considered in the feeder-link feasibility study.
- The column titled "**Beam name**" contains the beam name as per the Appendix 30A feeder-link Plans, except in few cases for "existing" systems and new beams.
- The columns titled "**WRC-97: Pol. | Feeder-link channels**" contain the Appendix S30A channels and polarization for each beam, if it existed at the time of the establishment of that Appendix. In cases where the Appendix S30A beam has been moved, the Appendix S30A orbital position is also indicated.
- The columns titled "**Action 2: Polarization and channel(s) | Affected channel(s) | Worst EPM**" (i.e. Equivalent Protection Margin) contain information related to Action 2 of the feeder-link feasibility study (section 8.3 of Attachment 1 to Document CMR2000/34), i.e. feeder-link compatibility analysis using the downlink channels defined at Step 6 of the downlink feasibility study and transposed in the 17 GHz frequency band. The information provided in these columns corresponds respectively to:
  – The polarization and channel number(s) or the block[3] assigned to each beam (the orbital position used at Action 2 is also provided in cases where a different orbital position was used at Action 3).
  – The affected channel(s) of each beam.
  – The EPM in dB of the worst test-point of the worst affected channel of each beam.
- The columns titled "**Action 3: Orbital position | Polarization and channel(s) | Affected channel(s) | Worst EPM**" contain information related to Action 3 of the feeder-link feasibility study (section 8.4 of Attachment 1 to Document CMR2000/34 and its Corrigendum 1), i.e. manual adjustment of the Action 2 situation by using opposite type of polarization and/or different channels and/or, as a last resort, ±0.2° offset around a nominal orbital position[4]. The information provided in these columns corresponds respectively to:
  – The orbital position assigned to each beam, which, in particular, indicates the implementation or not of ±0.2° offset around a nominal orbital position (orbital positions in bold type highlight a change from the WRC-97 orbital position due to either an orbital position preference request or as a result of the downlink and feeder-link feasibility studies).
  – The polarization and channel number(s) or the block[3] assigned to each beam.
  – The affected channel(s) of each beam.
  – The EPM in dB of the worst test-point of the worst affected channel of each beam.

[3] A block of channels corresponds to a set of ten or twelve contiguous channels in one or two polarizations (see, in Annex 1 to this document, the description of the feeder-link blocks used in the analysis).

[4] The use of improved fast-roll antenna patterns at the receiving space station has not been used in this study since such an improved antenna was not provided by ITU-R JWP 10-11S at its October 1999 meeting.

3 Results of the feeder-link feasibility study

3.1 Overall results

The feeder-link feasibility study results constitute two “example Plans (i.e. at 14 GHz and 17 GHz)” and are not the only solution, nor it is the optimum one.

The results indicate that among 227 beams[5] relating to 51 nominal orbital positions considered in the feeder-link feasibility study, including 28 “existing” beams[5], 118 beams[5] relating to 28 nominal orbital positions contain affected channels after the implementation of Action 1 (i.e. reuse of downlink channels after a frequency transposition at 17 GHz), and that no beam[5] contain affected channels after the implementation of Action 3 (i.e. manual adjustments of the Action 2 situation).

Consequently, 100% of the beams[5] considered in the feeder-link feasibility study can get feeder-link channels with no excess interference (i.e. EPM ≥ -0.45 dB or EPM ≥ (Reference EPM - 0.45 dB)), noting that, the three multinational beams, which were not successfully accommodated with the required number of channels at Step 6 of the downlink feasibility study, were not considered in the feeder-link feasibility study.

Details of the reference situation can be found in the form of MSPACE Input files. They are available from the ITU website at:

http://www.itu.int/brconf/irg-gte/index.html

3.2 Application of the ±0.2° orbital position offset

In accordance with IRG decision, a ±0.2° orbital position offset has been used only where it was not possible to maintain the beams at the nominal orbital position.

These results include the application of ±0.2° orbital position offset for 69 beams[5] relating to 9 nominal orbital positions (see the orbital position values provided under the “Action 3” column of the tables of Annex 2 to this document).

3.3 Use of the 14 GHz frequency band

In accordance with IRG decision, the 14 GHz frequency band has been used only where necessary, i.e. it has been used where it was not possible to use the 17 GHz frequency band, and it has been used in priority for those beams, which have been assigned channels in the 14 GHz frequency band in the Appendix S30A Plan.

The 14 GHz frequency band has been assigned to 20 beams[5] (see the polarization and channels provided the “Action 3” column of the tables of Annex 2 to this document), among which 11 beams[5] have already been assigned channels in this frequency band in the Appendix S30A Plan. On the other hand, it was possible to use the 17 GHz frequency band for 21 other beams[5], which have been assigned channels in the 14 GHz frequency band in the Appendix S30A Plan.

3.4 Required orbital position changes

As indicated in the IRG Report, it was expected that few orbital position changes might be necessary in order to find a solution to the feeder-link feasibility study.

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[5] A "beam" in this context is either a single elliptical beam, a composite beam or a shaped beam corresponding to an entry in the MSPACE input file, i.e.: a satellite system can be composed of several beams (e.g. two beams for HISPASAT-1 (analogue 27 MHz), four beams for RST-1).

Indeed, in order to resolve incompatibility problems encountered during the feeder-link feasibility study at 13° W, 7° W and 44° E, it was required to move the following 4 beams at another orbital position (see Note 1 of the tables of Annex 2 to this document):

- ALB29600 and TCD14300 from 7° W to 25° W;
- HOL21300 from 13° W to 25° W;
- MDA06300 from 44° E to 50° E.

In accordance with IRG decision, all beams that have moved to a new orbital position have had their ellipse parameters recalculated, except in the case of a ±0.2° orbital position offset. In few cases, it was necessary to add some temporary test-points within the national territory of a given country in order to ensure that the recalculated beam provides proper coverage of the national territory of that country. These temporary test-points were only added for the purpose of ellipse recalculation and were removed in subsequent actions in order not to be considered as new additional test-points. Plots of the recalculated ellipses are at Annex 3 to this document.

3.5 Required e.i.r.p. adjustment

Finally, as an exceptional measure, the following e.i.r.p. adjustments were implemented (see Notes a), b), c), or d) of the tables of Annex 2 to this document) in order to meet the required feeder-link objective (i.e. EPM ≥ -0.45 dB or EPM ≥ (Reference EPM - 0.45 dB)).

- 0.3 dB e.i.r.p. reduction on all channels of beam HNG10600 at 12.8° W in order to provide beam CZE14400 at 12.8° W with an EPM > -0.45 dB (an alternative solution would have been to use 0.4° orbital separation between these two beams, but it has not been implemented since the respective Administrations have requested the use of a common orbital position for these two beams). Should no e.i.r.p. reduction be applied, a worst EPM excess of 0.15 dB would have been found for beam CZE14400.
- 0.4 dB e.i.r.p. reduction on all channels of beam MCO11600 at 7.2° W in order to provide beam YUG14800 at 6.8° W with an EPM > -0.45 dB. Should no e.i.r.p. reduction be applied, a worst EPM excess of 0.19 dB would have been found for beam YUG14800.
- 3.5 dB e.i.r.p. reduction on channel 21 only of beam CYP08600 at 4.8° E in order to provide “existing” beam SIRIUS02 at 5.2° E with an EPM ≥ (Reference EPM - 0.45 dB). Should no e.i.r.p. reduction be applied, a worst EPM excess of 1.11 dB would have been found for beam “existing” beam SIRIUS02 on its channel 20 only, noting that no EPM Excess were found on its other channels.
- 2 dB e.i.r.p. reduction on all channels of beam ROU13600 at 43.8° E in order to provide beam TKM06800 at 44.2° E and beam UZB07100 at 43.8° E with an EPM > -0.45 dB, noting that the resulting e.i.r.p. level used for beam ROU13600 is 84 dBW which corresponds to the e.i.r.p. level of all the other beams sharing the same orbital position. The 86 dBW e.i.r.p. level, which was required for beam ROU13600 at its Appendix S30A orbital position: 1° W, is thus no longer necessary. Should no e.i.r.p. reduction be applied, a worst EPM excess of 0.76 dB and 0.52 dB would have been found for beams TKM06800 and UZB07100 respectively.

ANNEX 1

Feeder-link channel raster

A.1 Channel raster b) at 17 GHz

A.1.1 Blocks A, B, C and D

	Polarization	Channel numbers
Block A	CL	In Region 1: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19 In Region 3: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19,21,23
Block B	CR	In Region 1: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 In Region 3: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24
Block C	CL	In Region 1: 21, 23, 25, 27, 29, 31, 33, 35, 37, 39 In Region 3: 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39
Block D	CR	In Region 1: 22, 24, 26, 28, 30, 32, 34, 36, 38, 40 In Region 3: 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40

A.1.2 Blocks A’, B’, C’ and D’

	Polarization	Channel numbers
Block A’	CR	In Region 1: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19 In Region 3: 1, 3, 5, 7, 9, 11, 13, 15, 17, 19,21,23
Block B’	CL	In Region 1: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 In Region 3: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24
Block C’	CR	In Region 1: 21, 23, 25, 27, 29, 31, 33, 35, 37, 39 In Region 3: 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39
Block D’	CL	In Region 1: 22, 24, 26, 28, 30, 32, 34, 36, 38, 40 In Region 3: 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40

A.2 Channel raster d) at 14 GHz

A.2.1 Block E

	Polarization	Channel numbers
Block E	CL	In Region 1: 5, 7, 9, 11, 13 In Region 3: 3, 5, 7, 9, 11, 13
	CR	In Region 1: 6, 8, 10, 12, 14 In Region 3: 4, 6, 8, 10, 12, 14

A.2.2 Block E’

	Polarization	Channels
Block E’	CR	In Region 1: 5, 7, 9, 11, 13 In Region 3: 3, 5, 7, 9, 11, 13
	CL	In Region 1: 6, 8, 10, 12, 14 In Region 3: 4, 6, 8, 10, 12, 14

In the case of both Blocks E and E’, adjacent channels of a given beam are grouped in order to not take into account the internal adjacent channel interference effect, as decided by the IRG.

ANNEX 2

Nominal orbital position: 37° W

ADM	Beam name	WRC-97		**Action 2** (feeder-link feasibility study of transposed Step 6 downlink channels)			**Action 3** (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
CVA	CVA08300	CR	27,31,35,39	Block C' (CR)		>0	-37.00	Block C' (CR)		>0
	CVA08500 #	CR	23	CL 20	20	-6.10	-37.00	CL 40		>0
GMB	GMB30200	CR	3,7,11,15,19	Block A (CL)	3,5,7,9,11,13,15, 17,19	-1.60	-37.00	Block B (CR)		>0
GUI	GUI19200	CR	1,5,9,13,17	Block B (CR)		>0	-37.00	Block D (CR)		>0
POR	AZR13400 *	CL	24,28,32,36,40 (at 30° W)	Block A (CL)	1,3,5,7,9,11,13, 15,17,19	-5.27	**-37.00**	Block A (CL)		>0
	POR13300 *	CR	3,7,11,15,19 (at 30° W)							
SEN	SEN22200	CR	29,33,37	Block C (CL)		>0	-37.00	Block C (CL)		>0
	SEN22201	CR	7,11 (14 GHz)							
SMR	SMR31100	CL	1,5,9,13,17	Block A' (CR)	2,4,6,8,10, 12,14,16,18,20	>0	-37.00	Block A' (CR)		>0

Multinational beam
* Composite beam

Nominal orbital position: 33.5° W

ADM	**Beam name**	**WRC-97**		**Action 2** (feeder-link feasibility study of transposed Step 6 downlink channels)			**Action 3** (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
AND	AND34100	CR	4,8,12,16,20 (at 37° W)	Block A (CL)		>0	**-33.50**	Block D (CL)		>0
G	G 02700	CL	4,8,12,16,20	Block B (CR)		>0	-33.50	Block B (CR)		>0
IRL	IRL21100	CL	2,6,10,14,18	Block D (CR)		>0	-33.50	Block A (CL)		>0
ISL	ISL04900	CR	21,25,29,33,37	Block C (CL)		>0	-33.50	Block C (CL)		>0
LBR	LBR24400	CL	3,7,11,15,19	Block A’ (CR)		>0	-33.50	Block A’ (CR)		>0
NGR	NGR11500	CL	24,28,32,36,40 (at 25° W)	Block D’ (CL)		>0	**-33.50**	Block D’ (CL)		>0
SRL	SRL25900	CL	23,27,31,35,39	Block C’ (CR)		>0	-33.50	Block C’ (CR)		>0

Nominal orbital position: 30° W *(first part)*

ADM	Beam name	WRC-97		**Action 2** (feeder-link feasibility study of transposed Step 6 downlink channels)			**Action 3** (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
BEL	BEL01800	CL	21,25,29,33,37 (at 19° W)	Block D (CR)		>0	**-30.00**	Block C (CL)		>0
BFA	BFA10700	CL	21,25,29,33,37	Block A (CL)	1,3,5,7,9, 11,13,15,17,19	-7.98	-30.00	Block D' (CL)		>0
CPV	CPV30100	CR	2,4,6,8,12 (14 GHz)	Block A' (CR)	1,3,5,7,9, 11,13,15,17,19	-2.79	-30.00	Block E (14 GHz)		>0
CTI	CTI23700	CR	22,26,30,34,38	Block D (CR)		>0	-30.00	Block B' (CL)		>0
E	CNR13000*	CR	23,27,31,35,39 $^{=}$	Block A' (CR) $^{+}$	1,3,5,7,9,	-23.21	-30.00	Block A' (CR) $^{+}$		>0
	E 12900 *	CR	1,5,9,13,17 $^{+}$		11,13,15,17,19					
	HISPASA4 $^{\%@}$	CR	1,5,9,13,17 $^{+}$	CR 1,5,9,13,17 $^{+}$	1,5,9,13,17	-14.54	-30.00	CR 1,5,9,13,17 $^{+}$		>0
	HISPASA6 $^{\%@}$	CR	1,5,9,13,17 $^{+}$	CR 1,5,9,13,17 $^{+}$	1,5,9,13,17	-13.54	-30.00	CR 1,5,9,13,17 $^{+}$		>0
	HISP27D6 $^{\%\&}$	CR	1,5,9,13,17 $^{+}$	CR 1,5,9,13,17 $^{+}$	1	-3.54	-30.00	CR 1,5,9,13,17 $^{+}$		>0
	HISP27D4 $^{\%\&}$	CR	1,5,9,13,17 $^{+}$	CR 1,5,9,13,17 $^{+}$	1	-4.54	-30.00	CR 1,5,9,13,17 $^{+}$		>0
	HISP33D6 $^{\%\&}$	CR	1,5,9,13,17 $^{+}$	CR 1,5,9,13,17 $^{+}$	1	-3.70	-30.00	CR 1,5,9,13,17 $^{+}$		>0
	HISP33D4 $^{\%\&}$	CR	1,5,9,13,17 $^{+}$	CR 1,5,9,13,17 $^{+}$	1,5,9,13,17	-4.70	-30.00	CR 1,5,9,13,17 $^{+}$		>0
	HISPASA2	CR	21,23,25,27,29, 31,33,35,37,39 $^{=}$	Not included in the study as not covered by Principle 3 of Annex 1 of Res. 532 (WRC-97). Subject to WRC-2000 decision.						

* Composite beam
% Existing system ($^{@}$: Prior WRC-97, $^{\&}$: After WRC-97)
$^{+}$ or $^{=}$ Channels grouped together

Nominal orbital position: 30° W *(second part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
GNB	GNB30400	CR	2,6,10,14,18	Block B' (CL)	2,4,6,8,10, 12,14,16,18	-3.28	-30.00	Block C' (CR)		>0
TUN	TUN15000	CL	22,26,30,34 (at 25° W)	Block B (CR)	2,4,6,8,10, 12,14,16,18,20	-19.24	**-30.00**	Block D (CR)		>0
	TUN27200 #	CL	38 (at 25° W)	CL 1	1	-11.12	**-30.00**	CR 4 (14 GHz)		>0

\# Multinational beam

Nominal orbital position: 25° W

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
AGL	AGL29500	CL	23,27,31,35,39 (at 13° W)	Block A (CL)	3,5,7,9, 11,13,15,17,19	-2.66	**-24.80**	Block D’ (CR)		>0
ALB	ALB29600	CL	21,25,29,33,37 (at 7° W)	Block A (CL) (at 7° W)	1,3,5,7,9, 11,13,15,17,19	-7.03	**-24.80**	Block B (CR) (see Note 1)		>0
ALG	ALG25100 [&]	CL	2,6,10,14,18	Block B’ (CL)	2,4,6,8,10, 12,14,16,18,20	-6.01	**-24.80**	Block A (CL)		-0.26
	ALG25200 [&]	CL	4,8,12,16,20							
GHA	GHA10800	CR	23,27,31,35,39	Block C’ (CR)	21,23,25,27,29, 31,33,35,37,39	-5.25	**-25.20**	Block A’ (CR)		-0.16
HOL	HOL21300	CR	23,27,31,35,39 (at 19° W)	Block D’ (CL) (at 13° W)	22,24,26,28,30, 32,34,36,38,40	-3.85	**-25.20**	Block A’ (CR) (see Note 1)		>0
LBY	LBY28000 [&]	CR	1,5,9,13,17	Block D (CR)	22,24,26,28,30,	-6.06	**-25.20**	Block C (CL)		>0
	LBY32100 [&]	CR	3,7,11,15,19		32,34,36,38,40					
MRC	MRC20900	CR	7,11,1,5,7 (14 GHz)	Block A’ (CR)		>0	**-25.20**	Block E’ (14 GHz)		>0
TCD	TCD14300	CR	2,6,10,14,18 (at 13° W)	Block A’ (CR) (at 7° W)	1,3,5,7,9, 11,13,15,17,19	-9.83	**-24.80**	Block D (CR) (see Note 1)		>0
TGO	TGO22600	CR	2,6,10,14,4 (14 GHz)	Block D’ (CL)		>0	**-24.80**	Block E (14 GHz)		>0

[&] Same beams replaced by one beam.
NOTE 1 - Moved from another nominal orbital position in order to resolve the feeder-link incompatibilities found at Action 2

Nominal orbital position: 19° W *(first part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
AUT	AUT01600	CR	4,8,12,16,20	Block C' (CR)	21,23,25,27,29, 31,33,35,37,39	-2.96	**-18.80**	Block C' (CR)		-0.27
BEN	BEN23300	CR	3,7,11,15,19	Block A (CL)		>0	**-19.20**	Block C (CL)		>0
COD	ZAI32200 *	CL	4,8,12,16,20	Block B (CR)	2,4,6,8,10,	-9.58	**-19.20**	Block A (CL)		>0
	ZAI32300 *	CL	2,6,10,14,18		12,14,16,18,20					
D	D 08700	CR	2,6,10,14,18	Block A' (CR)	1,3,5,7,9, 11,13,15,17,19	-3.99	**-18.80**	Block A' (CR)		-0.33
	D2-21600	CL	21,25,29,33,37 (at 1° W)	Not included in the study as covered by other beam(s) of that administration.						
GNE	GNE30300	CR	23,27,31,35,39	Block C (CL)		>0	**-18.80**	Block D (CR)		>0
LIE	LIE25300	CL	3,7,11,15,19	Block D' (CL)	22,24,26,28,30, 32,34,36,38	-0.51	**-18.80**	Block D' (CL)		>0
* Composite beam										

Nominal orbital position: 19° W *(second part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
MTN	MTN22300 *	CL	22,26,30,34,38 (at 37° W)	Block B (CR)	2,4,6,8,10, 12,14,16,18,20	-6.29	**-19.20**	Block B (CR)		>0
	MTN28800 *	CL	24,28,32,36,40 (at 37° W)							
NIG	NIG11900	CL	2,4,6,8,10 (14 GHz)	Block D (CR)	22,24,26,28,30, 32,34,36,38,40	-3.37	**-19.20**	Block E' (14 GHz)		>0
NMB	NMB02500	CR	11,1,5,9,13 (14 GHz)	Block C (CL)	21,23,25,27,29, 31,33,35,37,39	-8.29	**-18.80**	Block E (14 GHz)		>0
SUI	SUI14000	CR	22,26,30,34,38	Block B' (CL)	2,4,6,8,10, 12,14,16,18,20	-1.97	**-18.80**	Block B' (CL)		>0
UGA	UGA05100	CL	2,4,6,8,10 (at 11° E and 14 GHz)	Block A (CL)	3,5,7,9, 11,13,15,17,19	-1.24	**-19.20**	Block C (CL)		>0

* Composite beam

Nominal orbital position: 13° W *(first part)*

ADM	**Beam name**	**WRC-97**		**Action 2** (feeder-link feasibility study of transposed Step 6 downlink channels)			**Action 3** (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
CAF	CAF25800	CR	24,28,32,36,40	Block D' (CL)	22,24,26,28,30, 32,34,36,38,40	-3.38	**-13.20**	Block B' (CL)		>0
CME	CME30000	CL	1,5,9,13,17 (at 13° W)	Block C' (CR)	21,23,25,27,29, 31,33,35,37,39	-5.73	**-13.20**	Block E (14 GHz)		>0
COG	COG23500	CR	22,26,30,34,38	Block A (CL)	1,3,5,7,9, 11,13,15,17,19	-6.51	**-13.20**	Block D' (CL)		>0
CZE	CZE14400	CR	23,27,31,35,39	Block D (CR)	22,24,26,28,30, 32,34,36,38	-1.23	**-12.80**	Block B (CR)		-0.41
GAB	GAB26000	CL	3,7,11,15,19	Block A' (CR)	1,3,5,7,9, 11,13,15,17,19	-3.22	**-13.20**	Block A' (CR)		>0
HNG	HNG10600	CL	22,26,30,34,38 (at 1° W)	Block B (CR)	2,4,6,8,10, 12,14,16,18,20	-6.87	**-12.80**	Block A (CL) (a)		>0
HRV	HRV14800	CR	1,5,9,13,17 (at 34° E)	Block C (CL)	21,23,25,27,29, 31,33,35,37,39	-7.24	**-12.80**	Block C (CL)		>0
MLT	MLT14700	CL	4,8,12,16,20	Block B (CR)	2,4,6,8,10, 12,14,16,18,20	-4.26	**-13.20**	Block B (CR)		>0

(a) With an e.i.r.p. reduction of 0.3 dB.

Nominal orbital position: 13° W *(second part)*

ADM	**Beam name**	**WRC-97**		**Action 2** (feeder-link feasibility study of transposed Step 6 downlink channels)			**Action 3** (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
MWI	MWI30800	CL	24,28,32,36,40 (at 1° W)	Block B' (CL)		-0.44	**-12.80**	Block C' (CR)		>0
SVK	SVK14400	CL	3,7,11,15,19 (at 17° E)	Block A (CL)	3,5,7,9, 11,13,15,17,19	-1.02	**-12.80**	Block D (CR)		>0
PSE **	YYY00001	CR	1,5,9,13,17 (at 11° E)	Block B' (CL)		>0	**-12.80**	Block E' (14 GHz)		>0
** Palestinian Authority (based on Resolution 99 of PP-98).										

Orbital position: 8° W

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
F	F6_A27_E F6_A33_E F6_D27_E F6_D33_E	CL	2,6,10,14,18, 22,24,26,28,30, 32,34,36,38,40 +	Not included in the study as not covered by Principle 3 of Annex 1 of Res. 532 (WRC-97).						
	F6_A27_O F6_A33_O F6_D27_O F6_D33_O	CR	21,23,25,27,29, 31,33,35,37,39 +	Not included in the study as not covered by Principle 3 of Annex 1 of Res. 532 (WRC-97).						

+ Channels grouped together

Nominal orbital position: 7° W *(first part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
DNK	DNK08900 *	CL	12,16,20 [=] (at 5° E)	Block A (CL)	1,3,5,7,9, 11,13,15,17,19	-8.77	**-7.20**	Block D' (CL)		>0
	DNKFRO *	--	--							
EGY	EGY02600	CR	4,8,12,16,20	Block D (CR)	22,24,26,28,30, 32,34,36,38,40	-12.83	**-7.20**	Block D (CR)		>0
F	F 09300	CL	1,5,9,13,17 (at 19° W)	Block A' (CR)	1,3,5,7,9, 11,13,15,17,19	-8.10	**-6.80**	Block C' (CR)		>0
F	MYT09800 *	CL	24,28,32,36,40	Block D' (CL)	22,24,26,28,30, 32,34,36,38,40	-21.54	**-6.80**	Block A (CL)		>0
	MYT09801 *		(at 29° E)							
	REU09700 *	CL	22,26,30,34,38							
	REU09701 *		(at 29° E)							
F	F2aA2773	CL	23, 27, 31, 35, 39 [+]	Not included in the study as not covered by Principle 3 of Annex 1 of Res. 532 (WRC-97).						
	F2aA2722	CR	2,6,10,14,18 [+]	Not included in the study as not covered by Principle 3 of Annex 1 of Res. 532 (WRC-97).						
	F2aA2762	CL	22,24,26,28,30, 32,34,36,38,40 [+]	Not included in the study as not covered by Principle 3 of Annex 1 of Res. 532 (WRC-97).						

* Composite beam
[=] Channels grouped with those of beam SIRIUS02
[+] Channels grouped together

Nominal orbital position: 7° W *(second part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
F	F3_A2722 F3_A3322 F3_D3322	CR	2,6,10,14,18, 21,23,25,27,29, 31,33,35,37,39+	Not included in the study as not covered by Principle 3 of Annex 1 of Res. 532 (WRC-97).						
	F3_A2762 F3_A3362 F3_D3362	CL	22,24,26,28,30, 32,34,36,38,40+	Not included in the study as not covered by Principle 3 of Annex 1 of Res. 532 (WRC-97).						
KEN	KEN24900	CL	21,25,29,33,37 (at 11° E)	Block D (CR)	22,24,26,28,30, 32,34,36,38,40	-8.68	**-7.20**	Block B (CR)		>0
MCO	MCO11600	CL	21,25,29,33,37 (at 37° W)	Block C' (CR)	23,25,27,29, 31,33,35,37,39	-0.94	**-7.20**	Block A' (CR) (b)		-0.42
MLI	MLI32700 *	CL	2,6,10,14,18 (at 37° W)	Block D (CR)	22,24,26,28,30, 32,34,36,38,40	-5.99	**-7.20**	Block E' (14 GHz)		>0
	MLI32800 *	CL	4,8,12,16,20 (at 37° W)							
SDN	SDN23000 *	CL	23,27,31,35,39	Block B' (CL)	2,4,6,8,10, 12,14,16,18,20	-5.82	**-6.80**	Block E		>0
	SDN23100	CR	22,26,30,34,38					(14 GHz)		
	SDN23200 *	CR	24,28,32,36,40							

* Composite beam
+ Channels grouped together
(b) With an e.i.r.p. reduction of 0.4 dB

Nominal orbital position: 7° W *(third part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
STP	STP24100	CR	4,8,12,2,6 (at 13° W and 14 GHz)	Block D' (CL)		>0	**-7.20**	Block A (CL)		>0
SWZ	SWZ31300	CL	1,5,9,13,17 (at 1° W)	Block D (CR)		>0	**-7.20**	Block C (CL)		>0
YUG	YUG14800	CL	1,5,9,13,17	Block D' (CL)	22,24,26,28,30, 32,34,36,38,40	-8.72	**-6.80**	Block A' (CR)		-0.43

Orbital position: 5° W

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
F	F7_A27_E F7_A33_E F7_D27_E F7_D33_E	CL	2,6,10,14,18, 22,24,26,28,30, 32,34,36,38,40 +	Not included in the study as not covered by Principle 3 of Annex 1 of Res. 532 (WRC-97).						
	F7_A27_O F7_A33_O F7_D27_O F7_D33_O	CR	21,23,25,27,29, 31,33,35,37,39 +	Not included in the study as not covered by Principle 3 of Annex 1 of Res. 532 (WRC-97).						

+ Channels grouped together

Orbital position: 4° W

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
ISR	ISR11000	CL	7,11,1,5,9 (at 13° W and 14 GHz)	Block A (CL)		>0	**-4.00**	Block A (CL)		>0

Nominal orbital positions 1° W and 0.8° W *(first part)*

ADM	Beam name	WRC-97		**Action 2** (feeder-link feasibility study of transposed Step 6 downlink channels)			**Action 3** (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
BOT	BOT29700	CR	2,6,10,14,18	Block D (CR)		>0	-1.00	Block C (CL)		-0.40
BUL	BUL02000	CL	4,8,12,16,20	Block C’ (CR)	23,27,31,35,39	-22.42	-1.00	Block A’ (CR)		>0
IRQ	IRQ25600	CL	24,28,32,36,40 (at 11° E)	Block D’ (CL) (at 0.8° W)	22,24,26,28,30, 32,34,36,38,40	-7.10	**-1.20**	Block A (CL)		>0
MOZ	MOZ30700	CR	4,8,12,2,6 (at 14 GHz)	Block C (CL)	21,23,25,27,29, 31,33,35,37,39	-4.02	-1.00	Block E (14 GHz)		>0
ZMB	ZMB31400	CL	3,7,11,5,9 (at 14 GHz)	Block B (CR)	2,6,10,14,18	-1.25	-1.00	Block A (CL)		>0
ZWE	ZWE13500	CR	23,27,31,35,39	Block A (CL)		>0	-1.00	Block D (CR)		>0

Nominal orbital positions 1° W and 0.8° W *(second part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
NOR	BIFROS21 [% &]	CR	23,27,31,35,39	CR 23,27,31,35,39 [+]	23,27,31,35,39	-11.47	-0.80	CR 23,27,31,35,39 [+]		>0
	BIFROS22 [% &]	CL	2,6,10,14,18, 24, 28,32,36,40	CL 2,6,10,14,18, 24,28,32,36,40 [+]	24,28,32,36,40	-5.34	-0.80	CL 2,6,10,14,18, 24,28,32,36,40 [+]		-0.25
	BIFROST [% &]	CL	4,8,12,16,20	CL 4,8,12,16,20		-8.73	-0.80	CL 4,8,12,16,20		-7.50
	NOR12000	CR	14,18,38 (at 5° E)	Block D’ (CL) [+]	22,24,26,28,30, 32,34,36,38,40	-2.63	**-0.80**	Block D’ (CL) [+]		>0
	NOR12101 [#]	CR	28 (at 5° E)	Not yet included in the feeder-link analysis						
	NOR12102 [#]	CR	32 (at 5° E)	Not yet included in the feeder-link analysis						

Multinational beam
% Existing system (&: After WRC-97)
+ Channels grouped together

Nominal orbital positions 5° E and 5.2° E *(first part)*

ADM	**Beam name**	**WRC-97**		**Action 2** (feeder-link feasibility study of transposed Step 6 downlink channels)			**Action 3** (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
AFS	AFS02100	CR	7,11,1,5,9 (at 14 GHz)	Block A' (CR)	1,3,5,7,9, 11,13,15,17,19	-3.29	5.00	Block E' (14 GHz)		>0
CYP	CYP08600	CL	21,25,29,33,37	Block C' (CR)		>0	**4.80**	Block C (CL) (c)		>0
DNK	DNK09000 #	CL	24,36	CR 33, 37	33,37	-3.96	**5.20**	CR 33,37		-0.15
	DNK09100 #	CR	27,35	CR 27,35	27,35	-0.56	**5.20**	CR 27,35		>0
FIN	FIN10300	CR	2,6,10	CL 1, CL 22,24,26, 28,30,32,34,36, 38	1	-26.10	**5.20**	CR 25 + CL 22,24,26, 28,30,32,34,36, 38 +		>0
FIN	FIN10400 #	CR	22,26	Not yet included in the feeder-link analysis						
I	I 08200	CR	24,28,32,36,40 (at 19° W)	Block A (CL)	1,3,5,7,9, 11,13,15,17,19	-21.96	**4.80**	Block A' (CR)		>0
ISL	ISL05000 #	CL	23,31,39	CR 23,31,39	23,31,39	-16.85	**5.20**	CR 23,29,31		>0
LSO	LSO30500	CL	24,28,32,36,40	Block D (CR)		>0	**4.80**	Block C (CL)		>0

\# Multinational beam
\+ Channels grouped together
(c) With an e.i.r.p. reduction of 3.5 dB on channel 21

Nominal orbital positions 5° E and 5.2° E *(second part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
S	S 13800	CR	4,8,34 +	Block B' (CL) +	2,4,6,8,10, 12,14,16,18,20	-25.89	5.00	Block B' (CL) +		>0
	S 13900 #	CR	30	Not yet included in the feeder-link analysis						
	S 13902 # @ %	CR	40	CR 40	40	-29.05	5.00	CR 40		-4.18
	SIRIUS01 %@	CL	4,8 +	CL 4,8 + (at 5.2E)	4,8	-23.03	5.20	CL 4,8 +		-5.09
	SIRIUS02 %@	CL	12,16,20 =	CL 12,16,20 + (at 5.2E)	12,16,20	-23.03	5.20	CL 12,16,20 +		-5.07

\# Multinational beam
% Existing system (@: Prior WRC-97)
\+ Channels grouped together
= Channels grouped with those of beam DNK08900

Nominal orbital position: 11° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
BDI	BDI27000	CR	22,26,30,34,38	Block D' (CL)		>0	11.00	Block D' (CL)		>0
JOR	JOR22400	CR	23,27,31,35,39	Block D' (CL)		>0	11.00	Block B' (CL)		-0.26
LBN	LBN27900	CR	3,7,11,15,19	Block A' (CR)		>0	11.00	Block A' (CR)		>0
RRW	RRW31000	CR	4,8,12,16,20	Block B' (CL)		>0	11.00	Block A (CL)		>0
SYR	SYR22900	CL	22,26,30,34	Block B' (CL)	2,4,6,8,10, 12,14,16,18	-1.04	11.00	Block D' (CL)		>0
TZA	TZA22500	CL	1,5,9,13,17	Block C' (CR)		-0.06	11.00	Block C' (CR)		>0

Orbital position: 13° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol. Ang.	Feeder-link channels	Polarization, Angle and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization, Angle and channel(s)	Affected channel(s)	Worst EPM (in dB)
F/EUT	E1327DS1%& E1333DS1%& E1327AS1%& E1333AS1%&	LE 93.50	2,4,6,8,10, 12,14,16,18,20, 22,24,26,28,30, 32,34,36,38,40+	LE 93.50 2,4,6,8,10, 12,14,16,18,20, 22,24,26,28,30, 32,34,36,38,40+		>0	13.00	LE 93.50 2,4,6,8,10, 12,14,16,18,20, 22,24,26,28,30, 32,34,36,38,40+		>0
	E1327DS2%& E1333DS2%& E1327AS2%& E1333AS2%&	LE 3.50	1,3,5,7,9, 11,13,15,17,19, 21,23,25,27,29, 31,33,35,37,39+	LE 3.50 1,3,5,7,9, 11,13,15,17,19, 21,23,25,27,29, 31,33,35,37,39+		>0	13.00	LE 3.50 1,3,5,7,9, 11,13,15,17,19, 21,23,25,27,29, 31,33,35,37,39+		>0

% Existing system (&: After WRC-97)
+ Channels grouped together

Nominal orbital position: 17° E

ADM	**Beam name**	**WRC-97**		**Action 2** (feeder-link feasibility study of transposed Step 6 downlink channels)			**Action 3** (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
ARS	ARS00300 &	CR	4,8,12,16,20	Block D (CR)	22,24,26,28,30,	-1.57	17.00	Block D (CR)		>0
	ARS27500 &	CR	2,6,10,14,18		32,34,36,38,40					
	ARS00301	CL	4 (at 14 GHz)	Not included in the study as covered by other beam(s) of that administration.						
KWT	KWT11300	CR	22,26,30,34,38	Block D' (CL)	22,24,26,28,30, 32,34,36,38,40	-0.99	17.00	Block C (CL)		>0
OMA	OMA12300	CR	24,28,32,36,40	Block A (CL)		>0	17.00	Block A (CL)		>0
QAT	QAT24700	CL	1,5,9,13,17	Block B (CR)		>0	17.00	Block B (CR)		>0

& Same beams replaced by one beam

Nominal orbital position: 23° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
ARM	ARM06400	CL	24,28,32,36,40	Block A (CL)	1,3,5,7,9, 11,13,15,17,19	-2.80	**23.20**	Block C (CL)		>0
AZE	AZE06400	CL	4,8,12,16,20	Block B (CR)		-0.18	23.00	Block A (CL)		>0
DJI	DJI09900	CL	21,25,29,33,37	Block A (CL)	1,3,5,7,9, 11,13,15,17,19	-2.54	**22.80**	Block B' (CL)		>0
ERI	ERI09200	CL	23,27,31,35,39	Block C' (CR)	21,23,25,27,29, 31,33,35,37,39	-3.37	23.00	Block C' (CR)		>0
ETH	ETH09200	CR	8,12,2,6,10 (at 14 GHz)	Block C (CL)	21,23,25,27,29, 31,33,35,37,39	-4.88	23.00	Block E (14 GHz)		>0
GEO	GEO06400	CL	22,26,30,34,38	Block D (CR)		>0	**22.80**	Block D (CR)		>0
LTU	LTU06100	CL	3,7,11,15,19	Block A (CL)		>0	23.00	Block B (CR)		>0
MKD	MKD14800	CL	2,6,10,14,18	Block D' (CL)		>0	23.00	Block D' (CL)		>0
SOM	SOM31200	CL	2,6,10,14,18	Block A' (CR)	1,3,5,7,9, 11,13,15,17,19	-6.07	**23.20**	Block A' (CR)		>0

Orbital position: 28.2° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
LUX	LUX11400	CL	3,7,11,15,19 (at 19° W)	Block A (CL)		>0	**28.20**	Block A (CL)		>0

Nominal orbital position: 29° E

ADM	**Beam name**	**WRC-97**		**Action 2** (feeder-link feasibility study of transposed Step 6 downlink channels)			**Action 3** (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
BHR	BHR25500	CL	23,27,31,35,39 (at 17° E)	Block D' (CL)		>0	**29.00**	Block D' (CL)		>0
COM	COM20700	CR	3,7,11,15,19	Block A (CL)		>0	29.00	Block A (CL)		>0
MAU	MAU24200*	CL	2,6,10,14,18	Block D' (CL)		>0	29.00	Block D' (CL)		>0
	MAU24300*	CL	4,8,12,16							
MDG	MDG23600	CR	1,5,9,13,17	Block C' (CR)		>0	29.00	Block C' (CR)		>0
* Composite beam										

Nominal orbital position: 34° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
GRC	GRC10500	CL	3,7,11,15,19 (at 5° E)	Block A (CL)	1,3,5,7,9, 11,13,15,17,19	-7.98	**34.00**	Block A’ (CR)		>0
IRN	IRN10900	CR	3,7,11,15,19	Block A (CL)	1,3,5,7,9,11, 13,15,17,19	-16.25	34.00	Block A (CL)		>0
	IRN10901	CR	3,7,11 (at 14 GHz)	Not included in the study as covered by other beam(s) of that administration.						
SVN	SVN14800	CR	4,8,12,16,20	Block B (CR)		>0	34.00	Block C’ (CR)		>0

Nominal orbital position: 36° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
RUS	RSTREA11 %&	CR	27,31,35,39+	CR 27,31,35,39+		>0	36.00	CR 27,31,35,39+		>0
	RSTRED11 %&	CR	27,31,35,39+	CR 27,31,35,39+		>0	36.00	CR 27,31,35,39+		>0
	RSTRSA11	CR	25,27,29,31, 33,35,37,39+	Not included in the study according to IRG decision.						
	RSTRSD11 +	CR	25,27,29,31, 33,35,37,39+	CR 25,27,29,31, 33,35,37,39+		>0	36.00	CR 25,27,29,31, 33,35,37,39+		>0
	RSTREA12 %&	CL	28,32,36,40+	CL 28,32,36,40+		>0	36.00	CL 28,32,36,40+		>0
	RSTRED12 %&	CL	28,32,36,40+	CL 28,32,36,40+		>0	36.00	CL 28,32,36,40+		>0
	RSTRSA12	CL	26,28,30,32, 34,36,38,40+	Not included in the study according to IRG decision.						
	RSTRSD12	CL	26,28,30,32, 34,36,38,40+	CL 26,28,30,32, 34,36,38,40+		>0	36.00	CL 26,28,30,32, 34,36,38,40+		>0

% Existing system (&: After WRC-97)
+ Channels grouped together

Nominal orbital position: 38° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
BLR	BLR06200	CR	1,5,9,13,17	Block A (CL)	3,5,7,9, 11,13,15,17,19	-0.91	38.00	Block A' (CR)		>0
PAK	PAK12700 *	CL	2,6,10 (17 GHz)	Block B (CR)	2,4,6,8,10,12, 14,16,18,20	-5.20	38.00	Block E' (14 GHz)		>0
	PAK21000	CL	12,14 (17 GHz)	Not included in the study as covered by other beam(s) of that administration.						
	PAK28100	CL	18,22 (17 GHz)	Not included in the study as covered by other beam(s) of that administration.						
	PAK28200	CL	20,24 (17 GHz)	Not included in the study as covered by other beam(s) of that administration.						
	PAK28300	CL	4,8 (17 GHz)	Not included in the study as covered by other beam(s) of that administration.						
	PAK12701	CL	2,6 (14 GHz)	Not included in the study as covered by other beam(s) of that administration.						
	PAK21001	CL	12 (14 GHz)	Not included in the study as covered by other beam(s) of that administration.						
	PAK28301	CL	4,8 (14 GHz)	Not included in the study as covered by other beam(s) of that administration.						
TJK	TJK06900	CR	1,5,9,13,17 (at 44° E)	Block A (CL)	3,5,7,9, 11,13,15,17,19	-1.40	**38.00**	Block D' (CL)		>0
UKR	UKR06300	CR	3,7,11,15,19	Block B (CR)	2,4,6,8,10, 12,14,16,18,20	-4.62	38.00	Block B' (CR)		>0

* Considered as a composite beam since it fully overlaps the territory of the Islamic Republic of Pakistan, which is covered by all its other smaller beams.

Orbital position: 42.5° E

ADM	**Beam name**	**WRC-97**		**Action 2** (feeder-link feasibility study of transposed Step 6 downlink channels)			**Action 3** (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
SEY	SEY00000	--	--	Block C (CL)		>0	**42.50**	Block C (CL)		>0

Nominal orbital position: 44° E *(first part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
ARS	ARS34000 #	CR	23 (at 17° E)	CL 24	24	-19.28	**44.00**	CL 3 (14 GHz)		>0
	ARS34001 #	CR	1 (at 17° E and 14 GHz)							
BIH	BIH14800	CL	2,6,10,14,18 (at 34° E)	Block A' (CR)		>0	**44.20**	Block B (CR)		>0
EST	EST06100	CL	1,5,9,13,17 (at 23° E)	Block B (CR)	2,4,6,8,10, 12,14,16,18	-0.86	**43.80**	Block A' (CR)		>0
KAZ	KAZ06600	CR	24,28,32,36,40	Block A (CL)	1,3,5,7,9, 11,13,15,17,19	-6.64	**44.20**	Block A (CL)		-0.19
KGZ	KGZ07000	CR	22,26,30,34,38	Block A' (CR)	1,3,5,7,9,11, 13,15,17,19	-3.30	**43.80**	Block B (CR)		>0
MLD	MLD30600	CR	4,8,12,16	Block B (CR)		>0	**43.80**	Block B' (CL)		>0
ROU	ROU13600	CR	3,7,11,15,19 (at 1° W)	Block D (CR)	22,24,26,28,30, 32,34,36,38	-1.40	**43.80**	Block D' (CL) (d)		>0
SYR	SYR33900 #	CL	38 (at 11° E)	CL 21	21	-9.07	**43.80**	CL 5 (14 GHz)		>0

Multinational beam
(d) With an e.i.r.p. reduction of 2 dB, i.e. use 84 dBW instead of 86 dBW

Nominal orbital position: 44° E *(second part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
TKM	TKM06800	CL	23,27,31,35,39	Block C’ (CR)	21,23,25,27,29, 31,33,35,37,39	-8.54	**44.20**	Block C (CL)		>0
UZB	UZB07100	CR	3,7,11,15,19	Block D’ (CL)	22,24,26,28,30, 32,34,36,38,40	-9.40	**43.80**	Block D (CR)		>0
YEM	YEM26600*	CL	2,6,10,14,18 (at 11° E)	Block B’ (CL)	2,4,6,8,10, 12,14,16,18,20	-6.02	**44.20**	Block E’ (14 GHz)		>0
	YEM26700*	CR	1,5,9,3,7 (at 11° E and 14 GHz)							
* Composite beam										

Nominal orbital position: 50° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
AFG	AFG24500 [&]	CL	3,7,11,15	Block B' (CL)	2,4,6,8,10,12,	-3.01	50.00	CL 29,31,33,35,37,39[+]		>0
	AFG24600 [&]	CL	1,5,9,13		14,16,18,20,22			CR 30,32,34,36,38,40[+]		
CLN	CLN21900	CL	2,6,10,14	Block B (CR)		>0	50.00	Block B (CR)		>0
LVA	LVA06100	CL	21,25,29,33,37 (at 23° E)	Block D' (CL)		>0	**50.00**	Block D' (CL)		>0
MDA	MDA06300	CL	4,8,12,16,20 (at 38° E)	Block C (CL) (at 44° E)	21,23,25,27,29, 31,33,35,37,39	-5.46	**50.00**	Block C' (CR) (see Note 1)		>0
NPL	NPL12200	CR	17,19,21,23	Block A' (CR)	1,3,5,7,9,11, 13,15,17,19	-2.57	50.00	Block A (CL)		>0
POL	POL13200	CR	1,5,9,13,17 (at 1° W)	Block B' (CL)		>0	**50.00**	Block B' (CL)		>0
TUR	TUR14500	CL	1,5,9,13,17 (at 5° E)	Block A' (CR)	1,3,5,7,9,11, 13,15,17,19	-5.48	**50.00**	Block A' (CR)		-0.35

[&] Same beams replaced by one beam.
[+] Channels grouped together
NOTE 1 - Moved from another nominal orbital position in order to resolve the feeder-link incompatibilities found at Action 2

Orbital position: 52.5° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
UAE	UAE27400	CL	21,25,29,33,37 (at 17° E)	Block C' (CR)		>0	**52.50**	Block C' (CR)		>0

Nominal orbital position: 56° E *(first part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
IND	IND03900*	CL	1,9 (17 GHz)	Block B (CR)		>0	56.00	Block B' (CL)		>0
	IND04100*	CR	18,24 (17 GHz)							
	IND04300*	CL	3,11 (17 GHz)							
	IND04500*	CR	6,14 (17 GHz)							
	IND03901	CL	5,13 (14 GHz)	Not included in the study as covered by other beam(s) of that administration.						
	IND04101	CR	6,8 (14 GHz)	Not included in the study as covered by other beam(s) of that administration.						
	IND04301	CL	7,1 (14 GHz)	Not included in the study as covered by other beam(s) of that administration.						
	IND04501	CR	2,10 (14 GHz)	Not included in the study as covered by other beam(s) of that administration.						
* Composite beam										

Nominal orbital position: 56° E *(second part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
IND	IND04200*	CR	20,22 (17 GHz) (at 68° E)	Block A (CL)		>0	**56.00**	Block A' (CR)		>0
	IND04600*	CL	17,23 (17 GHz) (at 68° E)							
	IND04800*	CR	4,12 (17 GHz) (at 68° E)							
	IND04201	CR	4,10 (14 GHz) (at 68° E)	Not included in the study as covered by other beam(s) of that administration.						
	IND04601	CL	5,7 (14 GHz) (at 68° E)	Not included in the study as covered by other beam(s) of that administration.						
	IND04801	CR	8,2(14 GHz) (at 68° E)	Not included in the study as covered by other beam(s) of that administration.						
RUS	RSTRSA21	CR	25,27,29,31, 33,35,37,39 +	Not included in the study according to IRG decision.						
	RSTRSA22	CL	26,28,30,32, 34,36,38,40 +	Not included in the study according to IRG decision.						
	RSTRSD21	CR	25,27,29,31, 33,35,37,39 +	CR 25,27,29,31, 33,35,37,39 +	25	-2.07	56.00	CR 25,27,29,31, 33,35,37,39 +		>0
	RSTRSD22	CL	26,28,30,32, 34,36,38,40 +	CL 26,28,30,32, 34,36,38,40 +		>0	56.00	CL 26,28,30,32, 34,36,38,40 +		>0

* Composite beam + Channels grouped together

Nominal orbital position: 62° E

ADM	**Beam name**	**WRC-97**		**Action 2** (feeder-link feasibility study of transposed Step 6 downlink channels)			**Action 3** (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
CHN	CHN15400	CL	2,6,10	Not included in the study as covered by other beam(s) of that administration.						
	CHN15600	CL	4,8,12	Not included in the study as covered by other beam(s) of that administration.						
	CHN15500	CR	1,5,9	Not included in the study as covered by other beam(s) of that administration.						
	CHN15700	CR	3,7,1	Not included in the study as covered by other beam(s) of that administration.						
	CHN18300	CL	22	Not included in the study as covered by other beam(s) of that administration.						
	CHN15401*	CL	14	Block A (CL)		>0	62.00	Block A (CL)		>0
	CHN15501*	CR	13							
	CHN18400*	CL	20							
	CHN18500*	CL	18							
	CHN18600*	CR	16							
	CHN18800*	CR	24							
* Composite beam										

Nominal orbital position: 68° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
IND	IND03700	CR	2,10 (17 GHz)	Block B' (CL)		>0	68.00	Block B' (CL)		>0
	IND04700	CL	7,15 (17 GHz)	Block A' (CR)		>0	68.00	CR 29,31,33,35,37,39+ CL 30,32,34,36,38,40+		>0
	IND03800*	CL	19,21 (17 GHz) (at 56° E)	Block A' (CR)	1,3,5,7,9,11, 13,15,17,19,21,23	-4.46	**68.00**	Block A' (CR)		>0
	IND04000*	CR	8,16 (17 GHz) (at 56° E)							
	IND04400	CL	5,13 (17 GHz)	Not included in the study as covered by other beam(s) of that administration.						
	IND03701	CR	6,14 (14 GHz)	Not included in the study as covered by other beam(s) of that administration.						
	IND03801	CL	3,9 (14 GHz) (at 56° E)	Not included in the study as covered by other beam(s) of that administration.						
	IND04001	CR	4,12 (14 GHz) (at 56° E)	Not included in the study as covered by other beam(s) of that administration.						
	IND04401	CL	1,9 (14 GHz)	Not included in the study as covered by other beam(s) of that administration.						
	IND04701	CL	3,11 (14 GHz)	Not included in the study as covered by other beam(s) of that administration.						

* Composite beam
\+ Channels grouped together

Nominal orbital position: 74° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
BGD	BGD22000	CR	12,14,18,20,22	Block A' (CR)	21,23	-4.84	74.00	Block A' (CR)		>0
BRU	BRU3300A	CL	3,7,11,15	Block B (CR)		>0	74.00	Block B (CR)		>0
MNG	MNG24800	CR	25,29,33,37,39	Block C' (CR)	21,23	-4.97	74.00	Block C (CL)		>0
SNG	SNG15100	CR	2,6,10,14 (14 GHz)	Block A (CL)		>0	74.00	Block A (CL)		>0

Nominal orbital position: 80.2° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
INS	INS02800 [&]	CR	2,4,6,8	Block A' (CR)		>0	80.20	Block A' (CR)		>0
	INS03000 [&]	CR	18,20,22,24							
	INS03200 [&]	CR	17,19,21,23							

[&] Same beams replaced by one beam

Nominal orbital position: 86° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
BTN	BTN03100	CL	5,9,13,17	Block A' (CR)		>0	86.00	Block A' (CR)		>0
CBG	CBG29900	CL	18,20,22,24 (at 68° E)	Block B (CR)		>0	**86.00**	Block B (CR)		>0
RUS	RSTRSA31+	CL	25,27,29,31, 33,35,37,39+	Not included in the study according to IRG decision.						
	RSTRSA32+	CR	26,28,30,32, 34,36,38,40+	Not included in the study according to IRG decision.						
	RSTRSD31+	CR	25,27,29,31, 33,35,37,39+	CR 25,27,29,31, 33,35,37,39+		>0	86.00	CR 25,27,29,31, 33,35,37,39+		>0
	RSTRSD32+	CL	26,28,30,32, 34,36,38,40+	CL 26,28,30,32, 34,36,38,40+		>0	86.00	CL 26,28,30,32, 34,36,38,40+		>0

+ Channels grouped together

Orbital position: 91.5° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
MLA	MLA22700*	CL	16,18,20,22,24 (at 86° E)	Block B (CR)		>0	**91.50**	Block B (CR)		>0
	MLA22800*	CL	2,4,6,8,10 (at 86° E)							
* Composite beam										

Nominal orbital position: 92° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
CHN	CHN16000	CR	3,7,11	Not included in the study as covered by other beam(s) of that administration.						
	CHN16100	CL	2,4,6	Not included in the study as covered by other beam(s) of that administration.						
	CHN16200	CR	1,5,9	Not included in the study as covered by other beam(s) of that administration.						
	CHN16600*	CR	24	Block A (CL)		>0	92.00	Block A (CL)		>0
	CHN16700*	CR	17							
	CHN16800*	CR	22							
	CHN16900*	CL	16							
	CHN17000*	CL	12							
	CHN17100*	CL	10							
	CHN17200*	CL	14							
	CHN17300*	CL	8							
	CHN17400*	CR	15							
	CHN17500*	CR	21							
	CHN17900*	CR	19							
	CHN18000	CR	13	Not included in the study as covered by other beam(s) of that administration.						

* Composite beam

Nominal orbital position: 98° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
PHL	PHL28500	CL	16,18,20,22,24	Block B' (CL)	2,4,6,8,10,12, 14,16,18,20,22,24	-7.43	98.00	Block B' (CL)		>0
THA	THA14200	CL	1,5,9,13 (at 74° E)	Block A (CL)	1,3,5,7,9,11, 13,15,17,19,21,23	-6.47	**98.00**	Block A' (CR)		>0

Nominal orbital position: 104° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
BRM	BRM29800	CL	17,19,21,23 (at 74° E)	Block A (CL)	1,3,5,7,9,11, 13,15,17,19,21,23	-24.55	**104.00**	Block A (CL)		>0
INS	INS03500 [&]	CL	1,5,9,13	Block B' (CL)	2,4,6,8,10,12,	-26.64	104.00	CL 29,31,33,35,37,39 [+]		>0
	INS03600 [&]	CL	3,7,11,15,19		14,16,18,20,22,24			CR 30,32,34,36,38,40 [+]		

[&] Same beams replaced by one beam
[+] Channels grouped together

Orbital position: 107° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
VTN	VTN32500	CR	3,7,11,15 (at 86° E)	Block B (CR)		>0	**107.00**	Block B (CR)		>0

Nominal orbital positions 109.85° E and 110° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
J	000BS-3N%@	CR	1,3,5,7, 9,11,13,15 +	CR 1,3,5,7, 9,11,13,15 +		>0	109.85	CR 1,3,5,7, 9,11,13,15 +		>0
	J 1110E% @	CR	1,3,5,7, 9,11,13,15 +	CR 1,3,5,7, 9,11,13,15 +		>0	110.00	CR 1,3,5,7, 9,11,13,15 +		>0
	J 11100	CR	1,3,5,7, 9,11,13,15 +	Block A' (CR) +		>0	110.00	Block A (CR) +		>0
RUS	RUS00400	CR	25,27,31,35,39	CR 25,27,29,31, 33,35,37,39 +		>0	110.00	CR 25,27,29,31, 33,35,37,39 +		>0
				CL 26,28 +		>0	110.00	CL 26,28 +		>0

% Existing system (@: Prior WRC-97)
\+ Channels grouped together

Nominal orbital position: 116° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
KOR	KOR11200	CL	2,4,6,8,10,12	Block B' (CL)		>0	116.00	Block B' (CL)		>0
	KO11201D %@	CL	2,4,6,8,10,12 + (14 GHz)	CL 2,4,6,8,10,12 + (14 GHz)		>0	116.00	CL 2,4,6,8,10,12 + (14 GHz)		>0
	KOR11201 %@	CL	2,4,6,8,10,12 + (14 GHz)	CL 2,4,6,8,10,12 + (14 GHz)		>0	116.00	CL 2,4,6,8,10,12 + (14 GHz)		>0

% Existing system (@: Prior WRC-97)
+ Channels grouped together

Nominal orbital position: 122° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
CHN	CHN19000	CL	1,5,9,13	Block A' (CR)	1,3,5,7,9,11, 13,15,17,19,21,23	-5.32	**122.20**	Block A' (CR)		>0
LAO	LAO28400	CR	2,4,6,8,10 (at 74° E)	Block B' (CR)	2,4,6,8,10,12, 14,16,18,20,22,24	-6.99	**121.80**	Block A (CL)		>0
MAC	MAC00000	--	--	Block B' (CL)		>0	**122.20**	Block B' (CL)		>0
USA	GUM33100*	CR	21,25,29,33,37 +	Block A' (CL)	1,3,5,7,9,11, 13,15,17,19,21,23	-12.35	122.00	CR 29,31,33,35,37,39 + CL 30,32,34,36,38,40 +		>0
	GUM33101*	CR	21,25,29,33,37 +							
	MRA33200*	CL	3,7,11,15,19 =							
	MRA33201*	CL	3,7,11,15,19 =							

* Composite beam
\+ Channels grouped together
= Channels grouped together

Nominal orbital position: 128° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
PNG	PNG13100	CL	2,6,10,14 (at 110° E) (14 GHz)	Block B (CR)		>0	**128.00**	Block E' (14 GHz)		>0
	PNG27100	CL	4,8,12 (14 GHz)	Not included in the study as covered by other beam(s) of that administration.						
SLM	SLM00000	CR	1,5,9,13 (at 146° E)	Block A (CL)	1,3,5,7,9,11, 13,15,17,19,21,23	-4.26	**128.00**	Block A (CL)		>0

Nominal orbital position: 134° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
CHN	CHN15800	CL	15,19,23 (at 79.8° E)	Not included in the study as covered by other beam(s) of that administration.						
	CHN15900	CR	18,20,22 (at 79.8° E)	Not included in the study as covered by other beam(s) of that administration.						
	CHN16400	CL	5 (at 79.8° E)	Not included in the study as covered by other beam(s) of that administration.						
	CHN16300*	CL	1 (at 79.8° E)	Block A’ (CR)		>0	**134.00**	Block A’ (CR)		>0
	CHN16500*	CL	9 (at 79.8° E)							
	CHN17600*	CL	21 (at 79.8° E)							
	CHN17700*	CR	24 (at 79.8° E)							
	CHN17800*	CR	12 (at 79.8° E)							
	CHN18100*	CR	14 (at 79.8° E)							
	CHN18200*	CL	17 (at 79.8° E)							
	CHN18700*	CR	10 (at 79.8° E)							
NRU	NRU30900	CR	3,7,11,15	Block A (CL)		>0	134.00	Block A (CL)		>0

* Composite beam

Nominal orbital position: 140° E *(first part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
F	NCL10000*	CL	2,6,10,14+	Block B (CR)	2,4,6,8,10,12, 14,16,18,20,22,24	-30.75	140.00	Block B' (CL)		>0
	NCL10001*	CL	2,6,10,14+							
F	WAL10200*	CL	2,6,10,14+	Block B (CR)	2,4,6,8,10,12, 14,16,18,20,22,24	-32.64	140.00	Block A' (CR)		>0
	WAL10201*	CL	2,6,10,14+							
KRE	KRE28600	CL	14,16,18,20,22 (at 110° E)	Block B (CR)	24	-2.65	**140.00**	Block A (CL)		>0
PLW	PLW00000	CL	4,8,12,16,20 (at 146° E)	Block B (CR)	2,4,6,8,10,12, 14,16,18,20,22,24	-30.13	**140.00**	Block B (CR)		>0
RUS	RSTRSA51	CL	25,27,29,31, 33,35,37,39=	Not included in the study according to IRG decision.						
	RSTRSA52	CR	26,28,30,32, 34,36,38,40=	Not included in the study according to IRG decision.						
	RSTRSD51	CR	25,27,29,31, 33,35,37,39=	CR 25,27,29,31, 33,35,37,39=	25	-26.16	140.00	CR 25,27,29,31, 33,35,37,39=		>0
	RSTRSD52	CL	26,28,30,32, 34,36,38,40=	CL 26,28,30,32, 34,36,38,40=		>0	140.00	CL 26,28,30,32, 34,36,38,40=		>0

* Composite beam
\+ Channels grouped together
= Channels grouped together

Nominal orbital position: 140° E *(second part)*

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
USA	WAK33400*	CR	1,5,9,13,17=	Block A' (CR)	1,3,5,7,9,11,	-23.55	140.00	Block E		>0
	WAK33401*	CL	1,5,9,13,17=		13,15,17,19,21,23			(14 GHz)		
VUT	VUT12800	CR	3,7,11,15	Block A (CL)	3,5,7,9,11, 13,15,17,19,21,23	-2.01	140.00	CL 29,31,33,35,37,39+ CR 30,32,34,36,38,40+		>0

* Composite beam
= Channels grouped together
+ Channels grouped together

Nominal orbital position: 146°E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
FSM	FSM00000	CR	3,7,11,15,19	Block A (CL)		>0	146.00	Block A (CL)		>0
MHL	MHL00000	CL	2,6,10,14,18	Block B (CR)		>0	146.00	Block B (CR)		>0

Nominal orbital position: 152° E

ADM	**Beam name**	**WRC-97**		**Action 2** (feeder-link feasibility study of transposed Step 6 downlink channels)			**Action 3** (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
AUS	AUS00400	CL	3,7,11,15,19,23[+]	CL 3,7,11,15,19,23[+]		-0.32	152.00	CL 3,7,11,15,19,23[+]		-0.31
	AUS0040A[&]	CL	3,7,11,15,19,23[+]	CL 3,7,11,15,19,23[+]		-0.44	152.00	CL 3,7,11,15,19,23[+]		-0.43
	AUS0040B[&]	CL	3,7,11,15,19,23[+]							
	AUS0040C[&]	CL	3,7,11,15,19,23[+]							
	AUS00500	CR	4,8,12,16,20,24	CR 4,8,12,16,20,24	4,8	-25.56	152.00	CR 4,8,12,16,20,24		-0.31
	AUS00600	CR	28,32,36,40,26,30	CR 28,32,36,40,26,30		>0	152.00	CR 28,32,36,40,26,30		-0.37
	AUS0060G «	--	--	CR 1,5,9	5,9	-25.62	152.00	CL 1,35,39		-0.35

& Same beams replaced by one beam
+ Channels grouped together
„ new national beam

Nominal orbital position: 158° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
NZL	NZL28700	CL	13,17,21 (at 128° E)	Not included in the study as covered by other beam(s) of that administration.						
	CKH05200*	CR	2,6,10,14 +	Block A (CL)		>0	158.00	Block A (CL)		>0
	CKH05201*	CR	2,6,10,14 +							
	CKH05300*	CR	4,8,12,16 +							
	CKH05301*	CR	4,8,12,16 +							
	NIU05400*	CR	19,23 +							
	NIU05401*	CR	19,23 +							
	NZL05500*	CL	1,5,9,13							
	TKL05800*	CL	20,24 =							
	TKL05801*	CL	20,24 =							

* Composite beam
+ Channels grouped together
= Channels grouped together

Nominal orbital position: 164° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
AUS	AUS0070G "	--	--	CL 4,8,12		>0	164.00	CL 32,36,40		>0
	AUS00700	CR	3,7,11,15,19,23 +	CR 3,7,11,15,19,23 +	3,7,11	-2.88	164.00	CR 3,7,11,15,19,23 +		>0
	AUS0070A +	CR	3,7,11,15,19,23 +	CR 3,7,11,15,19,23 +	3,7,11	-3.09	164.00	CR 3,7,11,15,19,23 +		-0.10
	AUS00800	CL	2,6,10,14,18,22	CL 2,6,10,14,18,22		>0	164.00	CL 2,6,10,14,18,22		>0
	AUS00900	CR	27,31,35,39,25,29 =	CR 27,31,35,39,25,29 =		>0	164.00	CR 27,31,35,39,25,29 =		>0
	AUS0090A &	CR	27,31,35,39,25,29 =	CR 27,31,35,39,25,29 =		>0	164.00	CR 27,31,35,39,25,29 =		-0.08
	AUS0090B &	CR	27,31,35,39,25,29 =							

& Same beams replaced by one beam
\+ Channels grouped together
= Channels grouped together
" New national beam

Nominal orbital position: 170° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
TON	TON21500	CR	21,25,29,33	Block B (CR)		-0.30	170.00	Block A’ (CR)		>0
USA	PLM33700*	CL	1,5,9,13,17 +	Block B’ (CL)		>0	170.00	Block B’ (CL)		>0
	PLM33701*	CL	1,5,9,13,17 +							
	SMA33500*	CR	3,7,11,15,19 =							
	SMA33501*	CR	3,7,11,15,19 =							

* Composite beam
\+ Channels grouped together
= Channels grouped together

Nominal orbital position: 176° E

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	**Feeder-link channels**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**	**Orbital position (in ° E)**	**Polarization and channel(s)**	**Affected channel(s)**	**Worst EPM (in dB)**
KIR	KIR00001*	CL	3,7,11	Block A’ (CR)		>0	176.00	Block A’ (CR)		>0
	KIR00002*	CL	15,19,23							
TUV	TUV00000	CR	2,6,10,14	Block B’ (CL)		>0	176.00	Block B’ (CL)		>0

* Composite beam

Nominal orbital position: 178° W

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
FJI	FJI19300	CL	1,5,9,13 (at 152° E)	Block A’ (CR)	1,3,5,7,9,11, 13,15,17,19,21,23	-8.89	**-178.00**	Block A’ (CR)		>0
SMO	SMO05700	CL	3,7,11,15 (at 158° E)	Block A’ (CR)	1,3,5,7,9,11, 13,15,17,19,21,23	-3.88	**-178.00**	Block A (CL)		>0

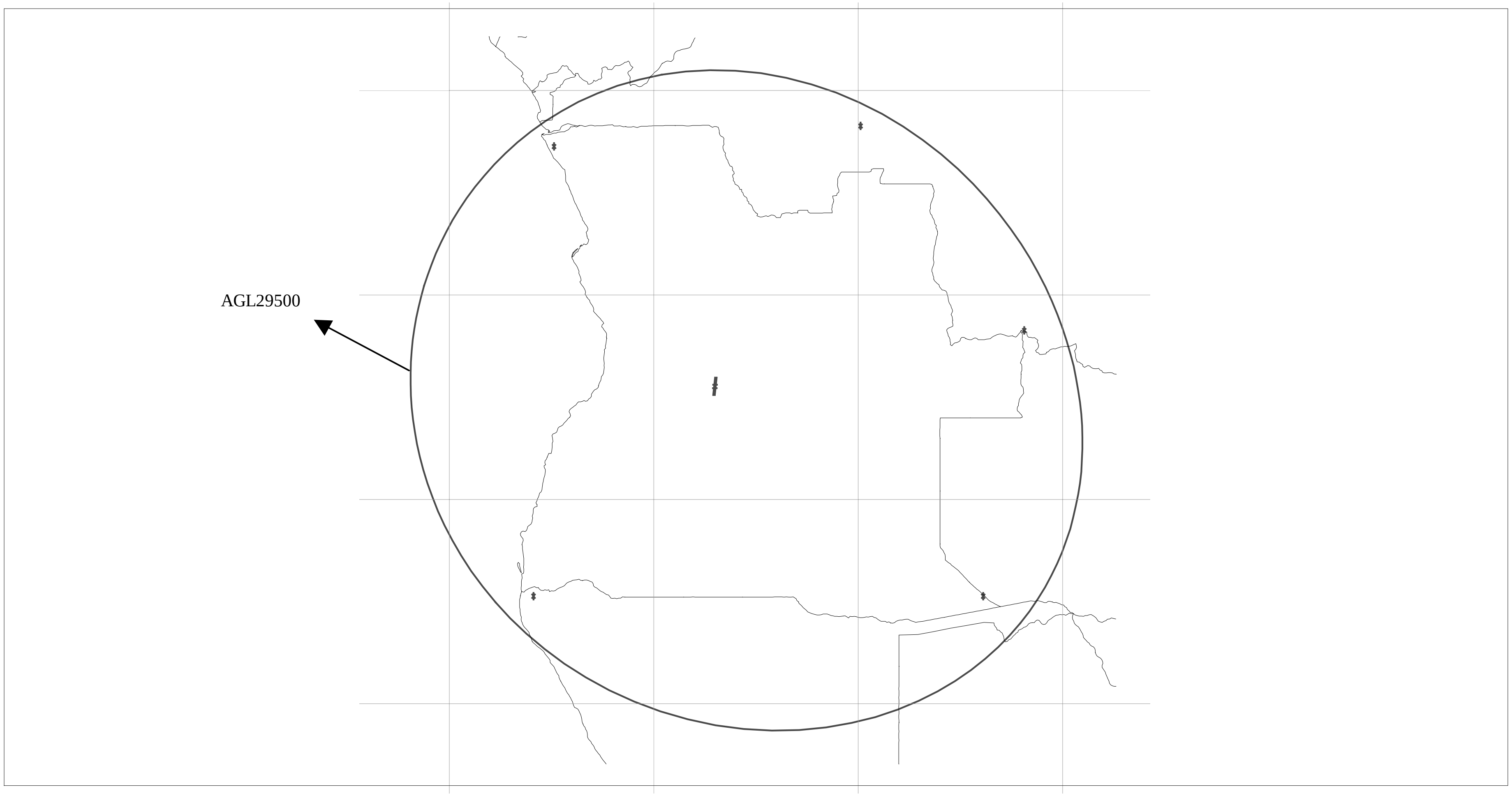
Nominal orbital position: 160° W

ADM	Beam name	WRC-97		Action 2 (feeder-link feasibility study of transposed Step 6 downlink channels)			Action 3 (draft feeder-link Plans at both 14 GHz and 17 GHz)			
		Pol.	Feeder-link channels	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)	Orbital position (in ° E)	Polarization and channel(s)	Affected channel(s)	Worst EPM (in dB)
F	OCE10100	CR	4,8,12,16	Block B’ (CL)		>0	-160.00	Block B’ (CL)		>0

ANNEX 3

Beams that have beam recalculated due to a change in the Orbital Position

AGL (24.80 W)



ITU Digitized World Map. UP17_FIN.UD3 UP PLATE-CARREE Scale: 15245040 GRID: 5.0

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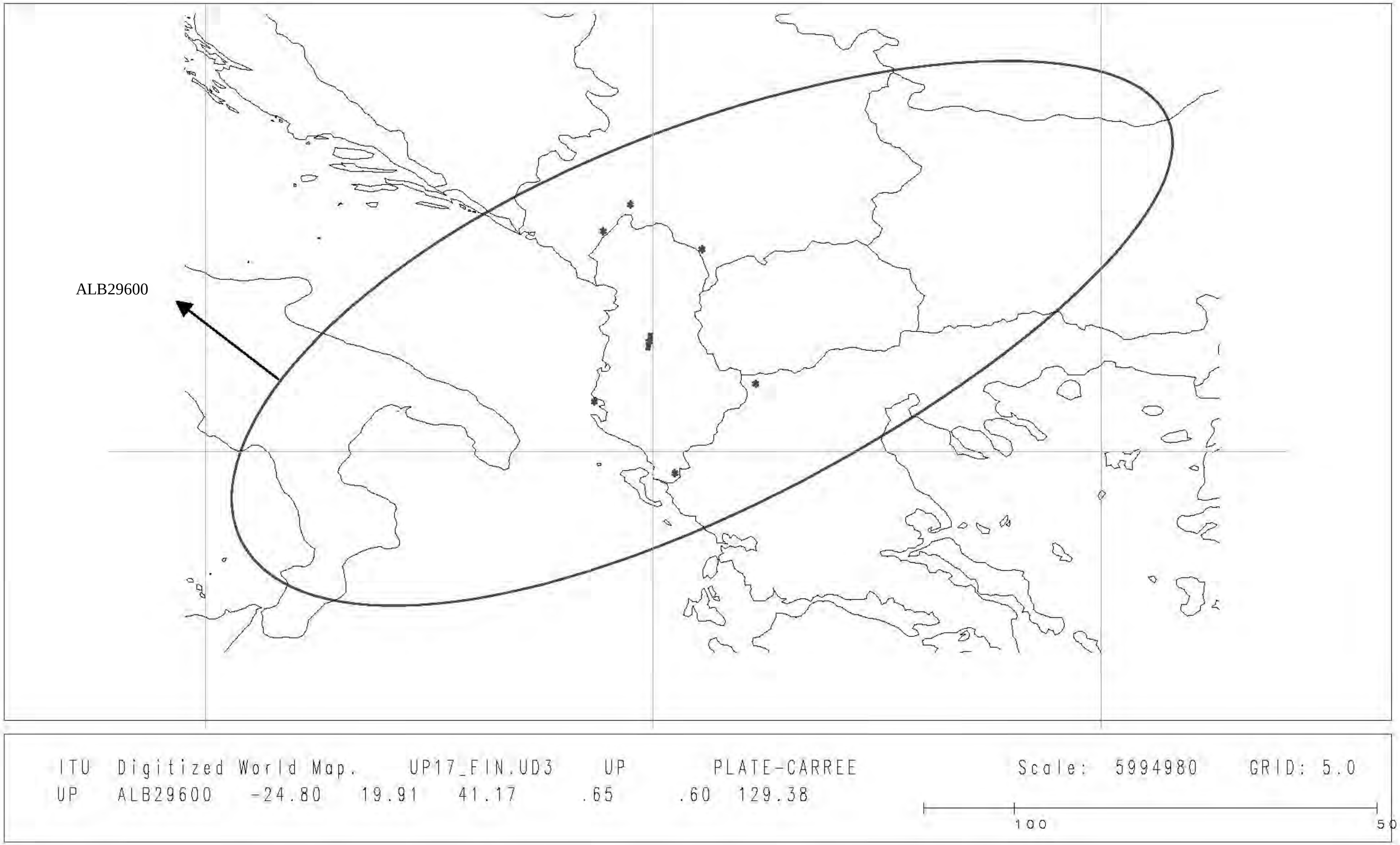
100 500 1000

ALB (24.80)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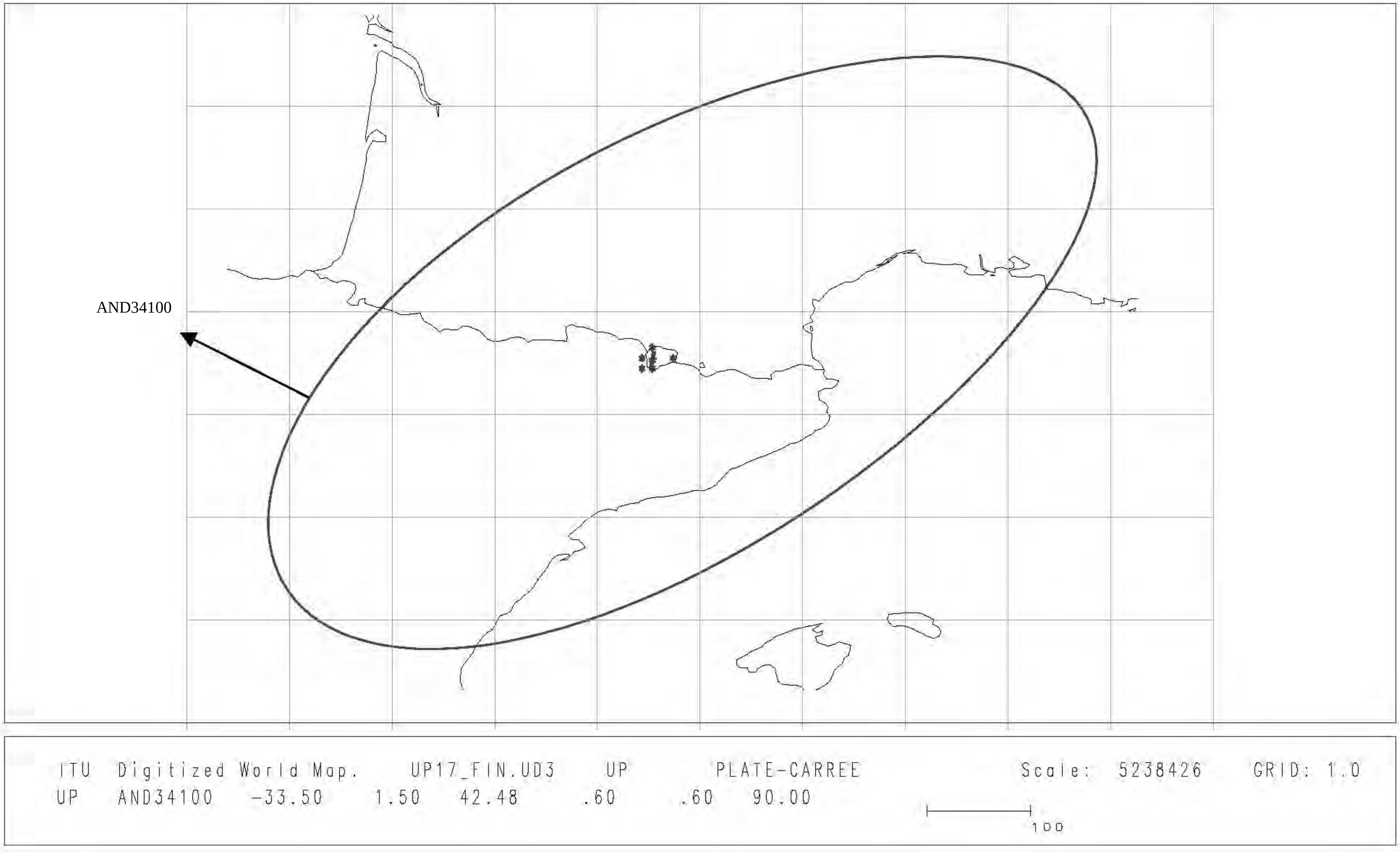
100
50

AND (33.50 W)


AND34100
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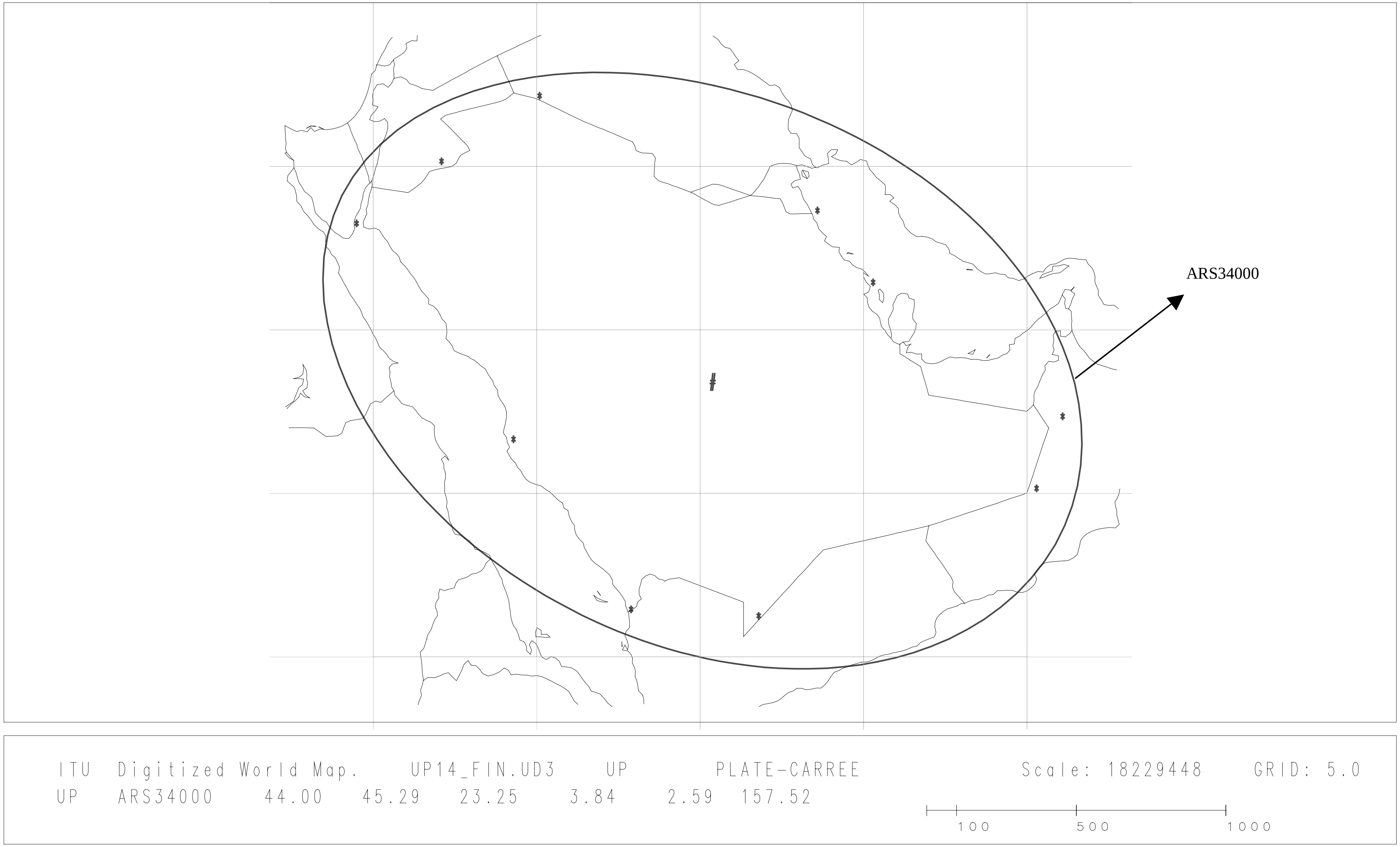
100

ARS (44.00 E) (multinational beam)

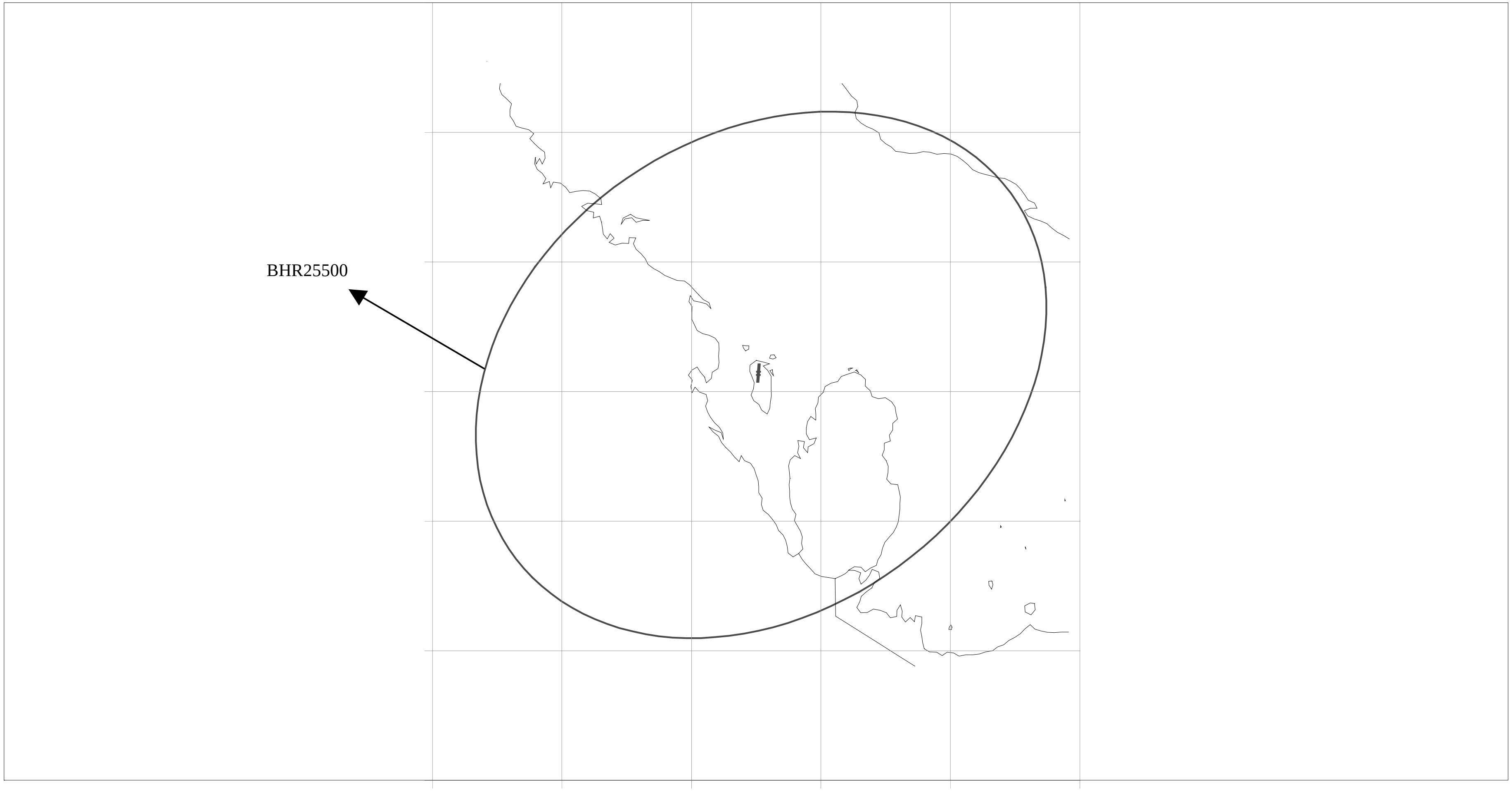


BEL (30.00 W)

ITU Digitized World Map. UP17_FIN.UD3 UP PLATE-CARREE Scale: 6838690 GRID: 5.0
UP BEL01800 -30.00 4.04 50.24 .60 .60 156.55

100 500

BHR (29.00 E)



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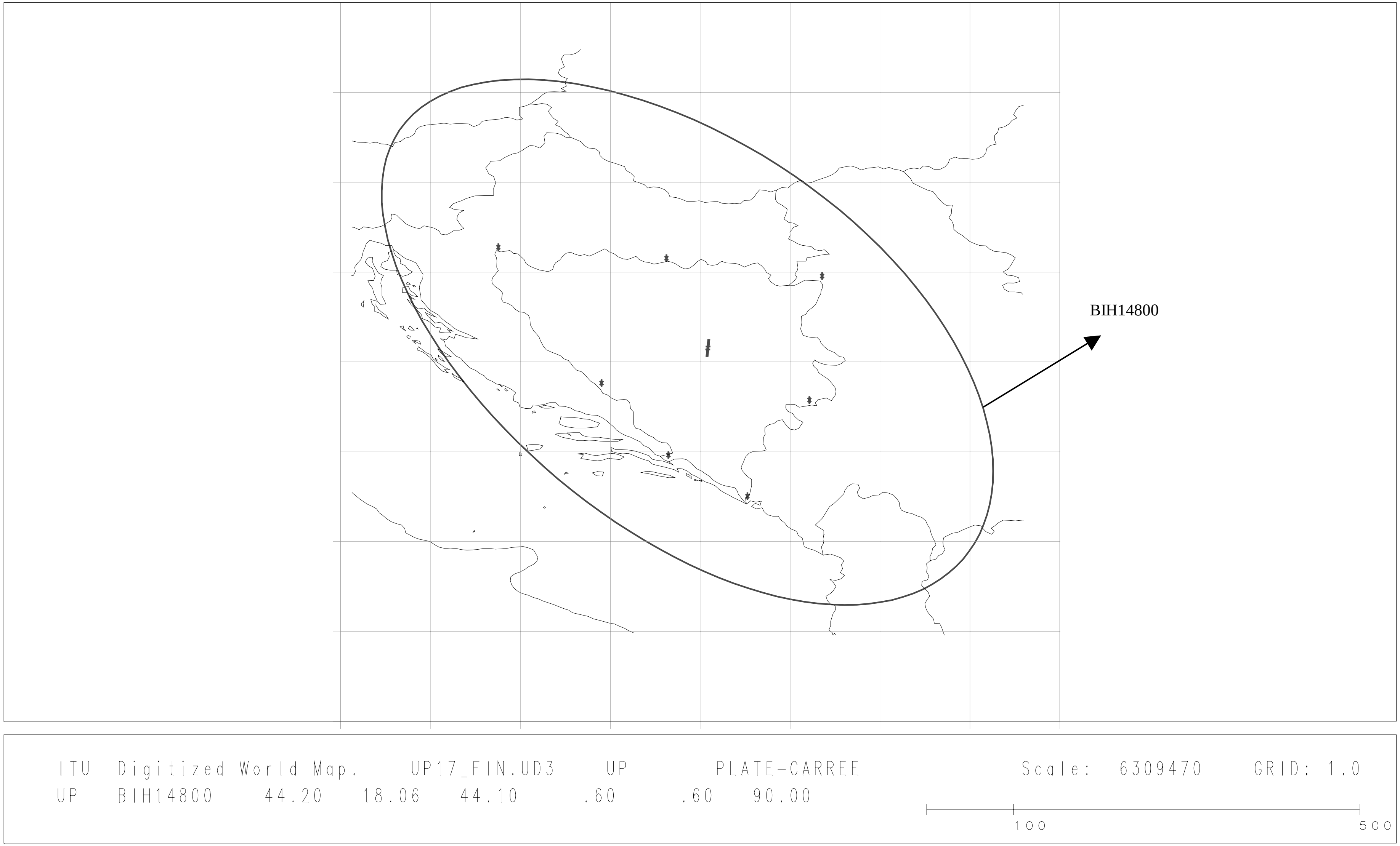
100

BIH (44.20 E)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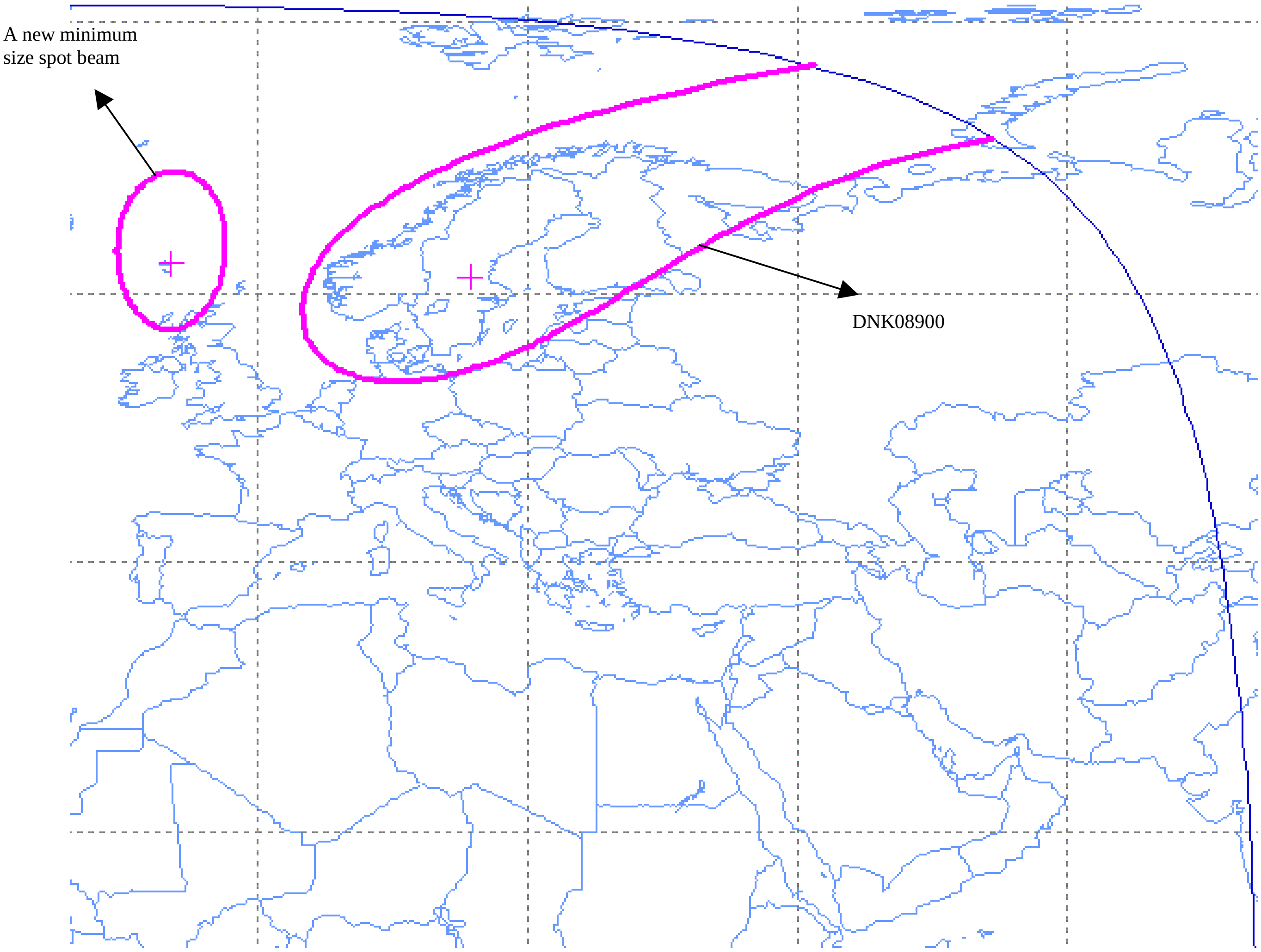
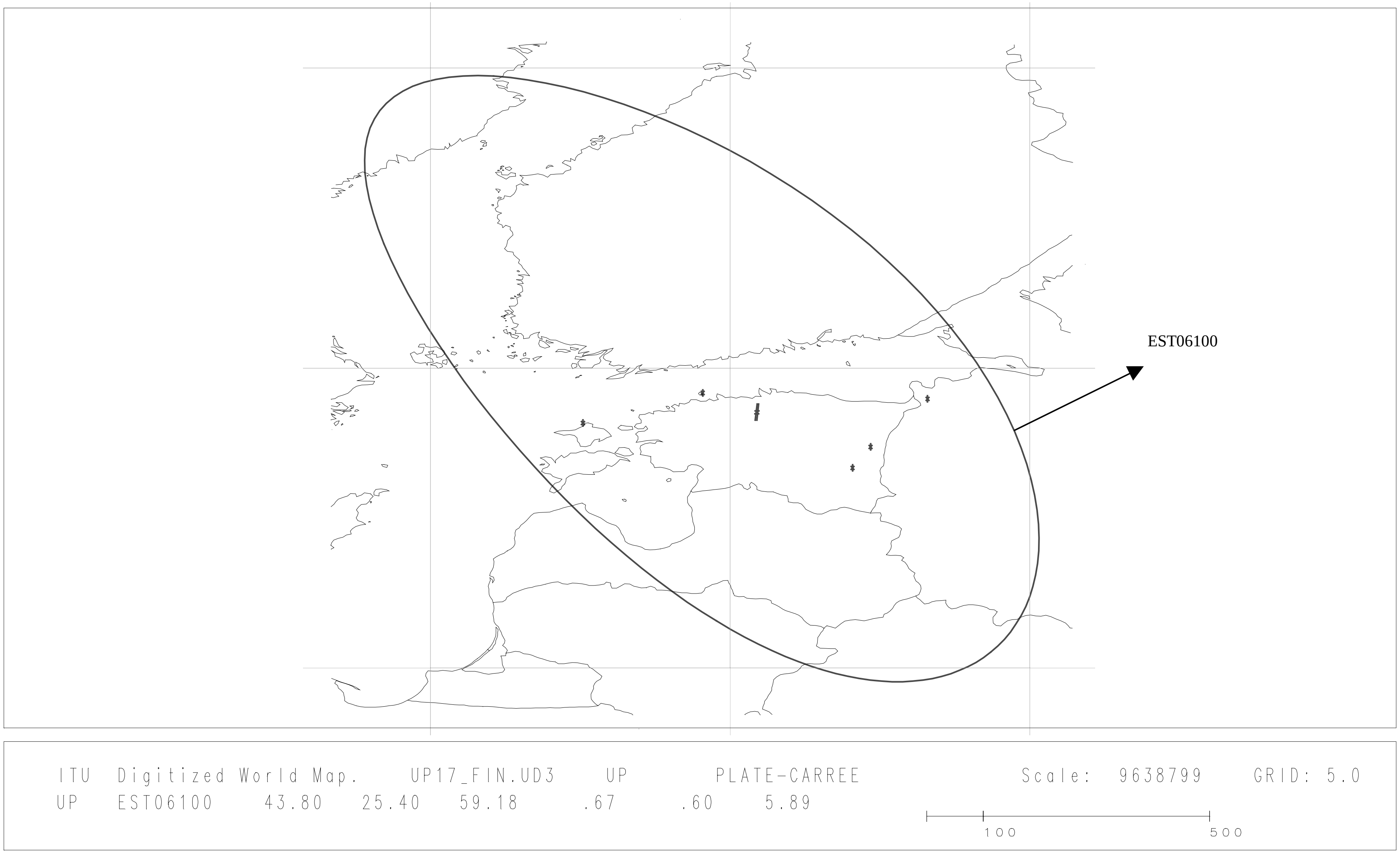
100
500

DNK (7.20 W) (1)



(1) Beam recalculated with temporary test-points to provide complete national coverage.

EST (43.80 E)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100
500

GRC (34.00 E)

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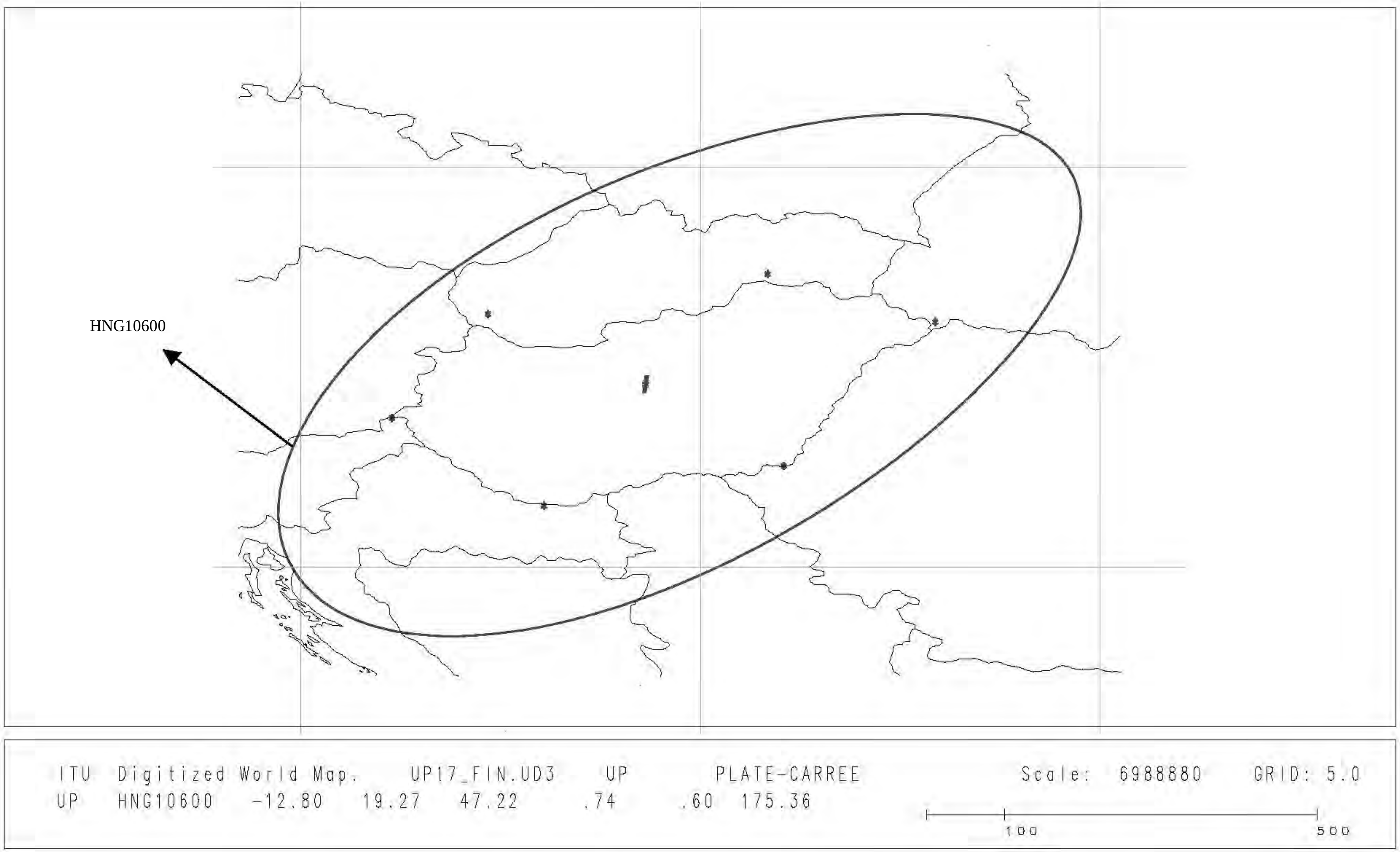
UP GRC10500 34.00 24.78 38.12 1.56 1.15 169.67

100 500

HNG (12.80 W)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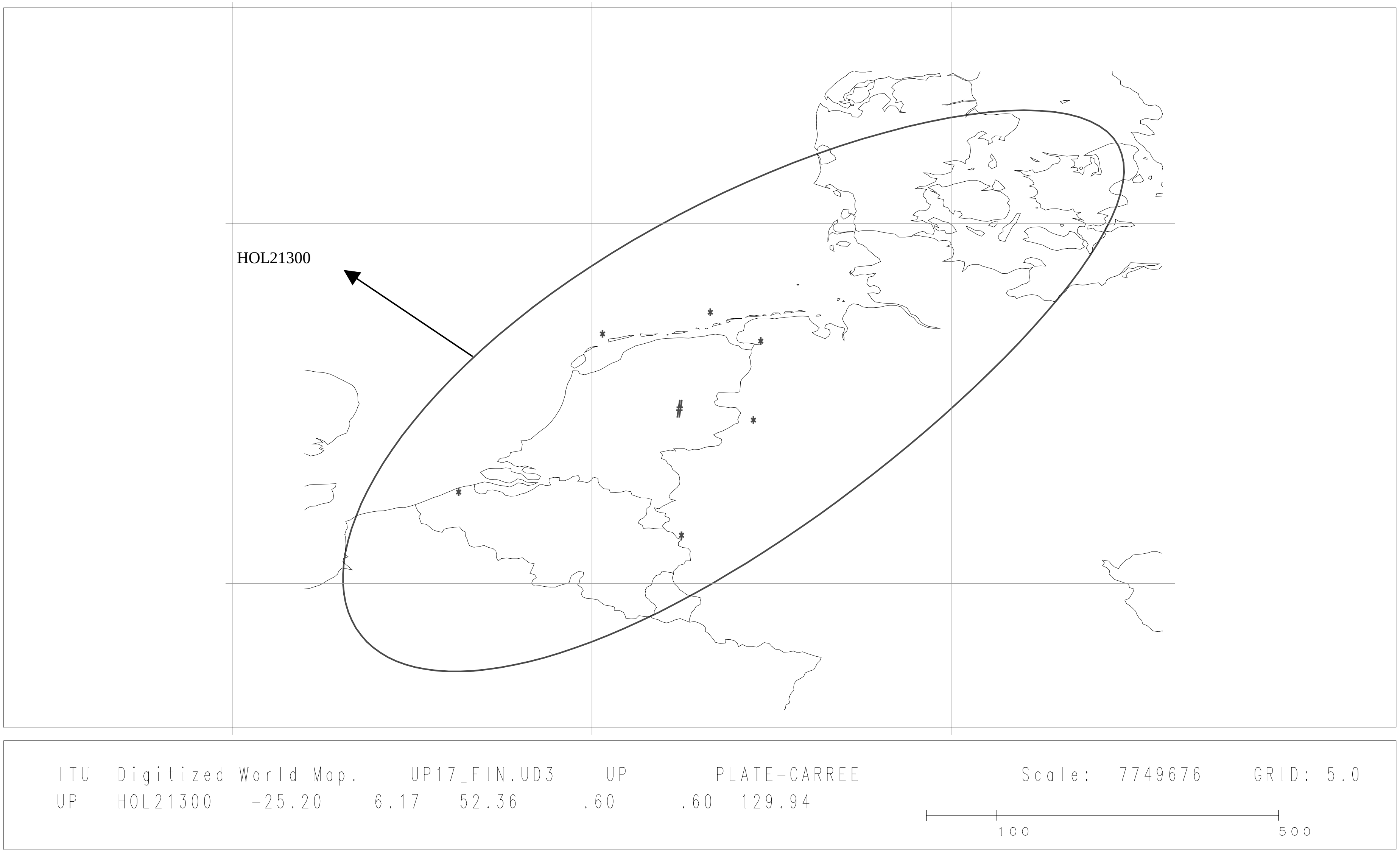
100
500

HOL (25.20 W)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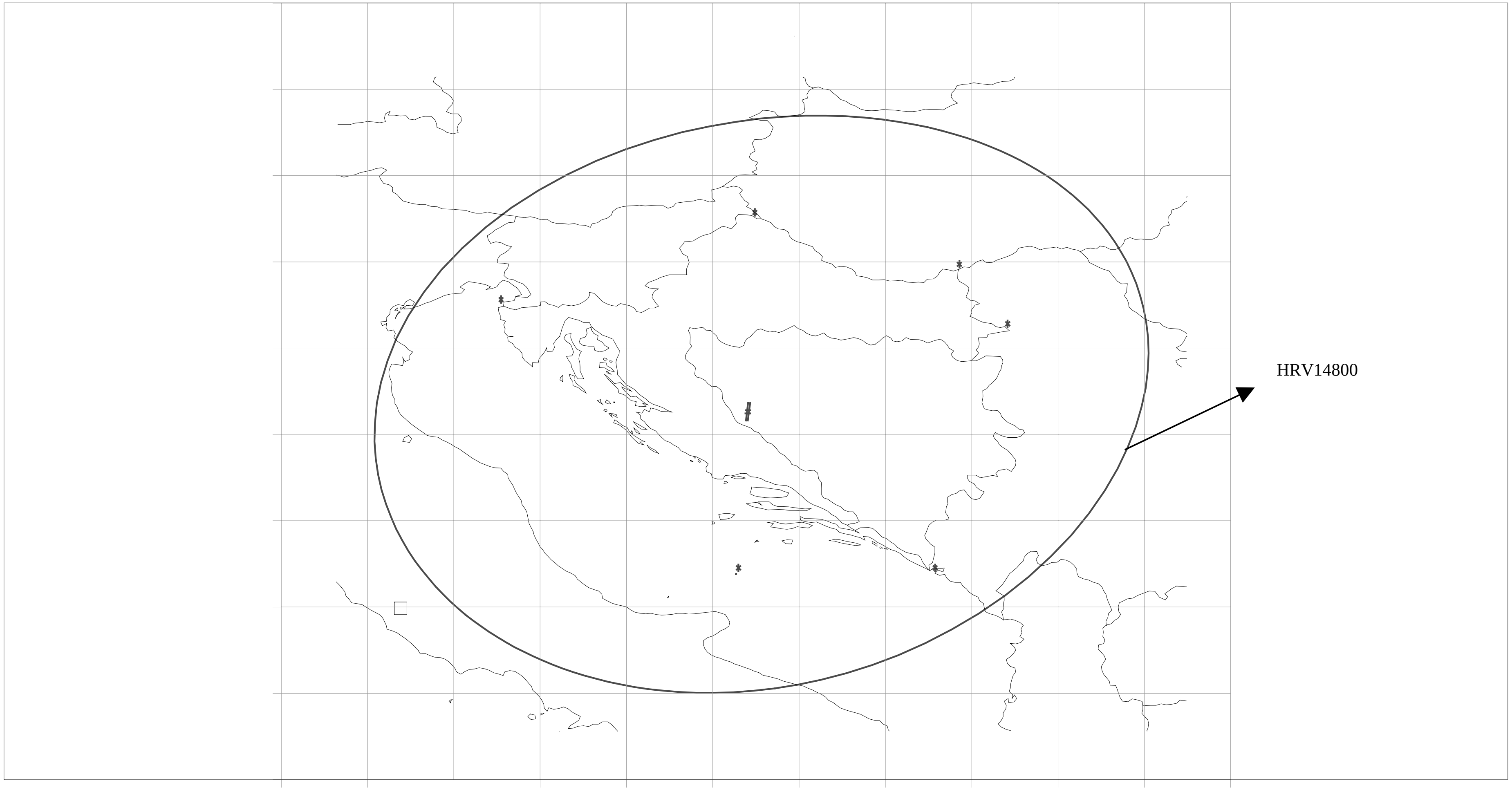
100
500

HRV (12.80 W)



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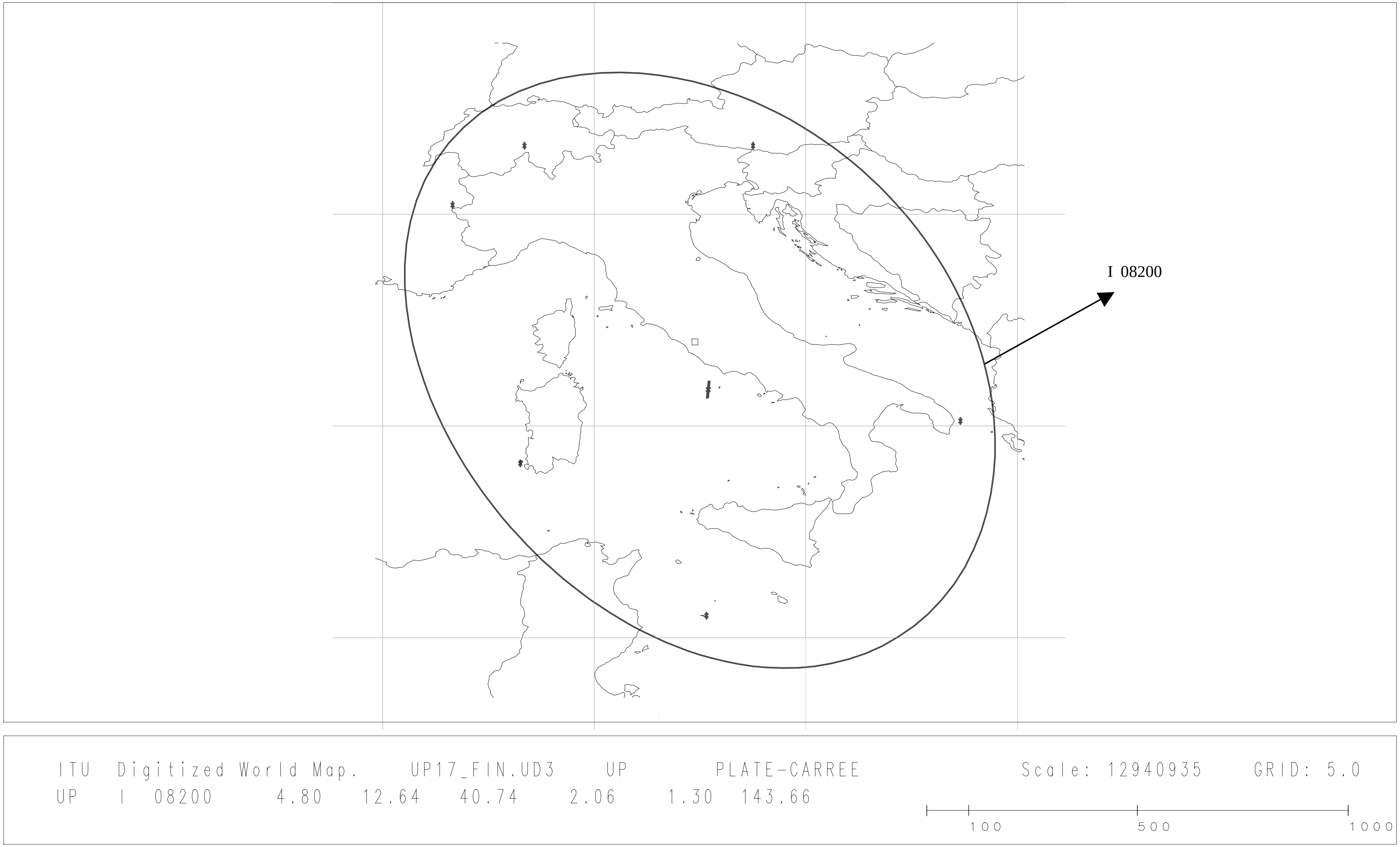
100 500

I (4.80 E)


I 08200
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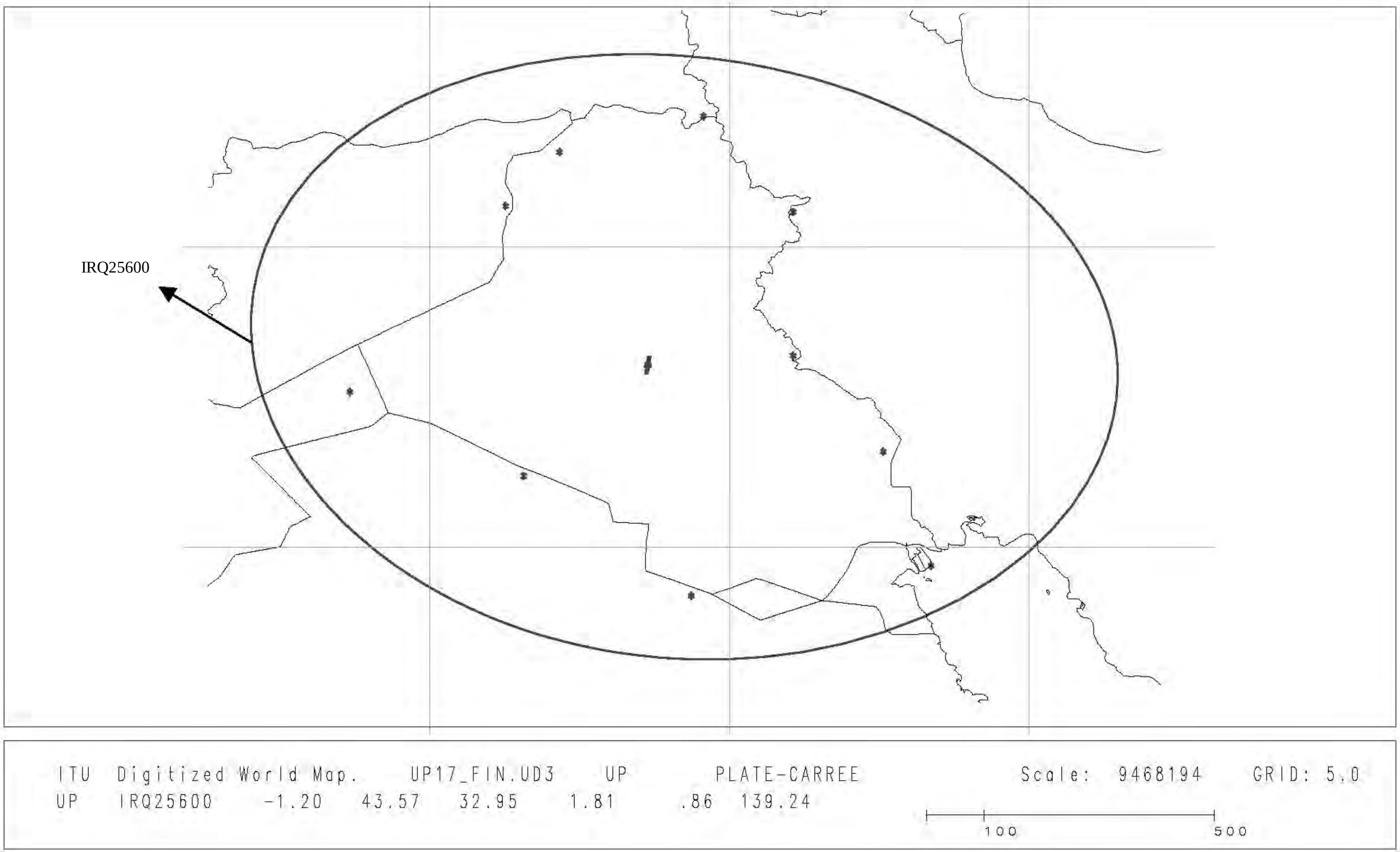
UP I 08200 4.80 12.64 40.74 2.06 1.30 143.66
100
500
1000

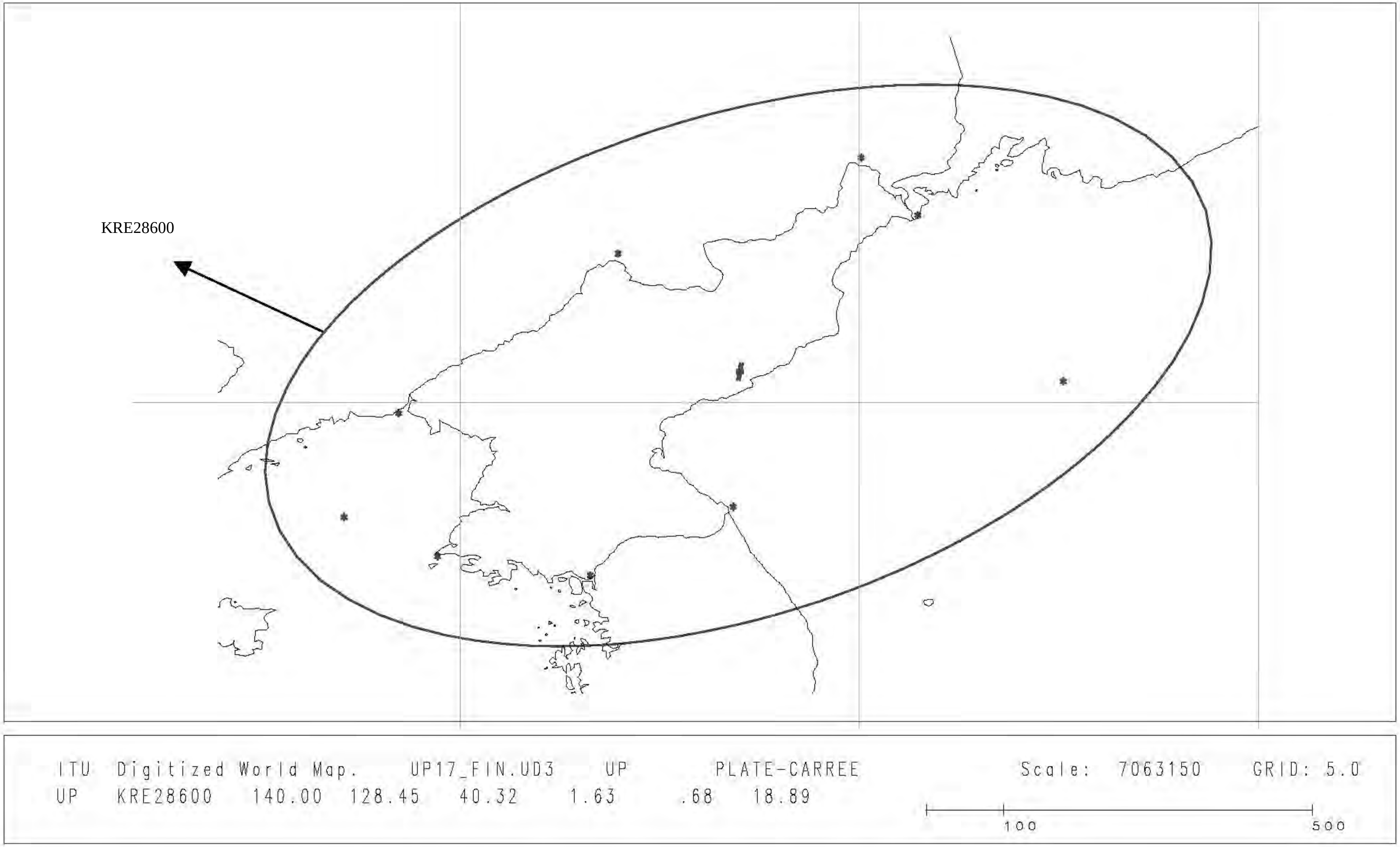
IRQ (1.20 W)


IRQ25600
ITU Digitized World Map. UP17_FIN.UD3 UP PLATE-CARREE Scale: 9468194 GRID: 5.0
UP IRQ25600 -1.20 43.57 32.95 1.81 .86 139.24
100
500

KEN (7.20 W) (1)

(1) Beam recalculated with temporary test-points to provide complete national coverage.

KRE (140.00 E)


KRE28600
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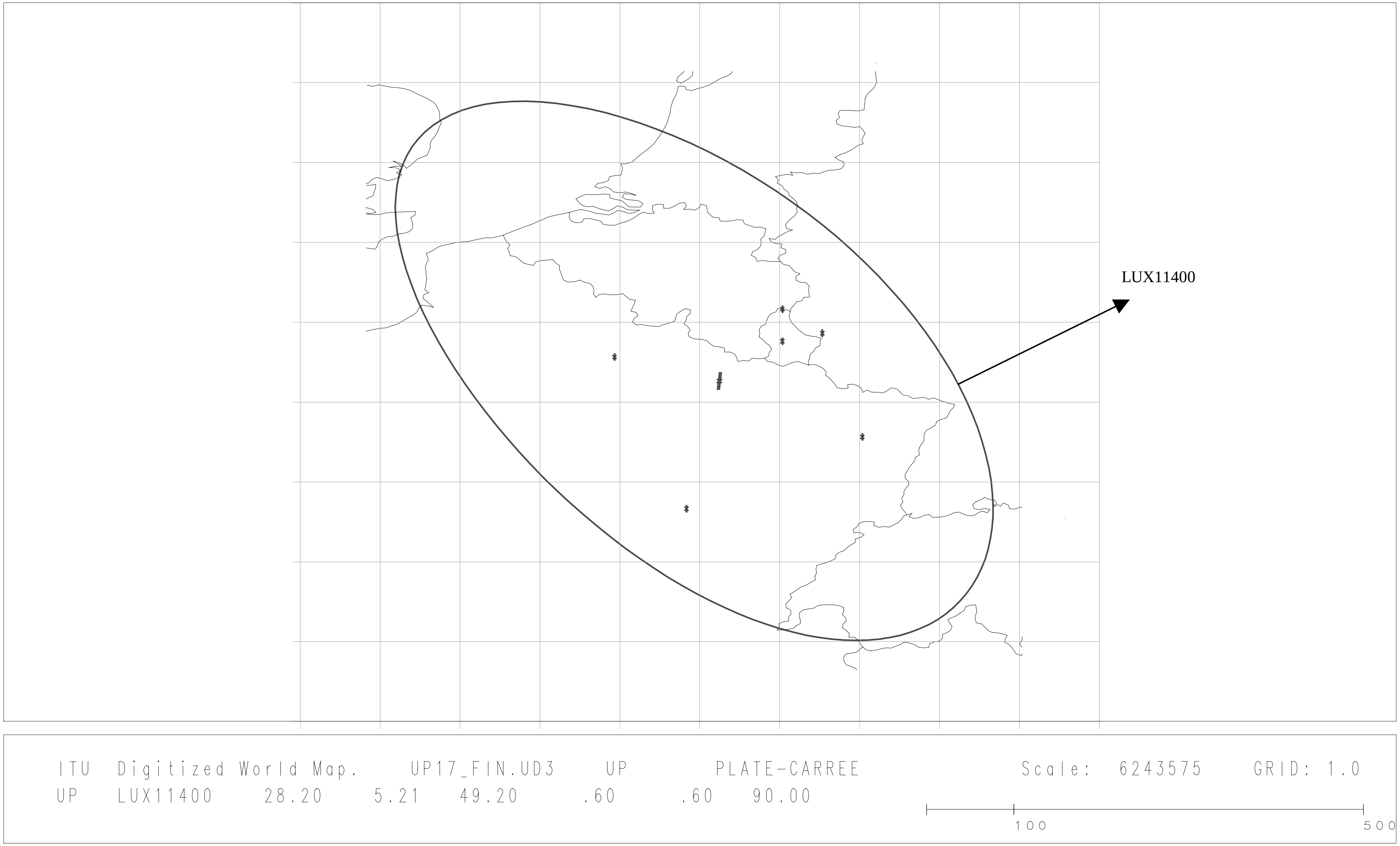
100
500

LUX (28.20 E)


LUX11400
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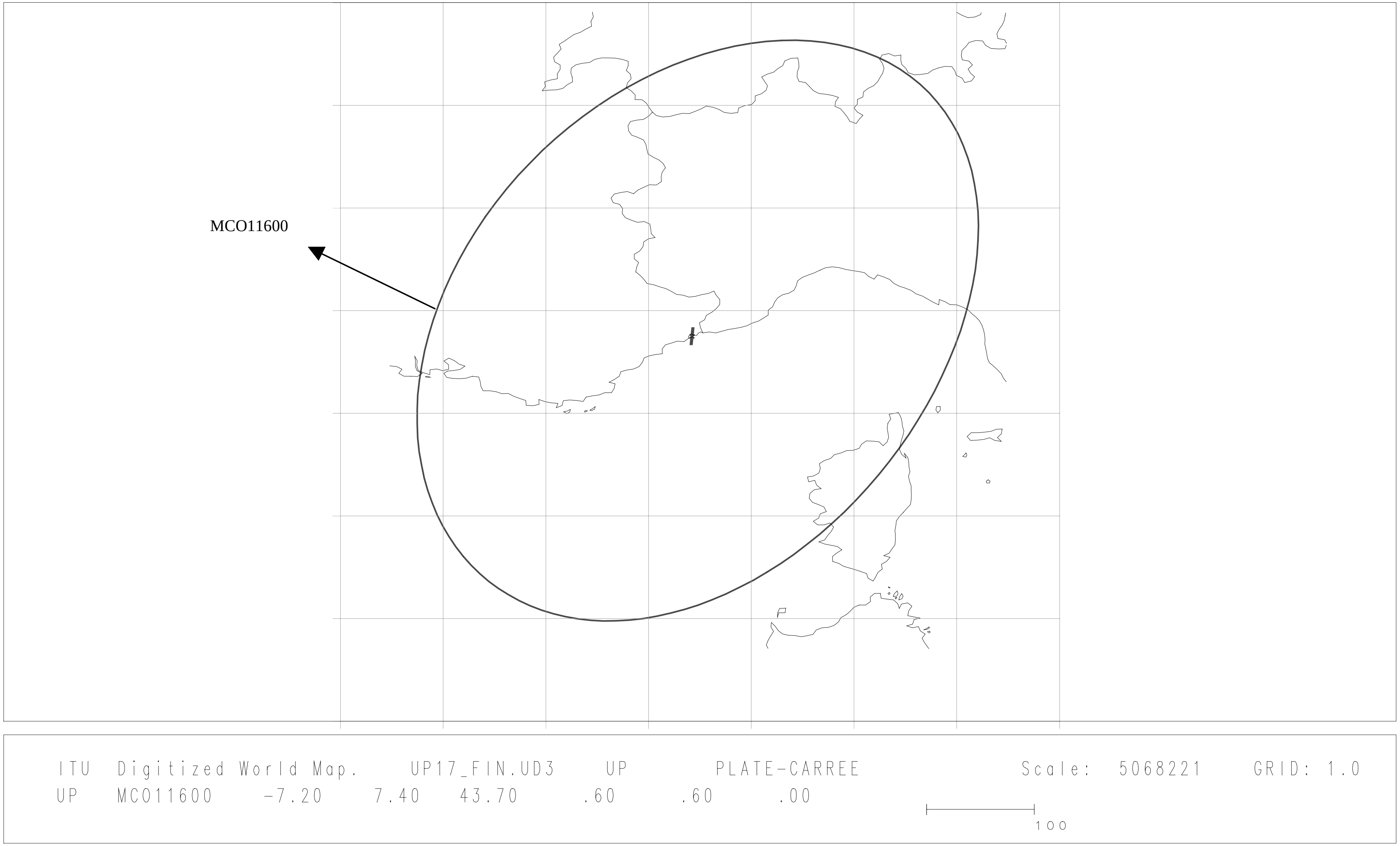
UP LUX11400 28.20 5.21 49.20 .60 .60 90.00
100
500

LVA (50.00 E)

ITU Digitized World Map. UP17_FIN.UD3 UP PLATE-CARREE Scale: 8762897 GRID: 5.0
UP LVA06100 50.00 24.18 56.80 .79 .60 13.57

100 500

MCO (7.20 W)


MCO11600
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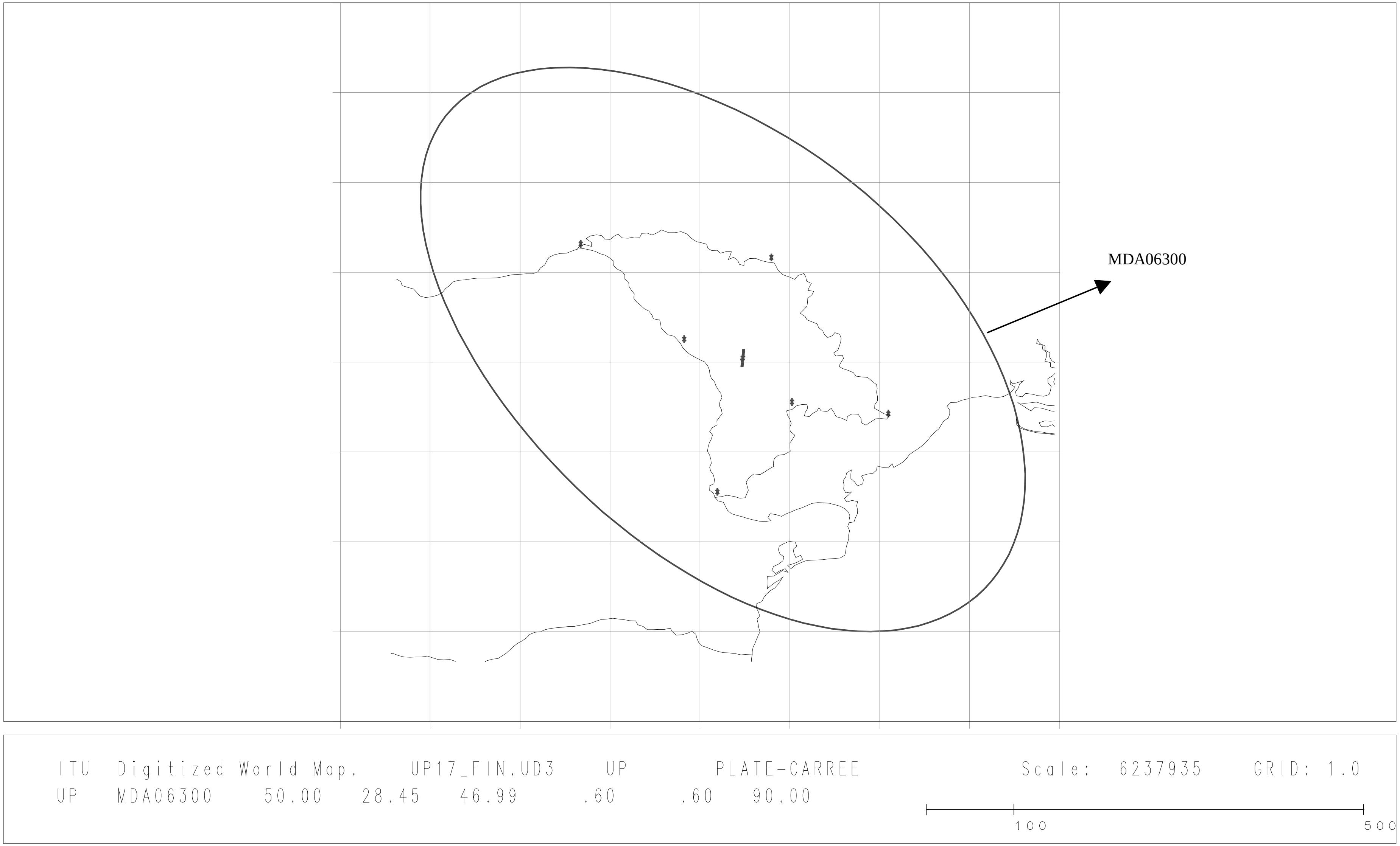
UP MCO11600 -7.20 7.40 43.70 .60 .60 .00
100

MDA (50.00 E)


MDA06300
ITU Digitized World Map. UP17_FIN.UD3 UP PLATE-CARREE Scale: 6237935 GRID: 1.0
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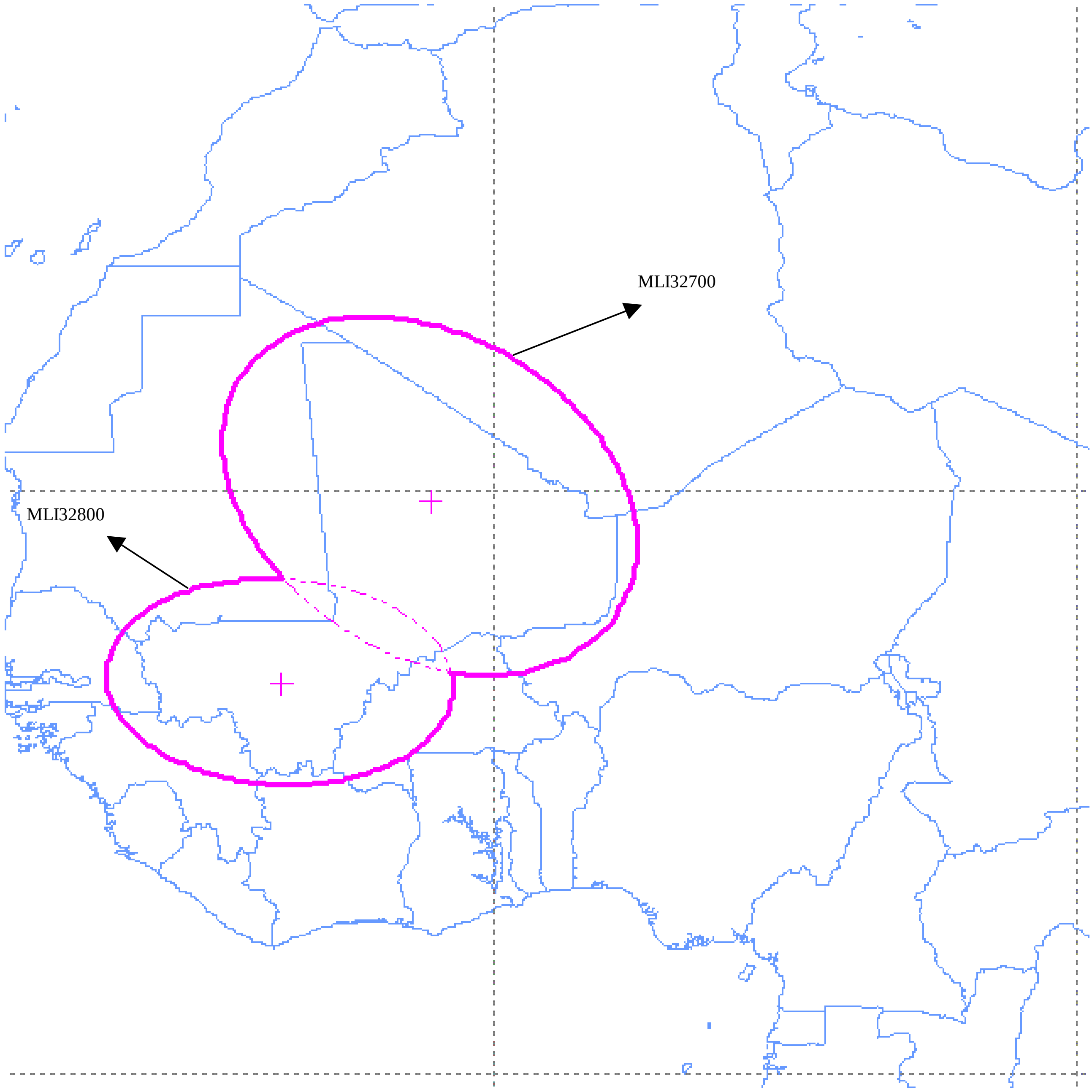
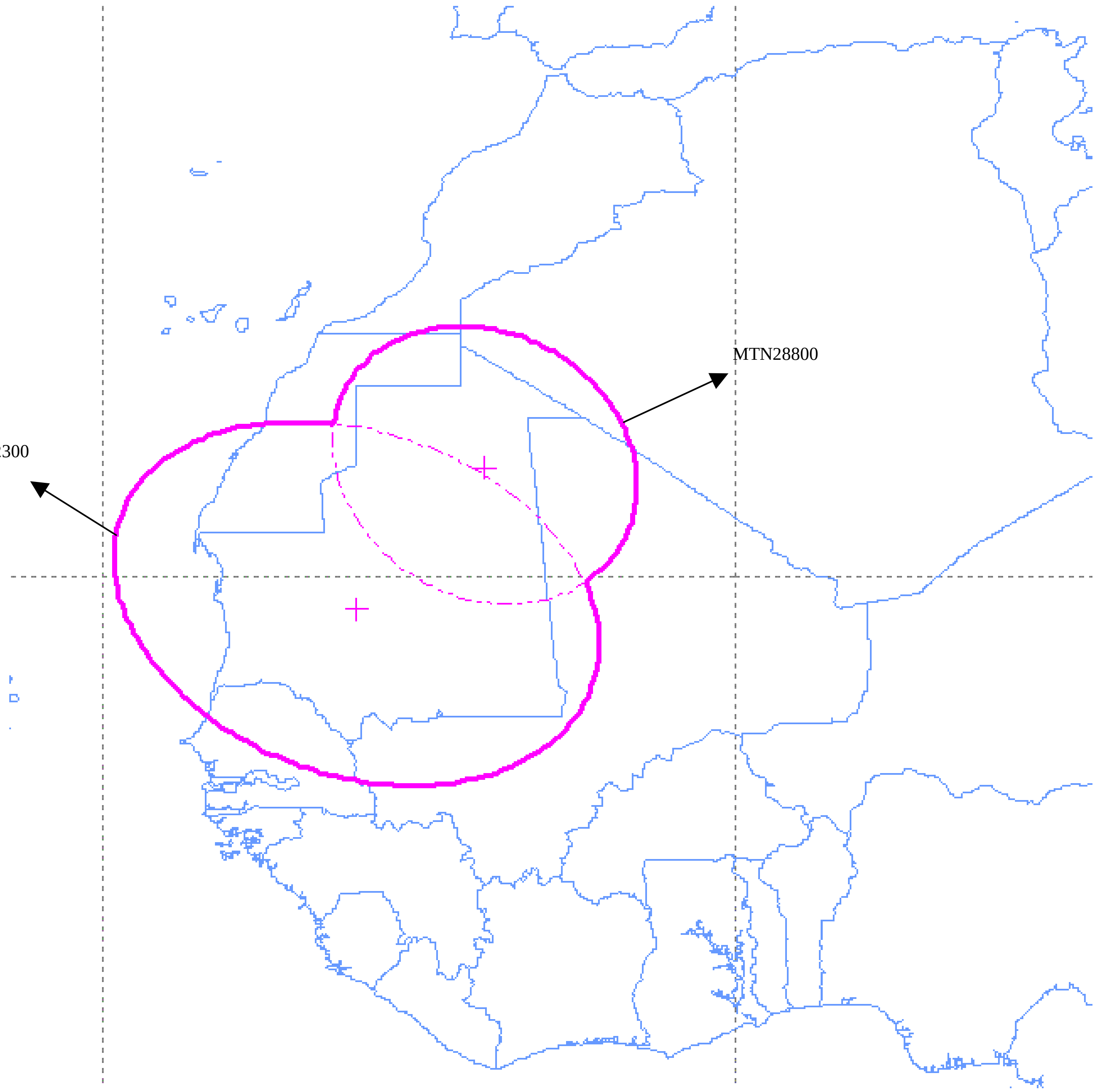
100
500

MLI (7.20 W) (1)



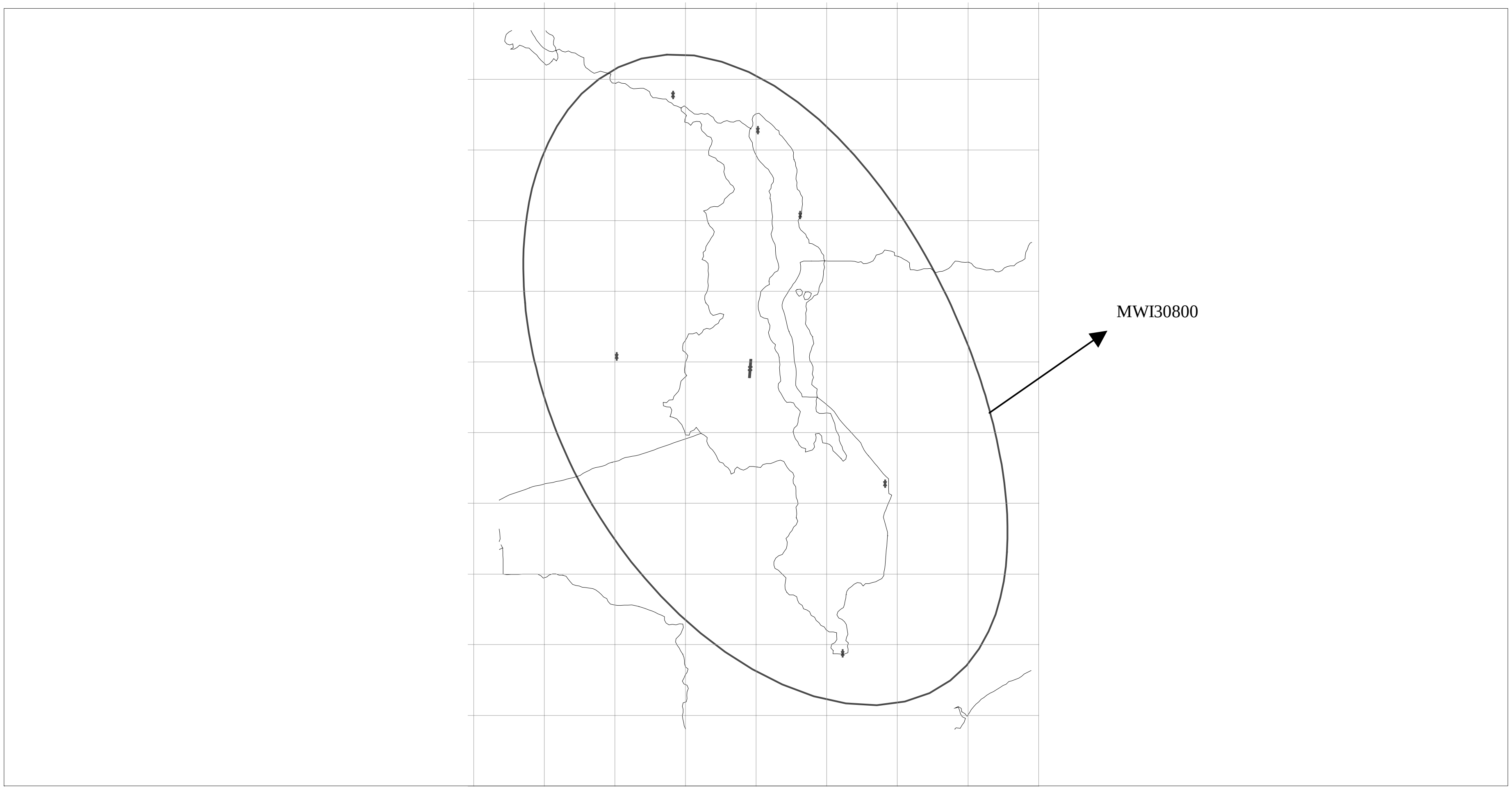
(1) Beam recalculated with temporary test-points to provide complete national coverage.

MTN (19.20 W) [(1)]



(1) Beam recalculated with temporary test-points to provide complete national coverage.

MWI (12.80 W)



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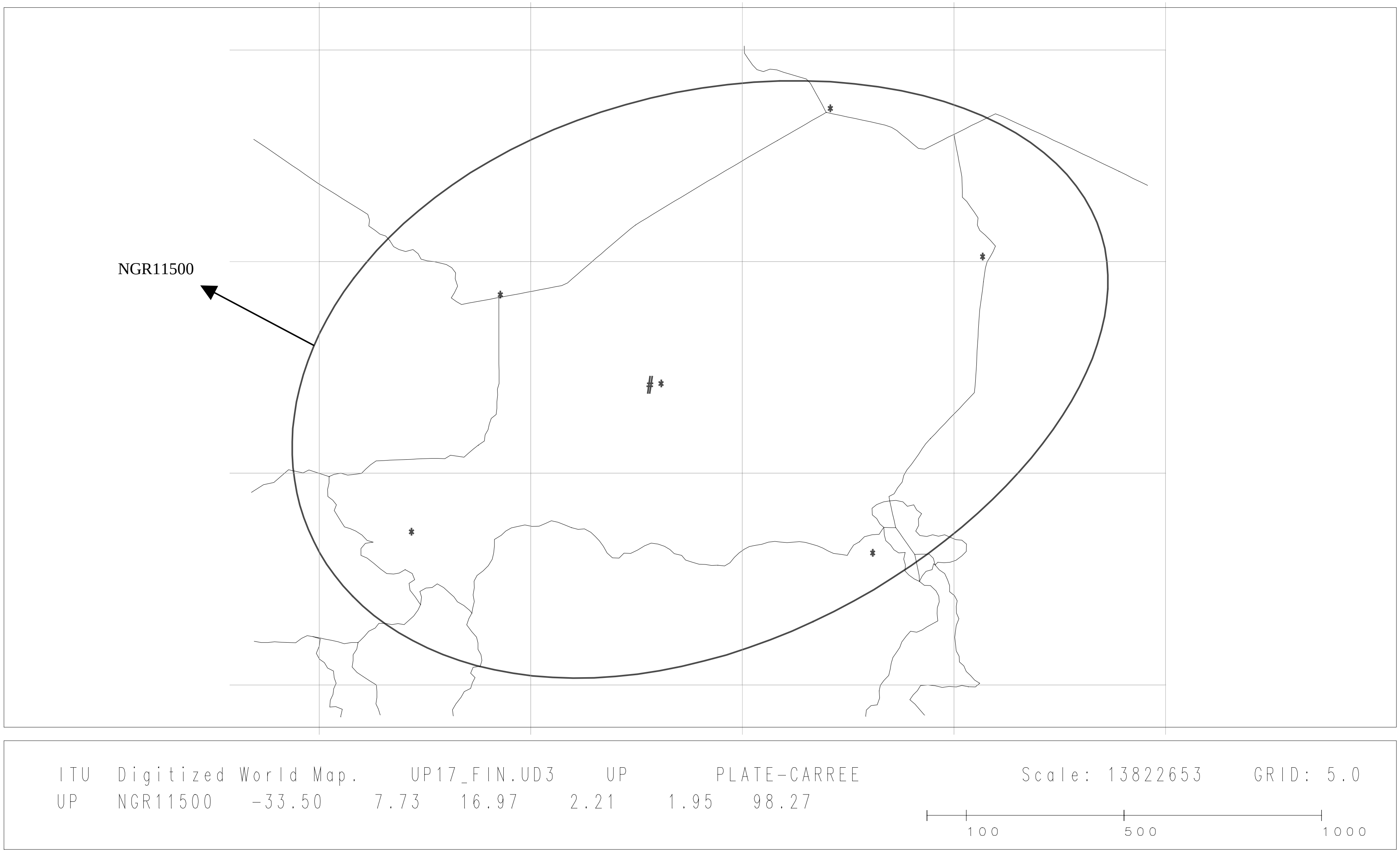
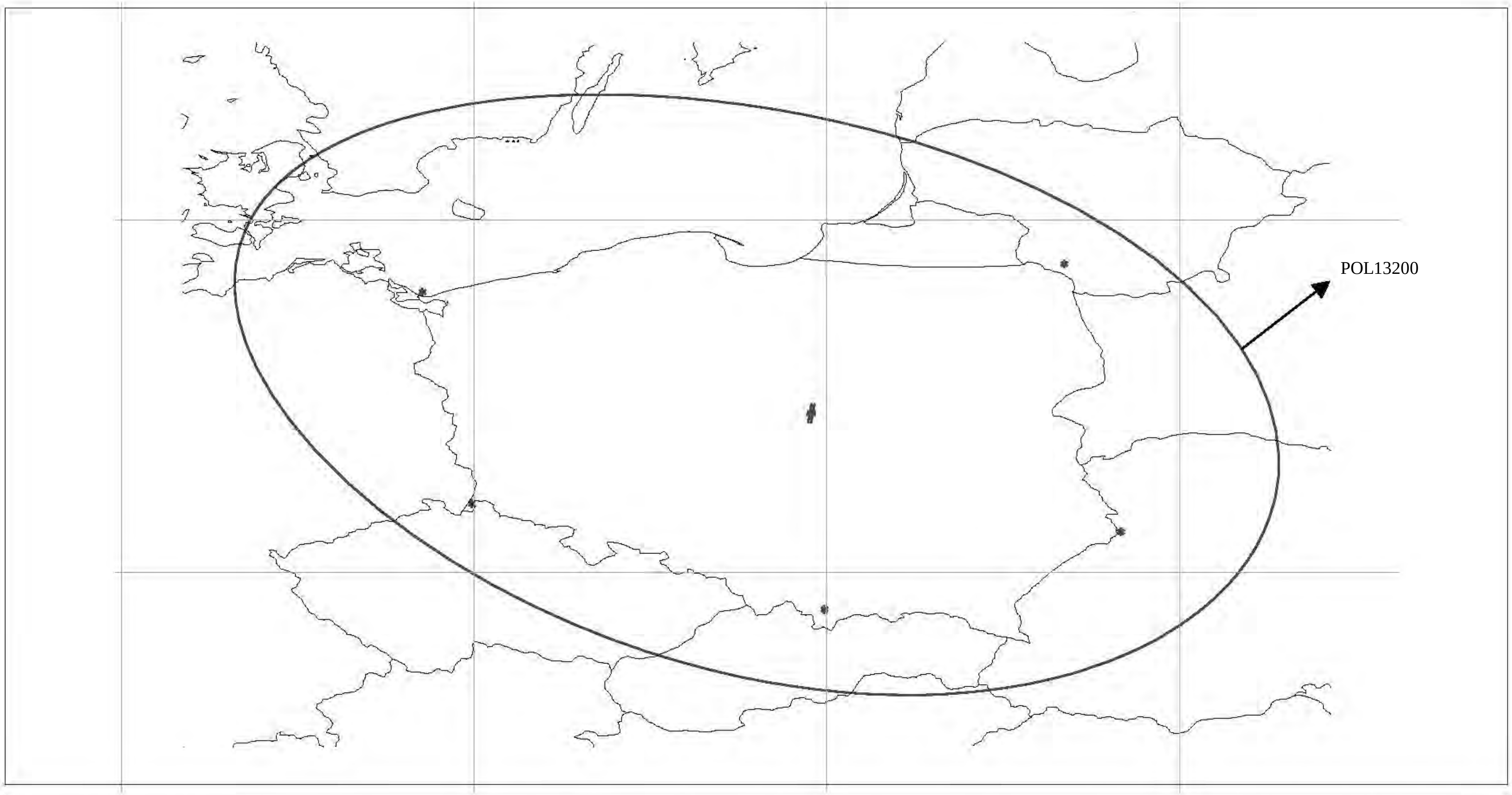
NGR (33.50 W) (1)



(1) Beam recalculated with temporary test-points to provide complete national coverage.

POL (50.00 E)



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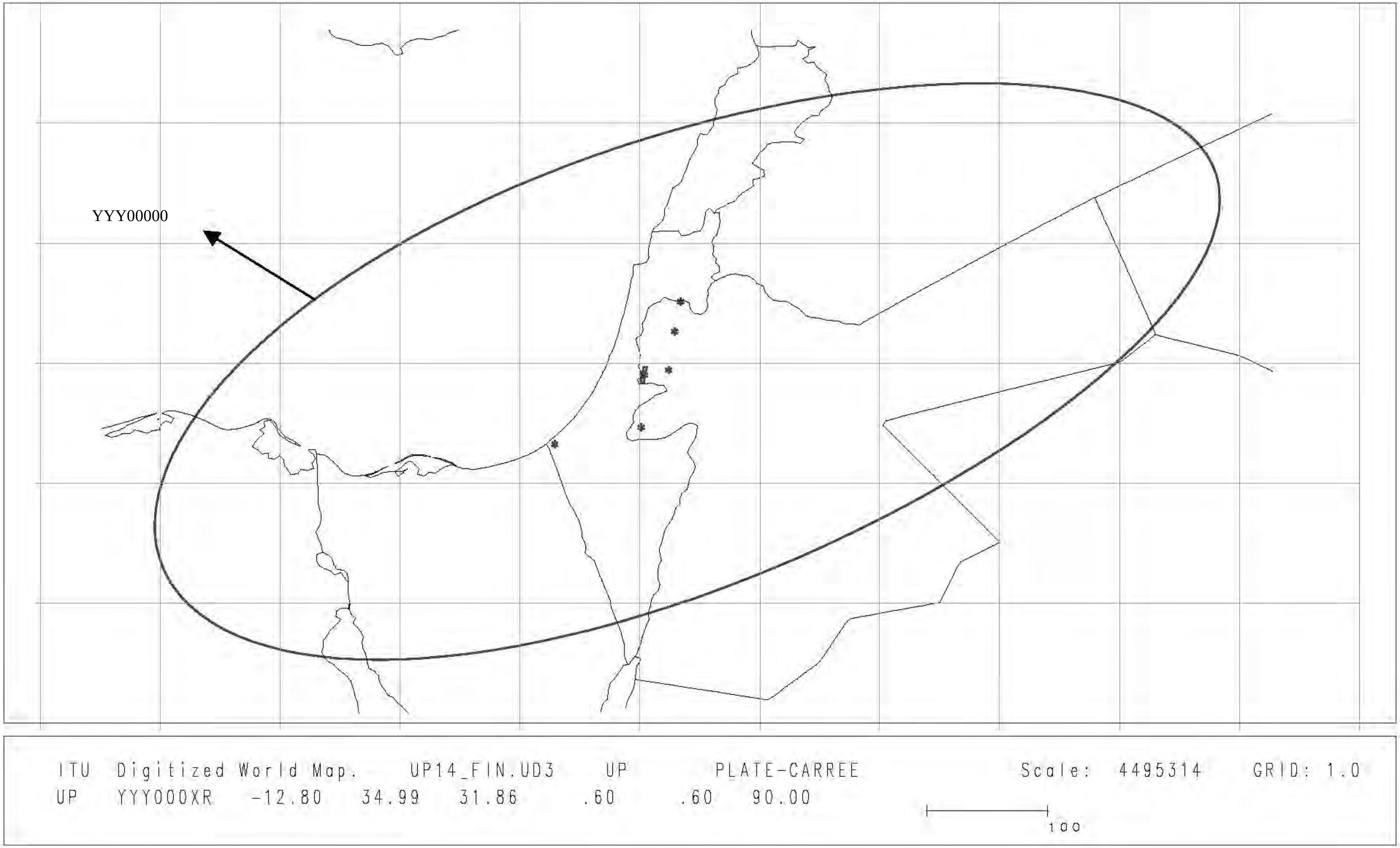
PSE (12.80 W)


YYY00000
ITU Digitized World Map. UP14_FIN.UD3 UP PLATE-CARREE Scale: 4495314 GRID: 1.0
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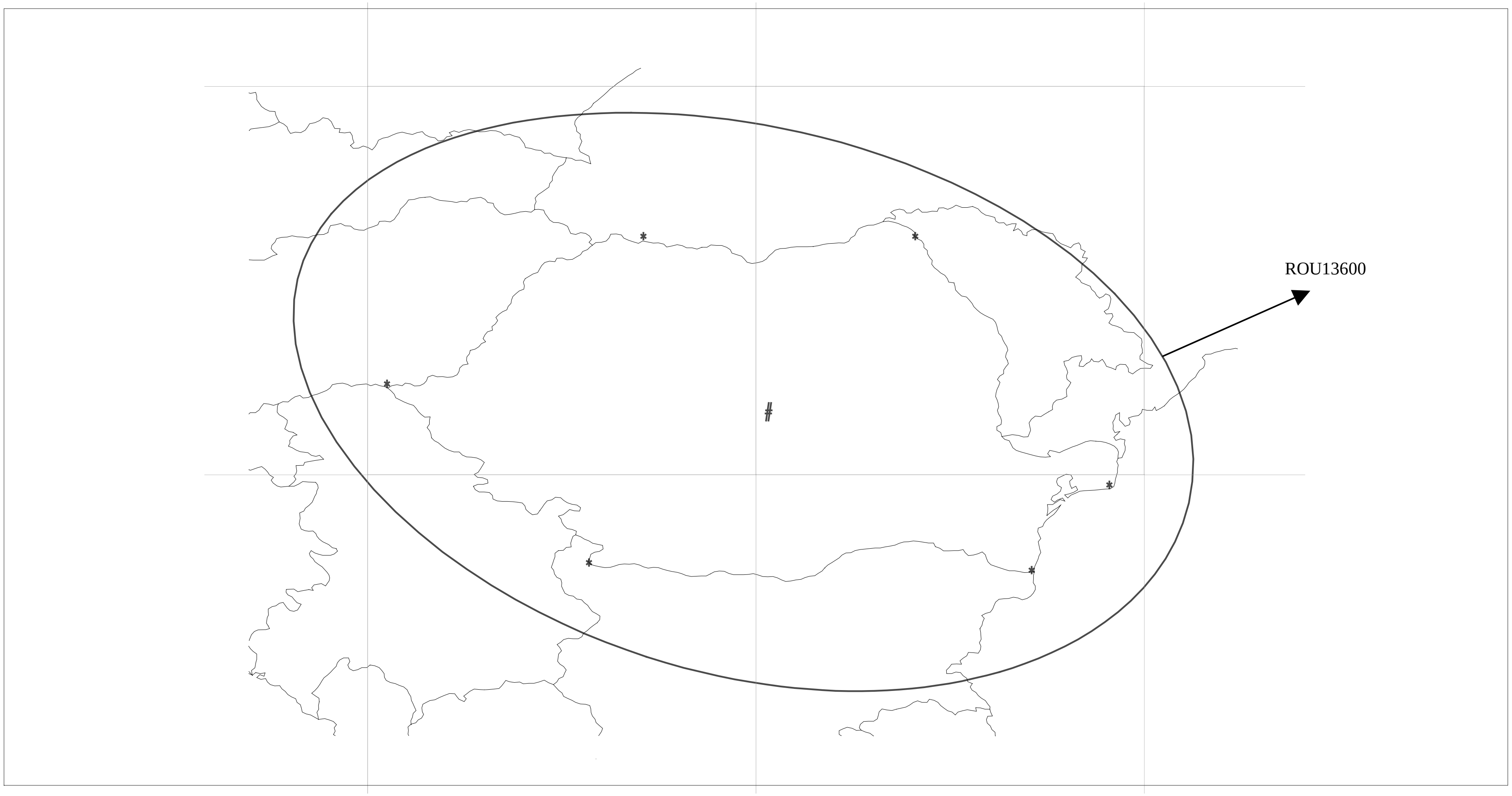
100

ROU (43.80 E)



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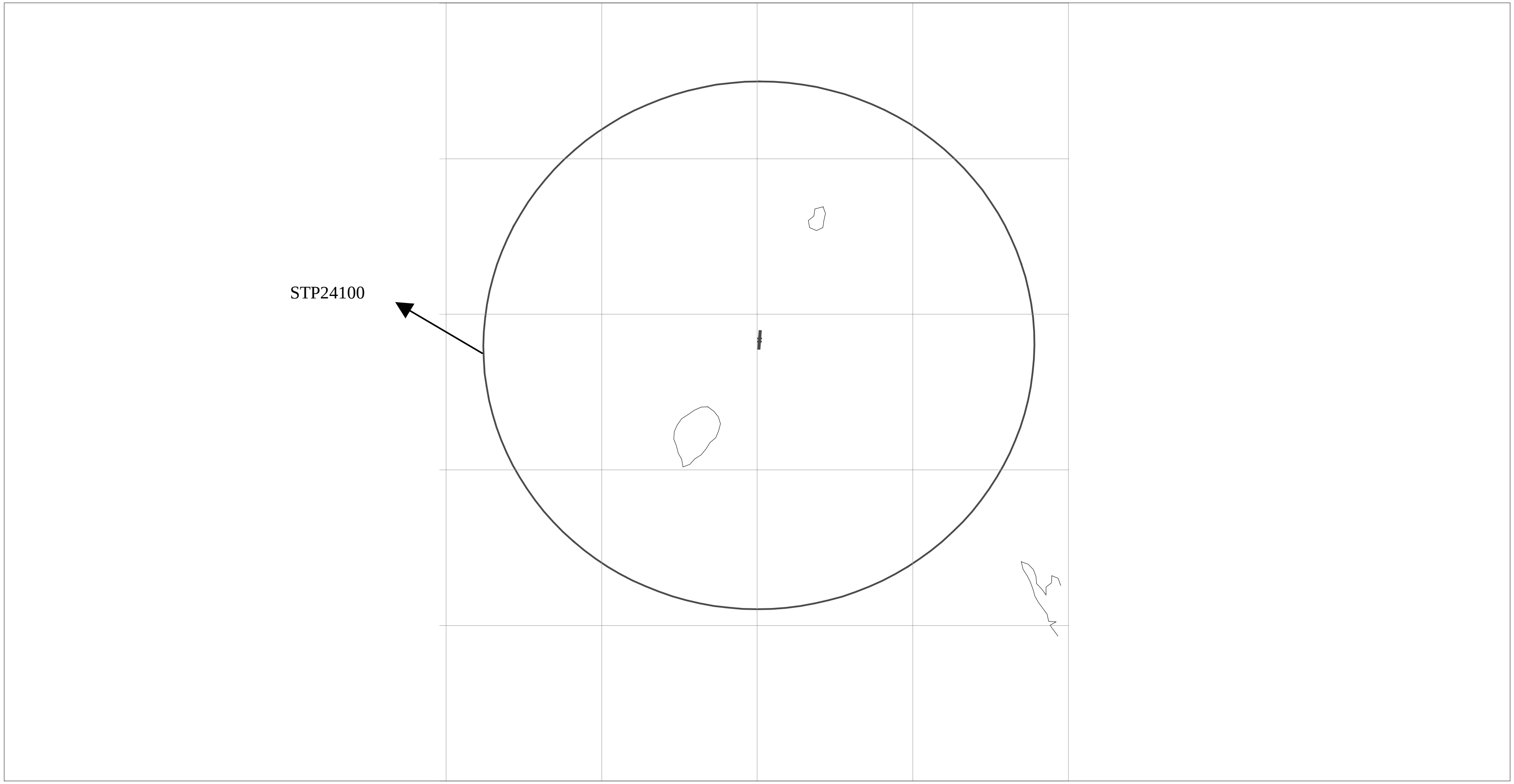
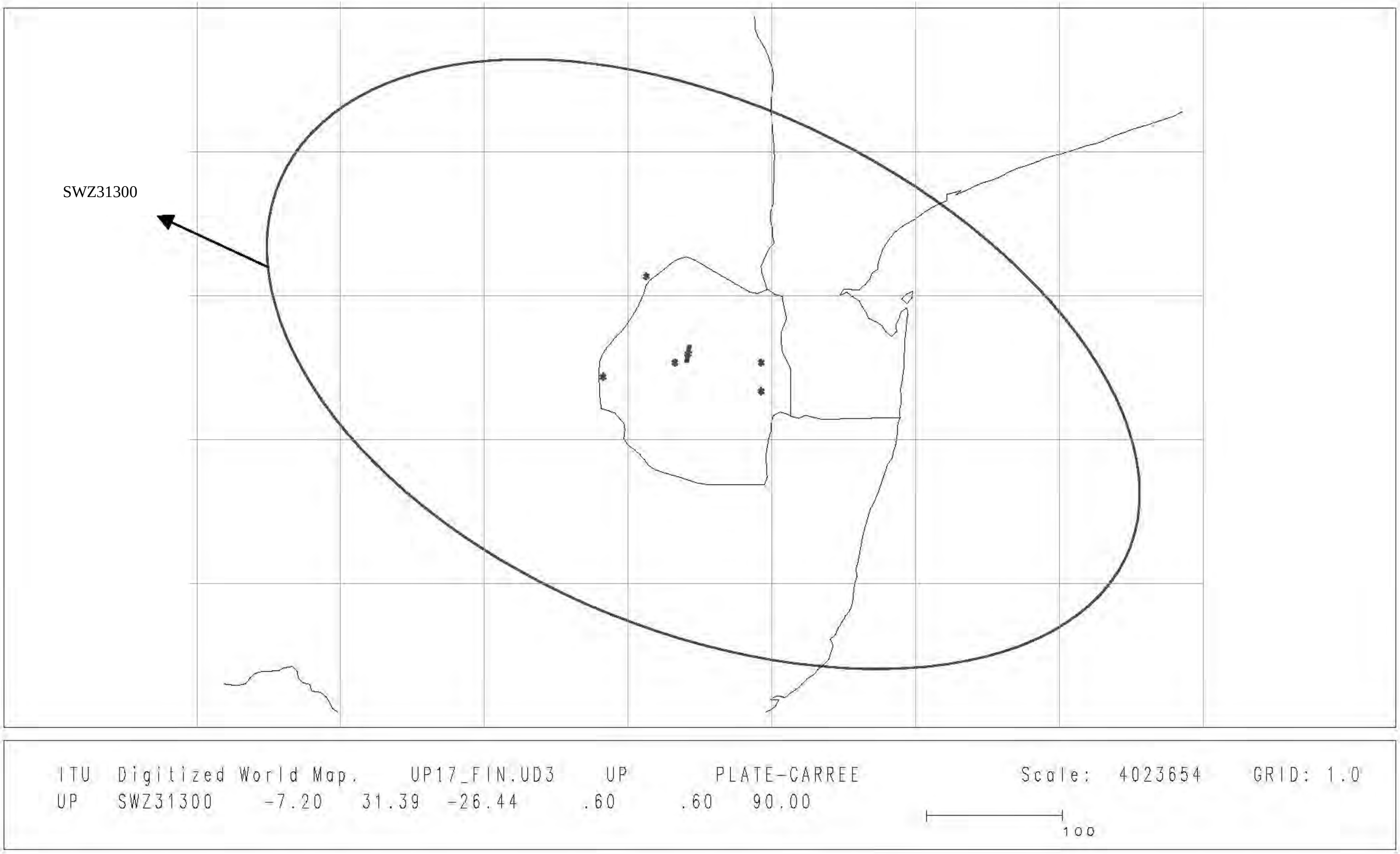
100 500

STP (7.20 W)



ITU Digitized World Map. UP17_FIN.UD3 UP PLATE-CARREE Scale: 4107514 GRID: 1.0
UP STP24100 -7.20 7.00 .80 .60 .60 .00
100

SWZ (7.20 W)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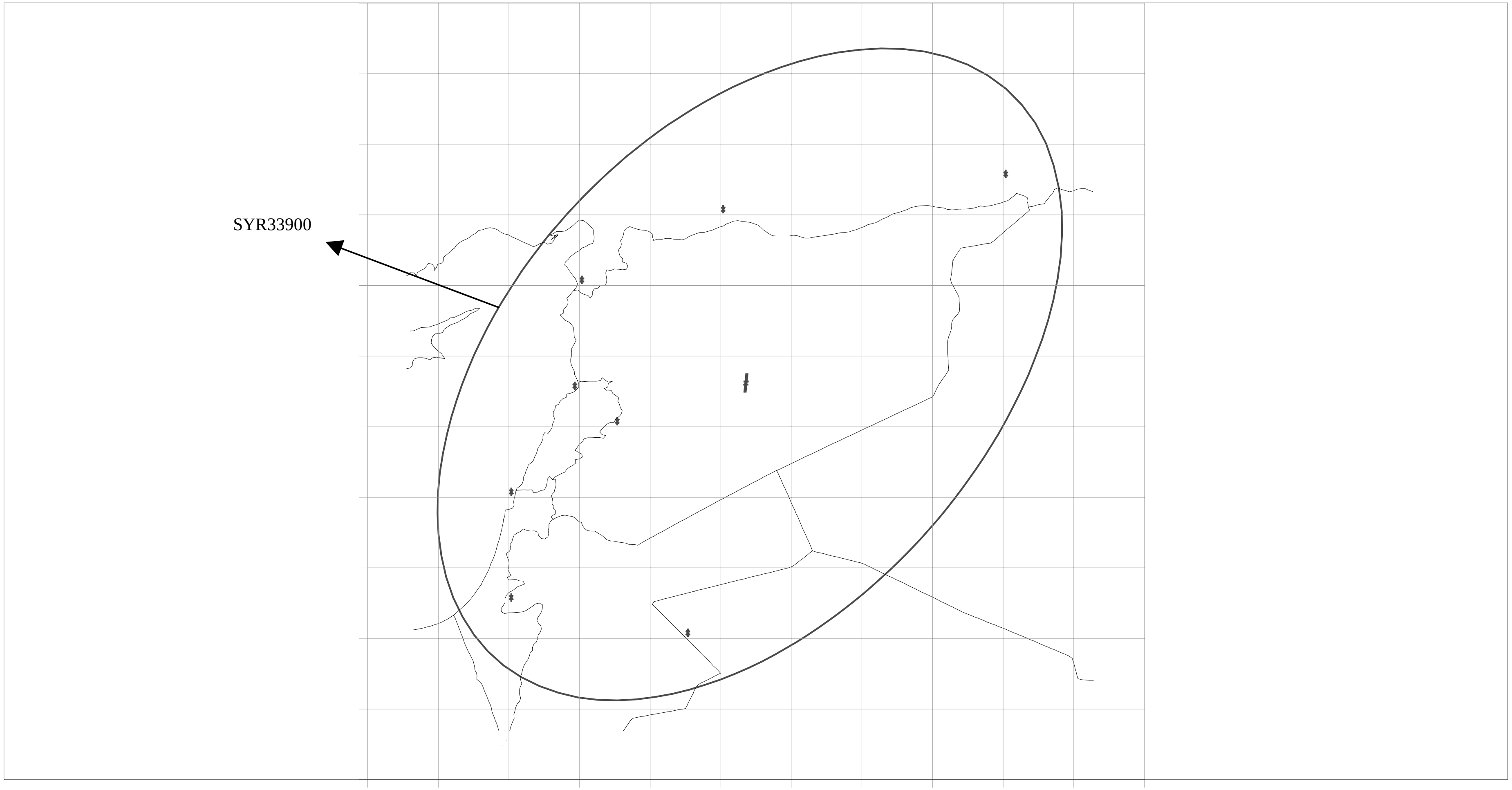
100

SYR (43.80 E) (multinational beam)



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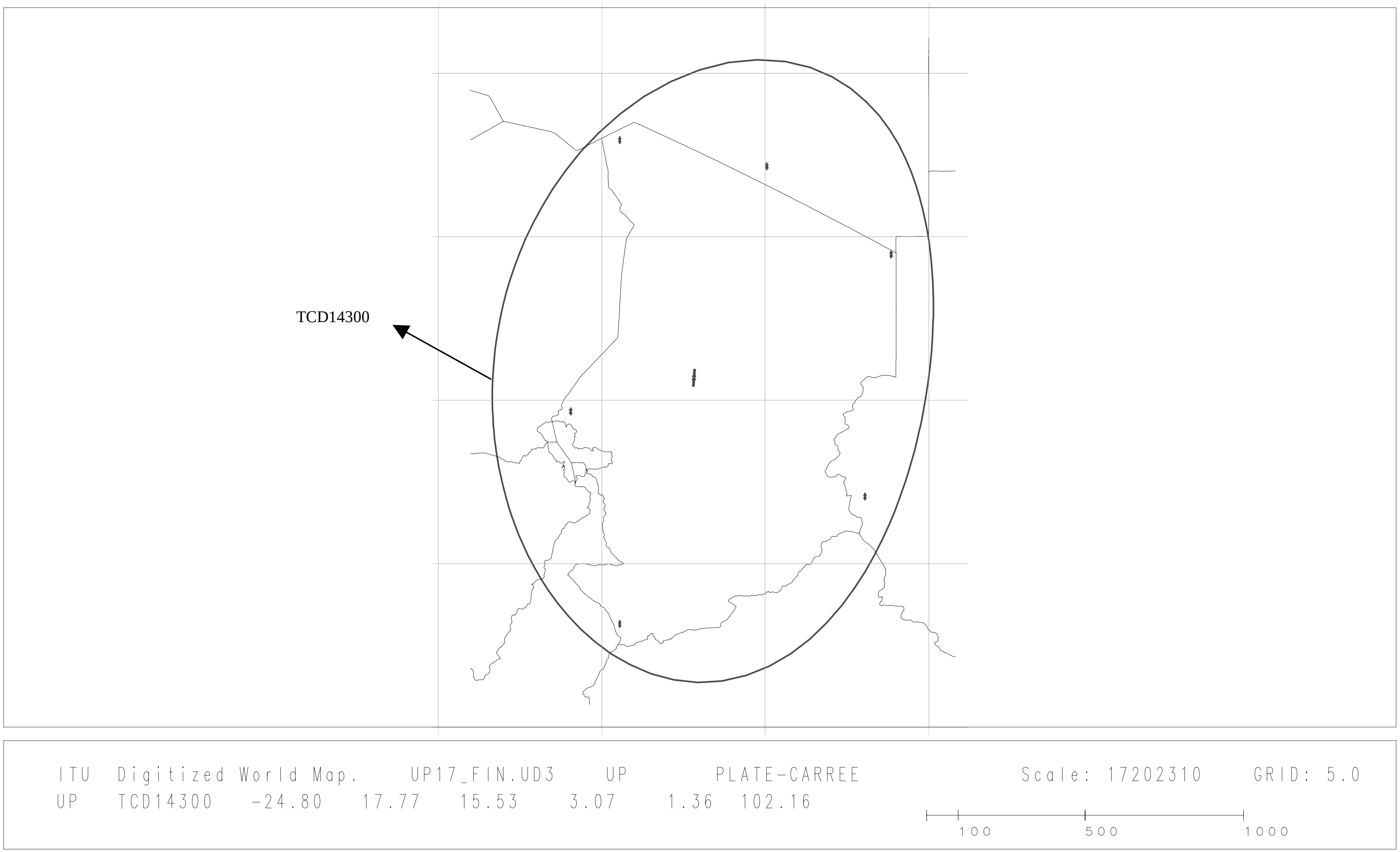
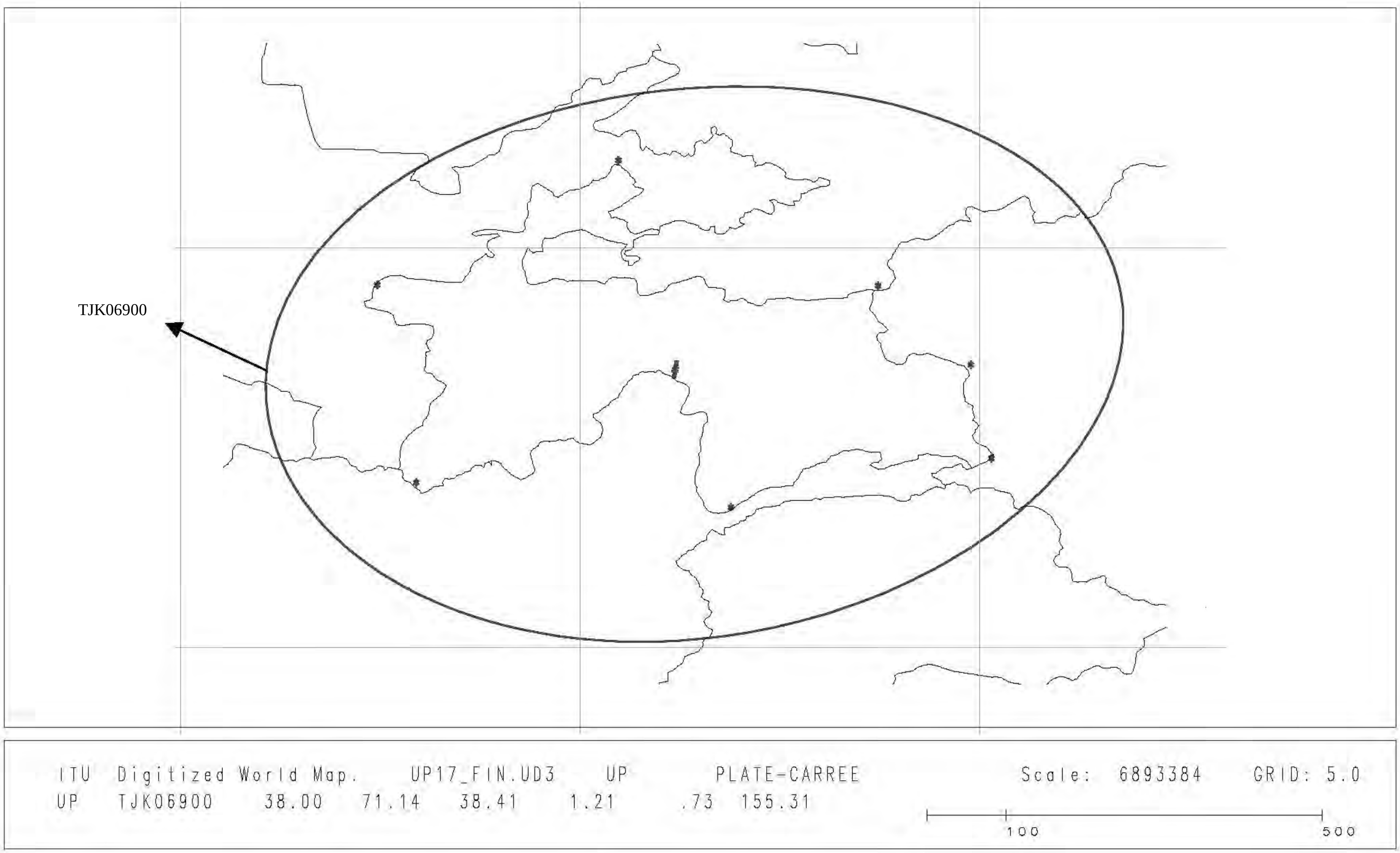
100 500

TCD (24.80 W) (1)



(1) Beam recalculated with temporary test-points to provide complete national coverage.

TJK (38.00 E)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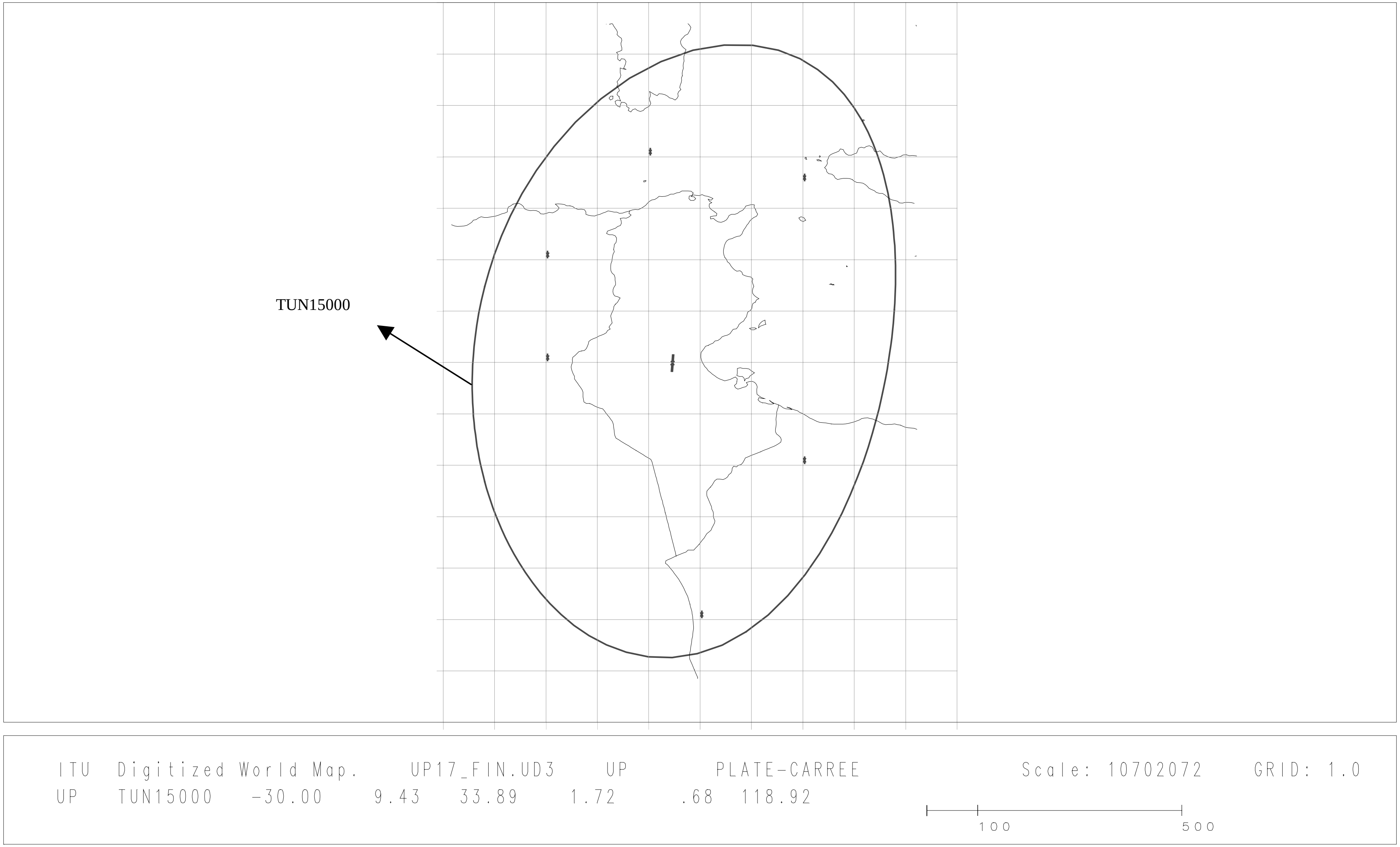
100
500

TUN (30.00 W)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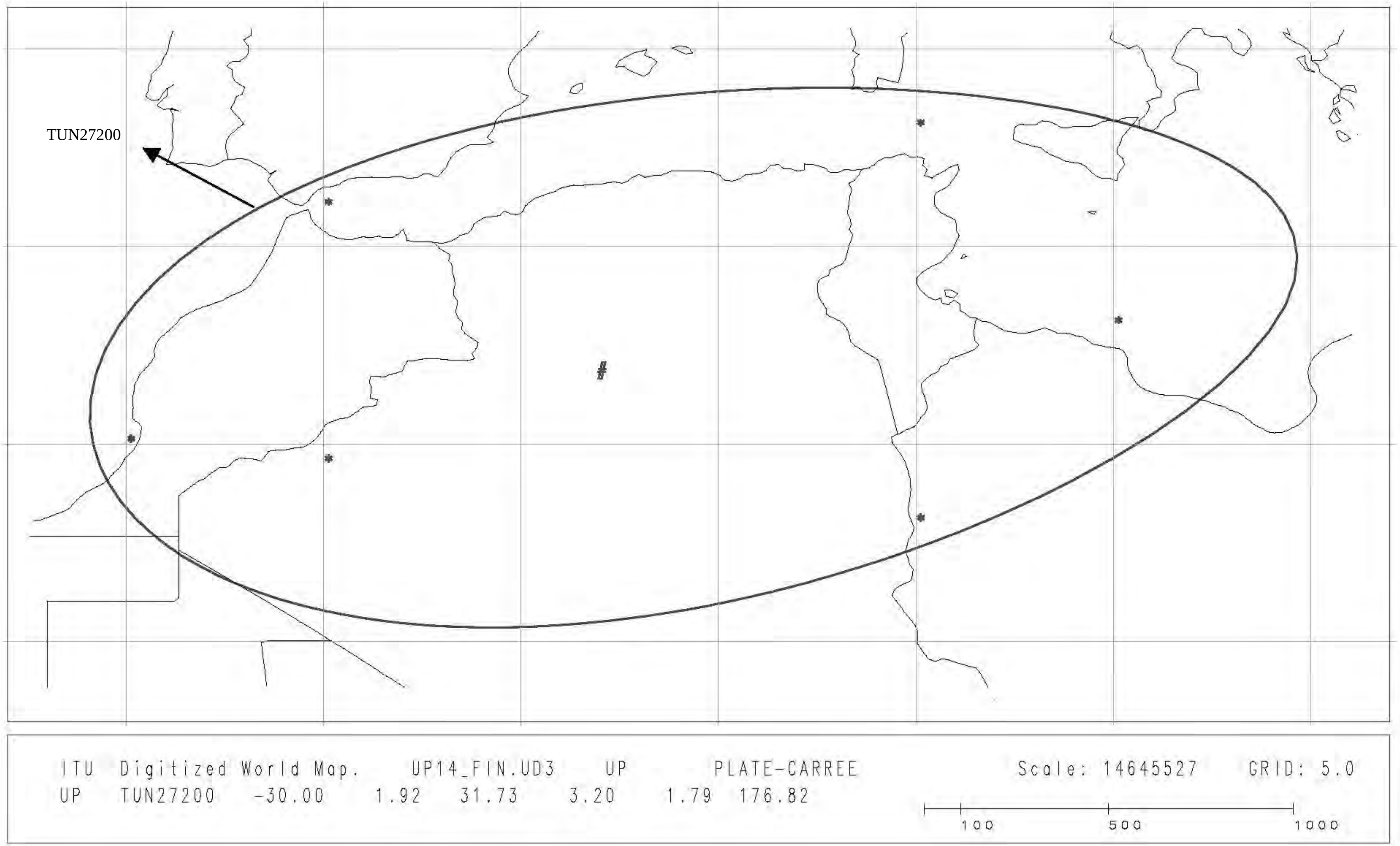
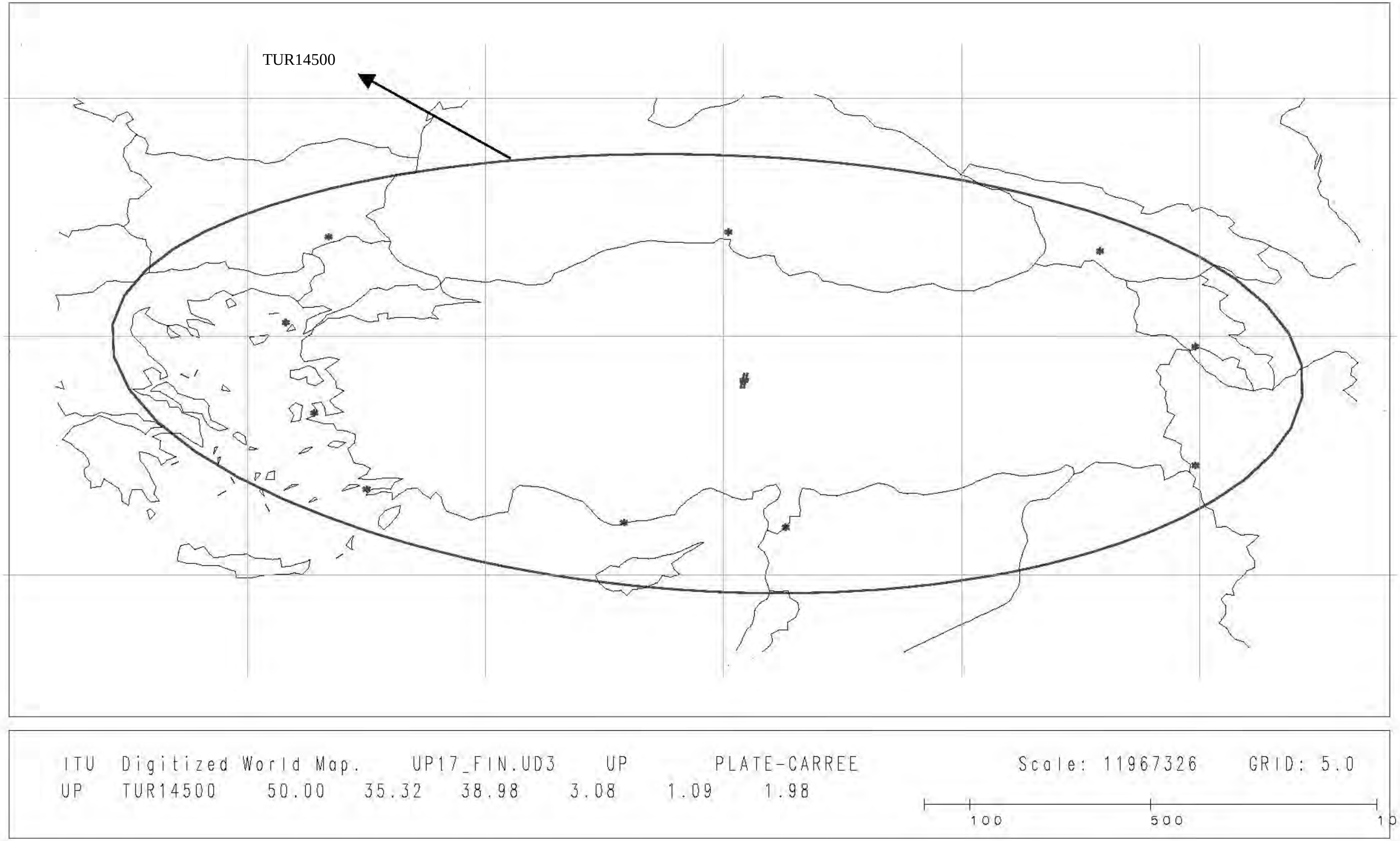
100
500

TUN (30.00 W) (multinational beam)



TUR (50.00 E)


TUR14500
ITU Digitized World Map. UP17_FIN.UD3 UP PLATE-CARREE Scale: 11967326 GRID: 5.0
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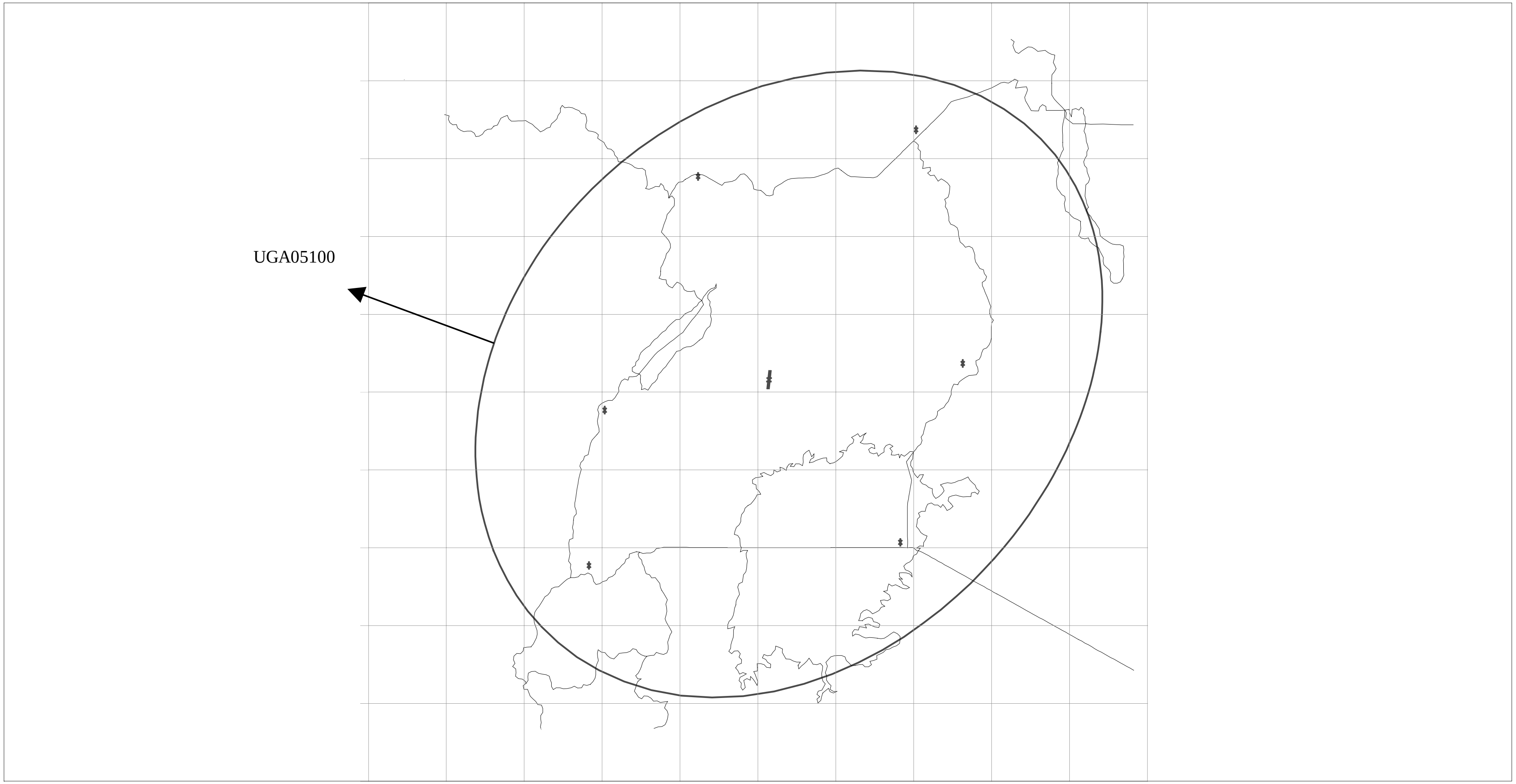
100
500

UGA (19.20 W)



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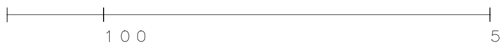
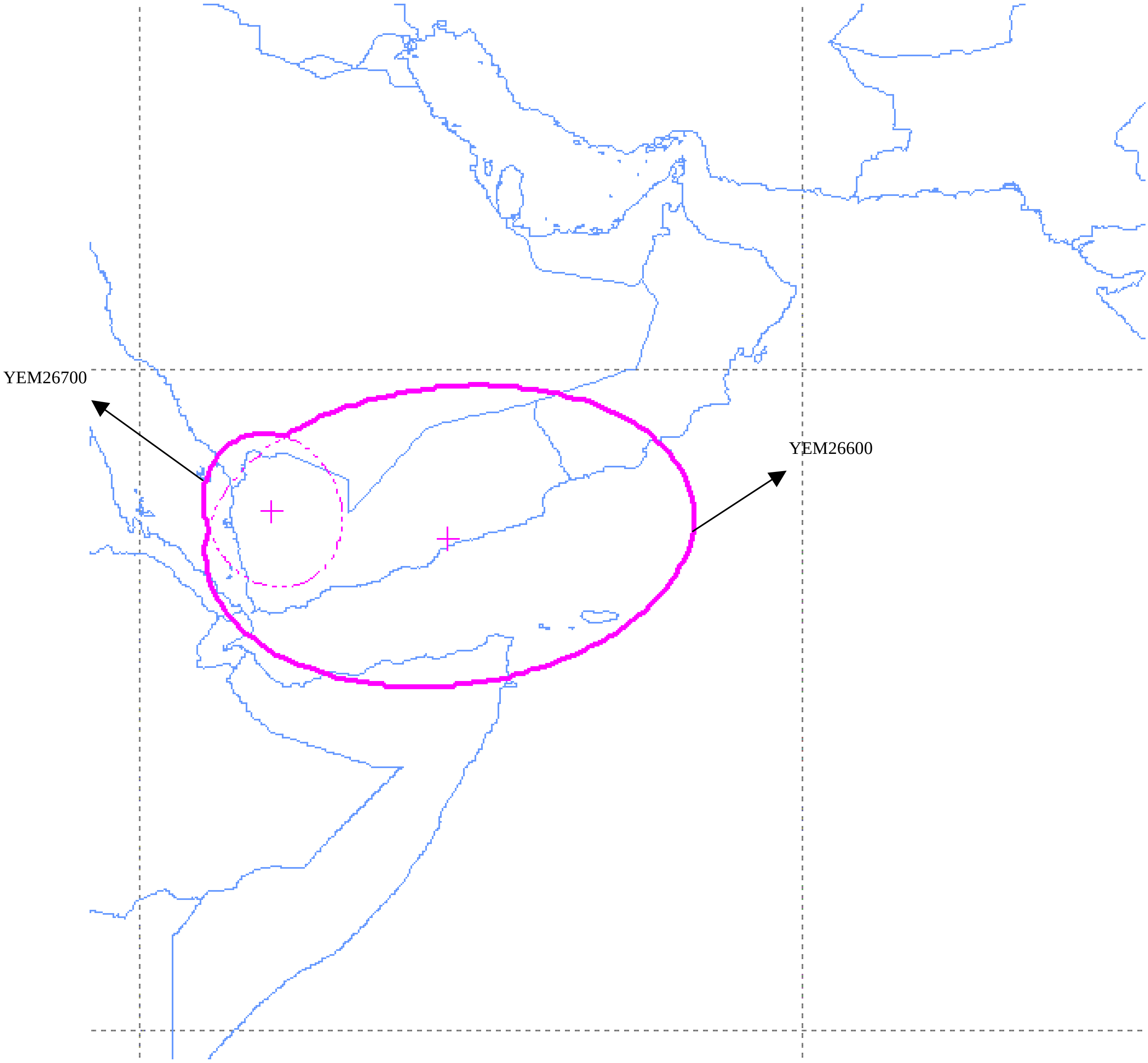


YEM (44.20 E) (1)



(1) Beam recalculated with temporary test-points to provide complete national coverage.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 2 to
Document 34-E
7 April 2000
Original: English

PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

RESULTS OF THE DOWNLINK FEASIBILITY STUDY

Please find attached to this document complementary/updated information to that contained in Attachment 4 to Document CMR2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Results of the downlink feasibility study

ATTACHMENT

Director, Radiocommunication Bureau

RESULTS OF THE DOWNLINK FEASIBILITY STUDY

0 Summary

A downlink feasibility study based on the “Planning Approach” has been conducted in accordance with the methodology and technical assumptions described in Attachments 1 and 2 of Document CMR2000/34 respectively.

The results indicate that:

- all national “planned” beams can be accommodated with 10 channels in Region 1 and 12 channels in Region 3; and
- eight of the eleven multinational beams (one “existing”[1] and ten “planned”[2]) can be accommodated with the required number of channels.

1 Introduction

The IRG defined a study approach for replanning feasibility studies and referred to it as the “Planning Approach”. The methodology of the “Planning Approach” consists of six steps and is described in Attachment 1 of Document CMR2000/34. Details of the technical assumptions used in performing studies on the “Planning Approach” are given in Attachment 2 to Document CMR2000/34.

In accordance with Principle 3 of Annex 1 to Resolution 532 (WRC-97), fifteen “existing” systems were included in the downlink feasibility study. They included those considered in the feasibility study for IRG-5 (beam J 11100 renamed to J 1110E, HISPASAT-1 (27 MHz analogue), HISPASAT-1 (27 MHz digital), KOREASAT-1 (analogue), KOREASAT-1 (digital), BS-3N, beam S 13902, SIRIUS, RST-1(8 channels), BIFROST-2 and DBL-19.2E) plus four additional networks that became “existing” systems after IRG-5 (HISPASAT-1 (33 MHz digital), BIFROST, EUTELSAT B-13E and DBL-28.2E) (see also Annex A of Corrigendum 2 to Document CMR2000/34).

The results of the downlink feasibility study conducted by the Radiocommunication Bureau at the request of the IRG are presented in this document for consideration by WRC-2000.

2 Description of Annex 3

The results of the downlink feasibility study are provided in orbital position order in Annex 3 of this document.

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[1] Whenever the term “existing” system is used in this document, it refers to a system with notified assignments that are in conformity with Appendices S30 and S30A, that have been brought into use and for which the date of bringing into use has been confirmed to the Bureau.

[2] Whenever the term “planned” is used in this document, it refers to assignments/beams other than those of “existing” systems as defined in the footnote above.

- The column titled "**ADM**" contains, generally, the ITU symbol of the Administration responsible for the proposed draft new assignments considered in the downlink feasibility study.
- The column titled "**Beam name**" contains the beam name as per Appendix S30.
- The column titled "**Orbital position**" indicates the orbital position of each beam. Orbital positions in bold type indicate a change in orbital position from the WRC-97 orbital positions due to either an orbital position preference request or as a result of the implementation of Step 4 (nearest suitable orbital position), Step 5 or from orbital position adjustments resulting from the feeder-link feasibility study.
- The column titled "**Status code**" contains the status of the assignments according to Article 11 of Appendix S30. It should be noted that "existing" systems that have entered into the Plan after WRC-97 are identified with status code "PU".
- The column titled "**WRC-97 Pol. channels**" contains the Appendix S30 channels and polarization for each beam.
- The column titled "**Channels found at Step 3**" provides the channels and polarization for each beam that was accommodated at Step 3.
- The column titled "**Channels found at Step 4**" provides the channels and polarization for each beam that was not accommodated at Step 3 but was accommodated at Step 4.
- The column titled "**Channels found at Step 5 or 6**", according to the case, provides the channels and polarization for each national beam that was not accommodated at Step 3 or 4 but was accommodated at Step 5 or, in the case of a multinational beam, at Step 6. Adjustments made due to the feeder-link feasibility study are also indicated in this column.

3 Step 3 results

An orbital separation limit[3] of 15º (co-polar)/9º (cross-polar) and an EPM degradation tolerance of 0.45 dB were applied in the downlink feasibility study. The order in which each beam was treated in the feasibility study was derived from the criteria in section 4 of the methodology document (Attachment 1 of Document CMR2000/34). A table showing the initial beam order (indicated in Column 1 of the table) is contained in Annex 1.

The MSPACE input file resulting from the implementation of Steps 1 and 2 was used to create the "Step 3 Starting Point Plan"[4] for the implementation of Step 3. An initial Step 3 run was performed without a preference for choosing blocks that contain the WRC-97 channels for a given beam. A second Step 3 run was performed with a preference for WRC-97 channels. The success rate was slightly higher with the preference for WRC-97 channels. Therefore, the Step 3 run with WRC-97 channel preference was used as the "draft Step 3 Plan".

3.1 Specific orbital position preferences

An examination of the "draft Step 3 Plan" revealed that a number of beams that had a preferred orbital position were not accommodated in the draft plan. Those beams were then treated in

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[3] When the orbital separation limit is applied, interference from assignments located at orbital positions greater than a certain angular offset from the nominal orbital position of the wanted assignment is not taken into account.

[4] All references to "Plan" in this document are to be considered as referring to the results of feasibility studies.

accordance with section 4.3.1 of the methodology document (Attachment 1 of Document CMR2000/34). Techniques such as changing the order of treatment, recalculating ellipse parameters, application of fast roll-off antenna and power adjustment were used to overcome incompatibility problems. Details of the actions taken are provided in Annex 2.

As a result, the initial order of treatment was changed. The revised order of treatment of beams is indicated in Column 2 of the table in Annex 1.

Annex 3 provides information on the channels found at Step 3 after orbital position preferences were taken into consideration.

202 beams[5] were considered at Step 3. All 15 existing systems were successfully accommodated. 158 of the 187 national beams were successfully accommodated with ten channels in a continuous band of 400 MHz in Region 1 and 12 channels[6] in a continuous band of 500 MHz in Region 3 utilizing channel raster “B” [7]. A statistical summary of the Step 3 results is given in Table 1 below.

TABLE 1

Step 3 result statistics

Beam category	Successful	Unsuccessful	Total
Existing	15	--	15
National	158	29	187
Total	*173 (86%)*	*29 (14%)*	*202*

The 29 beams that did not pass Step 3 were considered at Step 4. Three of those beams (DNK08900/DNKFRO, FIN10300 and HOL21300) had orbital position preferences that were unable to be satisfied at Step 3.

4 Step 4 results

Details of the channels and orbital positions found at Step 4 are provided in Annex 3.

[5] A "beam" in this context is a single elliptical beam, a composite beam or a group of beams forming a satellite system (e.g. DBL, RST-1).

[6] Due to time and resource constraints, the automated software was not modified to find a block of 12 channels for Region 3 beams at Steps 3 and 4. It remained unmodified i.e. set to find a block of 10 channels for all beams. The additional 2 channels were manually added to Region 3 beams at the end of Step 5 with a few very minor channel adjustments necessary. The result of this action was considered to have had the same effect as finding a block of 12 channels at Steps 3 and 4. Thus the results at Annex 3 show that 12 channels were found at Steps 3 and 4 for Region 3 beams when this was not strictly the case.

[7] Except RUS00401.

Of the 29 beams considered at Step 4, 28 were successfully accommodated with ten channels in a continuous band of 400 MHz in Region 1 and 12 channels[8] in a continuous band of 500 MHz in Region 3 utilizing channel raster "B" at the nearest suitable orbital position. A statistical summary of the Step 4 results is given in Table 2 below.

TABLE 2

Step 4 result statistics

Beam category	Successful	Unsuccessful	Total
National	28	1	29

The overall success rate after Step 4 was 99.5%. Since a suitable orbital position could not be found for the FIN10300 beam at Step 4, it was considered at Step 5.

5 Step 5 results

The FIN10300 beam was treated at Step 5 by studying other orbital positions within its service arc with adjustment of beam parameters such as e.i.r.p. and transmit antenna pattern (fast roll-off antenna). It was not possible to accommodate the beam with 10 channels in a continuous band of 400 MHz at other orbital positions.

The best solution possible, as prescribed by IRG, was the allotment of 9 channels in a continuous band of 400 MHz (channels 22,24,26,28,30,32,34,36,38) and a 10th channel within the 800 MHz (channel 1) at 5º E with a reduced e.i.r.p. of 56.7 dBW.

A statistical summary of the Step 5 results is given in Table 3 below.

TABLE 3

Step 5 result statistics

Beam category	Successful	Unsuccessful	Total
National	1	0	1

6 Step 6 results

Ten "planned" multinational beams were considered at Step 6. Of the ten "planned" multinational beams considered, seven were successfully accommodated with the required number of channels. Note that one "existing" multinational beam was accommodated at Step 3. A statistical summary of the Step 6 results is given in Table 4 below.

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[8] Due to time and resource constraints, the automated software was not modified to find a block of 12 channels for Region 3 beams at Steps 3 and 4. It remained unmodified i.e. set to find a block of 10 channels for all beams. The additional 2 channels were manually added to Region 3 beams at the end of Step 5 with a few very minor channel adjustments necessary. The result of this action was considered to have had the same effect as finding a block of 12 channels at Steps 3 and 4. Thus the results at Annex 3 show that 12 channels were found at Steps 3 and 4 for Region 3 beams when this was not strictly the case.

TABLE 4

Multinational beam result statistics

Beam category	Successful	Unsuccessful	Total
Multinational	7	3	10

7 Overall results

The downlink feasibility study results constitute an example Plan that is not the only solution, nor is it an optimum one.

The results indicate that all existing and national beams can be successfully accommodated with the required number of channels. However, three of the ten "planned" multinational beams cannot be accommodated with the required number of channels. A statistical summary of the overall downlink feasibility study results is given in Table 5 below.

TABLE 5

Overall result statistics

Beam category	Successful	Unsuccessful	Total
Existing	15	0	15
National	187	0	187
Multinational	7	3	10
Total	*209*	*3*	*212*

8 Adjustments due to the feeder-link feasibility study

In order to resolve incompatibility problems encountered during the feeder-link feasibility study at 13° W, 7° W and 44° E, the orbital positions of the beams ALB29600, HOL21300, MDA06300 and TCD14300 were changed. This was achieved by applying the Step 4 methodology to the above-mentioned beams in order to find an alternative suitable orbital position. The new orbital positions were then applied to the feeder-link plan. This iterative process was repeated until all incompatibility problems were resolved.

A shift of ±0.2 degrees around the nominal orbital position was also necessary for several beams in the feeder-link feasibility study. These orbital position shifts were transferred from the feeder-link plan to the downlink plan. A check of downlink plan revealed an incompatibility problem with the MCO11600 beam. This was resolved by applying the improved fast roll-off antenna and a 0.6 dB power increase to the beam.

9 Beam Recalculation

In accordance with an IRG decision, all beams that have moved to a new orbital position have had their ellipse parameters recalculated, except in the case of a ±0.2° orbital position shift. In a few cases, it was necessary to add some temporary test-points within the national territory of a given country in order to ensure that the recalculated beam provides proper coverage of the national territory of that country. These temporary test-points were only added for the purpose of ellipse recalculation and were removed in subsequent actions in order not to be considered as new additional test-points. Plots of the recalculated ellipses are at Annex 4 of this document.

10 Reference situation

An examination of the MSPACE results after the feeder-link orbital position shifts had been transferred to the downlink plan revealed that all national “planned” beams had no excess EPM degradation. However, a few “existing” systems had test points with an excess EPM degradation that exceeded the 0.45 dB EPM degradation tolerance as shown below.

TABLE 6

Beams with an Excess EPM Degradation

Beam	CHN	TP	ADM	POSN	Margin	Reference	Degradation
S 13902	40	4	S	5.1	-1.54	-0.58	**-0.96**
BIFROS22	14	8	NOR	-0.7	-28.61	-27.30	**-1.31**#
BIFROS22	14	9	NOR	-0.7	-28.15	-27.08	**-1.07**#
BIFROS22	18	8	NOR	-0.7	-28.61	-27.32	**-1.29**#
BIFROS22	18	9	NOR	-0.7	-28.15	-27.10	**-1.05**#
BIFROS22	36	7	NOR	-0.7	-5.67	-5.15	**-0.52**
E127ASCA	37	20	F	12.9	-1.25	-0.21	**-1.04**
E133ASCB	34	20	F	12.9	-1.00	-0.41	**-0.59**
E127ASZA	37	14	F	12.9	-2.05	-1.53	**-0.52**
E133ASZB	22	2	F	12.9	-0.53	-0.02	**-0.51**
E133ASZB	26	2	F	12.9	-0.54	-0.03	**-0.51**
E133ASZB	30	2	F	12.9	-0.54	-0.06	**-0.48**
E127ASWA	37	20	F	12.9	-1.79	-1.26	**-0.53**
E127DSWA	37	20	F	12.9	-1.19	-0.66	**-0.53**
D3128VI1	18	10	LUX	28.3	-4.76	-4.19	**-0.57**
S 13800	2	3	S	4.9	-0.81	-0.29	**-0.52**

This excess degradation can be ignored pursuant to the application of a principle contained in Step 5 of the methodology document which states that “when test points with very low EPM (less than about -10 dB) receive excess interference, such test points can be ignored for the purpose of the replanning exercises”.

Details of the reference situation can be found in the form of an MSPACE Input file. It is available from the ITU website at:

http://www.itu.int/brconf/irg-gte/index.html

11 Annex 7 of Appendix S30

In this feasibility study, there were some cases where the provisions of Annex 7 of Appendix S30 were not met. They occurred at the orbital positions 25.2° W, 19.2° W, 13.2° W, 7.2° W, 4° W, 1.2° W and 4.8° E. In all cases, except at 4° W, this was due to -0.2 degree orbital position shifts applied during the feeder-link feasibility study.

ANNEX 1

Beam order of treatment

Initial order	Revised order	ADM	Beam/Network	Starting Point Orbital position+ (° E)	Service arc - Western limit - (° E)	Service arc - Eastern limit - (° E)	Maximum beam area& (°^{2})
-	-	J	J 1110E%	110.00	-	-	-
-	-	E	HISPASA4%	-30.00	-	-	-
-	-	KOR	KOR11201%	116.00	-	-	-
-	-	J	BS-3N%	109.85	-	-	-
-	-	KOR	KO11201D%	116.00	-	-	-
-	-	S	S 13902%	5.00	-	-	-
-	-	S	SIRIUS%	5.20	-	-	-
-	-	RUS	RST-1%	36.00	-	-	-
-	-	NOR	BIFROSTXX2%	-0.80	-	-	-
-	-	LUX	DBL-19.2E%	19.20	-	-	-
-	-	E	HISPA27D%	-30.00	-	-	-
-	-	E	HISP33D1/2%	-30.00	-	-	-
-	-	NOR	BIFROST%	-0.80	-	-	-
-	-	F EUT	EUTELSAT B-13E%	13.00	-	-	-
-	-	LUX	DBL-28.2E%	28.20	-	-	-
-	-	E	E___30W*	-30.00	-	-	-
-	-	J	J 11100	110.00	-	-	-
-	-	KOR	KOR11200	116.00	-	-	-
-	-	RUS	RST-1	36.00			
-	-	NOR	NOR12000	-0.80	-	-	-
1	1	RUS	RUS00401	110.00	110.00	110.00	8.59
2	2	RUS	RST-2	56.00	56.00	56.00	4.84
3	3	RUS	RST-3	86.00	86.00	86.00	4.84
4	4	RUS	RST-5	140.00	140.00	143.00	4.84
5	5	S	S 13800	5.00	5.00	19.00	1.02
6	6	AUS	AUSA152E*	152.00	134.19	152.00	35.44
7	7	ISL	ISL04900	-33.50	-33.50	-15.10	0.60
8	8	DNK	DNK___5E*	5.00	-17.40	5.00	1.08
9	9	AUS	AUSB164E*	164.00	134.19	164.00	30.80
10	10	FIN	FIN10300	5.00	5.00	36.40	1.05
11	11	EST	EST06100	23.00	5.95	45.63	0.43
12	12	KRE	KRE28600	140.00	103.49	145.20	1.43
13	13	KAZ	KAZ06600	44.00	43.55	90.94	7.33
14	14	KIR	KIR_176E*	176.00	161.83	-147.11	7.21
15	15	LVA	LVA06100	23.00	-1.15	50.29	0.50
16	16	AUS	AUS9164E*	164.00	134.19	-174.10	4.02
17	17	CHN	CHNC134E*	134.00	81.96	134.95	6.95
18	18	CHN	CHNE_92E*	92.00	92.00	147.35	14.37
19	19	NZL	NZL_158E*	158.00	158.00	-146.03	7.19
20	20	CHN	CHNF_92E*	92.00	92.00	149.60	3.65
21	21	POR	POR__37W*	-37.00	-37.00	21.41	2.00
22	22	CHN	CHN15800	134.00	85.99	144.61	4.34
23	23	MNG	MNG24800	74.00	73.11	132.01	4.07
24	24	LTU	LTU06100	23.00	-6.88	53.32	0.42
25	25	FSM	FSM00000	146.00	119.91	-179.80	8.06
26	26	INS	INSA_80E*	80.20	77.69	138.37	14.36
27	27	AUS	AUS00800	164.00	118.84	179.69	5.90

Initial order	Revised order	ADM	Beam/Network	Starting Point Orbital position+ (° E)	Service arc - Western limit - (° E)	Service arc - Eastern limit - (° E)	Maximum beam area& (°^{2})
28	28	G	G 02700	-33.50	-33.50	27.72	1.32
29	29	GMB	GMB30200	-37.00	-37.00	24.93	0.47
30	30	SEN	SEN22200	-37.00	-37.00	25.51	1.52
31	31	IRL	IRL21100	-33.50	-37.00	25.72	0.50
32	32	BLR	BLR06200	38.00	-2.44	60.29	0.73
33	33	GNB	GNB30400	-30.00	-37.00	25.73	0.54
56	34	CHN	CHNA_62E*	62.00	54.41	126.20	7.44
130	35	CHN	CHN15500	62.00	42.03	134.47	3.76
34	36	IND	INDB_56E*	56.00	52.54	115.84	4.45
35	37	POL	POL13200	-1.00	-12.91	51.17	0.93
36	38	GUI	GUI19200	-37.00	-37.00	27.59	1.64
37	39	AUT	AUT01600	-19.00	-21.83	42.93	1.67
38	40	D	D 08700	-19.00	-21.83	42.93	1.67
39	41	LIE	LIE25300	-19.00	-21.83	42.93	1.67
40	42	SUI	SUI14000	-19.00	-21.83	42.93	1.67
41	43	INS	INSB104E*	104.00	97.63	162.51	11.40
42	44	MLA	MLA__91E*	91.50	76.40	141.79	3.51
43	45	SRL	SRL25900	-33.50	-37.00	29.47	0.53
44	46	UKR	UKR06300	38.00	-3.06	64.29	2.20
45	47	LBR	LBR24400	-33.50	-37.00	31.41	0.85
46	48	MAU	MAU__29E*	29.00	25.70	94.17	4.16
47	49	AUS	AUS4152E*	152.00	83.49	152.00	7.72
48	50	BRM	BRM29800	104.00	62.50	131.05	5.53
49	51	BGD	BGD22000	74.00	55.85	125.25	1.23
50	52	PNG	PNG13100	128.00	114.11	-176.44	6.82
51	53	AUS	AUS7164E*	164.00	123.31	-166.40	2.52
52	54	VTN	VTN32500	107.00	69.45	139.93	4.88
53	55	IND	INDA_56E*	56.00	41.45	111.95	7.10
54	56	CHN	CHN19000	122.00	78.74	149.82	0.55
55	57	CTI	CTI23700	-30.00	-37.00	34.27	1.95
57	58	MDG	MDG23600	29.00	9.07	81.11	3.10
58	59	AUS	AUS00500	152.00	97.47	169.68	4.91
59	60	CPV	CPV30100	-30.00	-37.00	35.29	0.60
60	61	LAO	LAO28400	122.00	66.18	139.08	1.93
61	62	THA	THA14200	98.00	64.03	137.23	5.10
62	63	CAF	CAF25800	-13.00	-15.62	57.61	3.78
63	64	HOL	HOL21300	-19.00	-30.53	42.76	0.46
64	65	F	NCL10000	140.00	129.68	-156.57	0.82
65	66	BFA	BFA10700	-30.00	-37.00	37.41	1.65
66	67	IND	IND03700	68.00	54.65	129.42	1.65
67	68	FJI	FJI19300	-178.00	142.15	-142.77	1.07
68	69	USA	USAB170E*	170.00	154.96	-129.33	1.08
69	70	F	F 09300	-7.00	-35.77	40.08	2.55
70	71	MHL	MHL00000	146.00	128.49	-155.54	1.86
71	72	PHL	PHL28500	98.00	83.83	159.83	6.09
72	73	CHN	MAC00000	122.00	75.30	151.80	0.36
73	74	GHA	GHA10800	-25.00	-37.00	39.65	1.57
74	75	NIG	NIG11900	-19.00	-30.78	46.37	4.36
75	76	TON	TON21500	170.00	146.11	-136.41	0.96
76	77	VUT	VUT12800	140.00	130.50	-151.93	1.03
77	78	COG	COG23500	-13.00	-24.42	53.84	2.38

Initial order	Revised order	ADM	Beam/Network	Starting Point Orbital position+ (° E)	Service arc - Western limit - (° E)	Service arc - Eastern limit - (° E)	Maximum beam area& ($°^2$)
78	79	COD	COD__19W*	-19.00	-19.00	59.32	8.32
79	80	CME	CME30000	-13.00	-26.81	51.64	4.27
80	81	IND	INDD_68E*	68.00	33.84	112.36	4.96
81	82	USA	USAA122E*	122.00	105.76	-175.70	1.08
82	83	SLM	SLM00000	128.00	120.15	-161.26	1.46
83	84	CBG	CBG29900	86.00	65.64	144.23	0.89
84	85	CZE	CZE14400	-13.00	-24.52	54.44	0.50
85	86	BEL	BEL01800	-19.00	-35.33	43.91	0.49
86	87	MRC	MRC20900	-25.00	-37.00	42.76	4.38
87	88	MTN	MTN__37W*	-37.00	-37.00	43.19	6.69
88	89	BEN	BEN23300	-19.00	-37.00	43.33	0.98
90	90	SMO	SMO05700	-178.00	147.57	-130.93	0.36
91	91	IND	IND04700	68.00	52.57	134.29	1.15
92	92	MLD	MLD30600	44.00	32.11	113.83	0.58
93	93	MOZ	MOZ30700	-1.00	-1.00	81.00	4.93
94	94	UZB	UZB07100	44.00	21.67	104.12	2.56
95	95	PLW	PLW00000	140.00	91.97	174.44	0.78
96	96	TUV	TUV00000	176.00	136.53	-140.87	0.56
97	97	GAB	GAB26000	-13.00	-30.32	52.34	1.60
98	98	COM	COM20700	29.00	2.47	85.22	0.46
99	99	SVK	SVK14400	-13.00	-21.43	61.43	0.49
100	100	SNG	SNG15100	74.00	62.66	145.75	0.36
101	101	CLN	CLN21900	50.00	39.16	122.41	0.71
102	102	LUX	LUX11400	-19.00	-36.51	47.28	0.36
103	103	F	WAL10200	140.00	140.00	-136.20	0.44
104	104	STP	STP24100	-13.00	-35.93	48.32	0.36
105	105	HNG	HNG10600	-13.00	-22.24	62.33	0.59
106	106	TZA	TZA22500	11.00	-2.31	82.31	4.15
107	107	GNE	GNE30300	-19.00	-32.00	52.94	0.41
108	108	SEY	SEY00000	42.50	13.38	98.43	2.53
109	109	F	OCE10100	-160.00	178.11	-96.71	15.36
110	110	SDN	SDN___7W*	-7.00	-19.14	66.14	10.76
111	111	TCD	TCD14300	-13.00	-26.22	59.22	5.85
112	112	ROU	ROU13600	-1.00	-18.14	67.30	0.91
113	113	BRU	BRU33000	74.00	71.87	157.36	0.36
114	114	TUR	TUR14500	50.00	-8.23	77.36	3.17
115	115	NRU	NRU30900	134.00	123.68	-150.68	0.36
116	116	MLI	MLI__37W*	-37.00	-37.00	48.75	5.51
117	117	ALG	ALG__25W*	-25.00	-37.00	48.85	10.92
89	118	TGO	TGO22600	-25.00	-37.00	43.41	0.91
118	119	RRW	RRW31000	11.00	-14.31	72.31	0.40
119	120	I	I 08200	5.00	-33.01	54.63	2.51
120	121	MDA	MDA06300	38.00	-16.25	71.50	0.36
122	122	HRV	HRV14800	-13.00	-28.46	61.18	0.61
123	123	TKM	TKM06800	44.00	13.55	103.22	2.23
124	124	IRN	IRN10900	34.00	7.06	97.25	6.95
125	125	SVN	SVN14800	34.00	-30.06	60.33	0.36
126	126	MCO	MCO11600	-7.00	-36.12	54.57	0.61
127	127	KGZ	KGZ07000	44.00	29.84	121.15	0.86
128	128	BUL	BUL02000	-1.00	-20.46	71.34	0.62
129	129	YUG	YUG14800	-7.00	-26.12	66.09	0.55

Initial order	Revised order	ADM	Beam/Network	Starting Point Orbital position+ (° E)	Service arc - Western limit - (° E)	Service arc - Eastern limit - (° E)	Maximum beam area& (°^{2})
131	130	BIH	BIH14800	34.00	-28.88	63.66	0.37
132	131	GEO	GEO06400	23.00	-4.21	89.49	0.67
133	132	AFG	AFG__50E*	50.00	21.14	115.80	3.51
134	133	GRC	GRC10500	5.00	-24.33	71.43	1.74
135	134	ARS	ARS__17E*	17.00	-3.39	92.47	10.52
136	135	LBY	LBY__25W*	-25.00	-30.98	66.17	5.24
137	136	AZE	AZE06400	23.00	-1.42	96.12	0.56
138	137	TJK	TJK06900	44.00	21.92	119.72	0.95
139	138	CVA	CVA08300	-37.00	-37.00	61.19	0.36
140	139	TUN	TUN15000	-25.00	-37.00	61.31	1.35
141	140	SMR	SMR31100	-37.00	-37.00	61.71	0.36
121	141	AND	AND34100	-37.00	-37.00	51.59	0.36
142	142	AFS	AFS02100	5.00	-25.51	73.40	5.26
143	143	MKD	MKD14800	23.00	-27.79	71.33	0.36
144	144	ALB	ALB29600	-7.00	-29.87	69.92	0.41
145	145	AUS	AUS00600	152.00	86.23	-173.79	3.66
146	146	NGR	NGR11500	-25.00	-37.00	63.06	5.28
147	147	ARM	ARM06400	23.00	-5.89	94.72	0.44
148	148	SYR	SYR22900	11.00	-11.46	90.36	0.94
149	149	EGY	EGY02600	-7.00	-21.81	81.06	4.01
150	150	PAK	PAK12700	38.00	20.04	123.13	4.97
151	151	IRQ	IRQ25600	11.00	-8.97	94.75	1.80
152	152	F	F_____7W*	-7.00	-7.00	97.00	1.01
153	153	MLT	MLT14700	-13.00	-37.00	68.76	0.36
154	154	CYP	CYP08600	5.00	-19.96	87.21	0.36
155	155	NPL	NPL12200	50.00	30.28	137.61	1.03
156	156	NMB	NMB02500	-19.00	-35.32	72.42	5.05
157	157	BOT	BOT29700	-1.00	-30.07	78.61	3.20
158	158	JOR	JOR22400	11.00	-17.32	91.63	0.66
159	159	LBN	LBN27900	11.00	-18.26	90.84	0.36
160	160	AGL	AGL29500	-13.00	-37.00	72.34	6.98
161	161	YEM	YEM__11E*	11.00	-7.39	103.25	2.90
162	162	ISR	ISR11000	-4.00	-20.46	90.81	0.44
163	163	OMA	OMA12300	17.00	0.72	112.05	1.92
164	164	PSE	YYY00000	11.00	-20.68	90.73	0.36
165	165	LSO	LSO30500	5.00	-27.67	84.05	0.40
166	166	UAE	UAE27400	52.50	-2.20	109.53	1.01
167	167	ZWE	ZWE13500	-1.00	-26.94	85.52	1.99
168	168	BTN	BTN03100	86.00	34.18	146.72	0.43
169	169	KWT	KWT11300	17.00	-8.75	103.88	0.41
170	170	ETH	ETH09200	23.00	-16.72	96.50	4.76
171	171	ZMB	ZMB31400	-1.00	-27.92	85.36	3.52
172	172	SOM	SOM31200	23.00	-10.81	103.83	5.02
173	173	SWZ	SWZ31300	-1.00	-26.21	88.94	0.37
174	174	ERI	ERI09200	23.00	-17.95	97.33	1.59
175	175	KEN	KEN24900	11.00	-19.86	95.73	3.57
176	176	QAT	QAT24700	17.00	-6.37	109.23	0.36
177	177	BHR	BHR25500	17.00	-7.79	108.79	0.36
178	178	MWI	MWI30800	-1.00	-24.98	93.03	0.92
179	179	UGA	UGA05100	11.00	-27.23	91.63	1.64
180	180	USA	WAK33400	140.00	106.61	-133.41	0.36

Initial order	Revised order	ADM	Beam/Network	Starting Point Orbital position+ (° E)	Service arc - Western limit - (° E)	Service arc - Eastern limit - (° E)	Maximum beam area& ($°^2$)
181	181	DJI	DJI09900	23.00	-17.59	103.07	0.36
182	182	BDI	BDI27000	11.00	-31.50	90.90	0.43
1	1	DNK	DNK09000#	5.00	5.00	11.48	2.00
2	2	FIN	FIN10400#	5.00	5.00	18.20	2.00
3	3	DNK	DNK09100#	5.00	-17.40	5.00	1.76
4	4	ISL	ISL05000#	5.00	-17.40	5.00	1.76
5	5	S	S 13900#	5.00	5.00	27.51	2.00
6	6	NOR	NOR12100#	-0.80	0.80	42.92	1.39
7	7	TUN	TUN27200#	-25.00	-37.00	46.97	6.28
8	8	CVA	CVA08500#	-37.00	-37.00	61.00	1.20
9	9	SYR	SYR33900#	11.00	-11.49	90.31	1.16
10	10	ARS	ARS34000#	17.00	-0.63	104.97	1.88

+ Shaded background indicates a preferred orbital position.
& Determined by multiplying the beam's major axis (in degrees) by its minor axis (in degrees).
% Existing system.
* Composite beam.
# Multinational beam.

ANNEX 2

Treatment of beams at Step 3 where a specific orbital position was requested

The following actions were taken at Step 3 in order to accommodate beams with orbital position preferences into the draft Step 3 Plan.

S 13800 A change in the order of treatment was not possible because there were no preceding beams to change with. Re-calculated ellipse did not work. Fast roll-off antenna did not work. In order to reduce negative EPM to BIFROST22 and EUTELSAT, a 6.8 dB power decrease (to 55.3 dBW) was applied. This made channels 2,4,6,8,10,12,14,16,18,20 (CR) available for the beam.

DNK A change in the order of treatment was not possible because there were no preceding beams to change with. Re-calculated ellipse did not work. Fast roll-off antenna did not work because the incompatibility problem also exists in the receiving side.
Power: In order to reduce negative EPM of channel 40 (CR), a power increase was required. This increased e.i.r.p. caused unacceptable interference to other beams which could not be overcome by a fast roll-off antenna. Therefore, power adjustment does not work.
Other beams: There is no national preference which has an impact on this situation.
Conclusion: The beam should be treated in Step 4.

FIN A change in the order of treatment was not possible because there were no preceding beams to change with. Re-calculated ellipse did not work. Fast roll-off antenna did not work because the incompatibility problem also exists in the receiving side.
Power: In order to reduce negative EPM of channel 40 (CR), a power increase was required for channel 40. This increased e.i.r.p. caused unacceptable interference to other beams.
Other beams: There is no national preference which has an impact on this situation.
Conclusion: The beam should be treated in Step 4.

KRE A change in the order of treatment was not possible because there were no preceding beams to change with. The second preferred orbital position at 140º E was tried and found to be successful.

UKR A change in the order of treatment was not possible because there were no preceding beams to change with. Re-calculated ellipse did not work. Fast roll-off antenna did not work. A 0.8 dB e.i.r.p. reduction (to 58.1 dBW) was applied and found to be successful.

HOL It is not possible to collocate 5 beams (HOL, D, AUT, SUI and LIE) at 19° W. As D, AUT, SUI and LIE were in the draft Step 3 Plan at 19º W, this beam was treated at Step 4.

TUR A change in the order of treatment was not possible because there were no preceding beams to change with. The second preferred orbital position at 50º E was applied and found to be successful.

ALG A change in the order of treatment with TGO was applied and found to be successful.

I__02900 A change in the order of treatment was not possible because there were no preceding beams to change with. The application of the fast roll-off antenna did not work. Power adjustment did not work. Other preferred orbital positions were tried. Application of the improved fast roll-off antenna at the fifth preferred orbital position (5º E) was tried and found to be successful.

IRN A change in the order of treatment was not possible because there were no preceding beams to change with. The application of the improved fast roll-off antenna was successful.

SYR A change in the order of treatment was not possible because there were no preceding beams to change with. The application of the improved fast roll-off antenna was successful.

JOR A change in the order of treatment was not possible because there were no preceding beams to change with. The application of the improved fast roll-off antenna with 2 dB e.i.r.p. reduction (to 56.1 dBW) was applied and found to be successful.

LBN A change in the order of treatment was not possible because there were no preceding beams to change with. The application of the improved fast roll-off antenna with 1 dB e.i.r.p. reduction (to 55.6 dBW) was applied and found to be successful.

CHN15500 A change in the order of treatment such that it and the CHNA_62E composite beam is treated before the INDB_56E composite beam was successful.

CZE/HNG/HRV/SVK All beams to be co-located at a common orbital position. The preferred common orbital position at 34º E did not work for all four beams. A search for a common orbital position within the requested preferred orbital arc (13º W to 34º E) was performed. The four beams were accommodated at 13º W with the improved fast roll-off antenna applied to all four beams.

MCO It is not possible to collocate 5 beams (MCO, D, AUT, SUI and LIE) at first preferred orbital position (19° W). It is also not possible to collocate 5 beams (MCO, CZE, HNG, HRV and SVK) at second preferred orbital position (13° W). The third preferred orbital position at 7º W was applied and found to be successful.

ANNEX 3

Orbital position 37° W

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 Channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
CVA	CVA08300	-37.00	P	CR	27,31,35,39	21,23,25,27,29,31,33,35, 37,39 (CR)		
	CVA08500#	-37.00	P	CR	23	--	--	20 (CL)
GMB	GMB30200	-37.00	P	CL	3,7,11,15,19	1,3,5,7,9,11,13,15,17,19 (CL)		
GUI	GUI19200	-37.00	P	CL	1,5,9,13,17	2,4,6,8,10,12,14,16,18,20 (CR)		
POR	AZR13400* POR13300*	**-37.00**	P	CL	21,25,29,33,37	1,3,5,7,9,11,13,15,17,19 (CL)		
SEN	SEN22200	-37.00	P	CL	21,25,29,33,37	21,23,25,27,29,31,33,35, 37,39 (CL)		
SMR	SMR31100	-37.00	P	CR	1,5,9,13,17	1,3,5,7,9,11,13,15,17,19 (CR)		

Multinational beam

* Composite beam

Orbital position 33.5° W

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
AND	AND34100	**-33.50**	P	CL	4,8,12,16,20	-- at 37° W	1,3,5,7,9,11,13,15,17,19 (CL)	
G	G 02700	-33.50	P	CR	4,8,12,16,20	2,4,6,8,10,12,14,16,18,20 (CR)		
IRL	IRL21100	-33.50	P	CR	2,6,10,14,18	22,24,26,28,30,32,34,36, 38,40 (CR)		
ISL	ISL04900	-33.50	P	CL	21,25,29,33,37	21,23,25,27,29,31,33,35, 37,39 (CL)		
LBR	LBR24400	-33.50	P	CR	3,7,11,15,19	1,3,5,7,9,11,13,15,17,19 (CR)		
NGR	NGR11500	**-33.50**	P	CL	24,28,32,36,40	-- at 25° W	22,24,26,28,30,32,34,36, 38,40 (CL)	
SRL	SRL25900	-33.50	P	CR	23,27,31,35,39	21,23,25,27,29,31,33,35, 37,39 (CR)		

Orbital position 30° W

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
BEL	BEL01800	**-30.00**	P	CR	21,25,29,33,37	-- at 19° W	22,24,26,28,30,32,34, 36,38,40 (CR)	
BFA	BFA10700	-30.00	P	CR	21,25,29,33,37	1,3,5,7,9,11,13,15,17,19 (CL)		
CPV	CPV30100	-30.00	P	CL	24,28,32,36,40	1,3,5,7,9,11,13,15,17,19 (CR)		
CTI	CTI23700	-30.00	P	CL	22,26,30,34,38	22,24,26,28,30,32,34,36,38,40 (CR)		
E	CNR13000*+ E 12900*+	-30.00	P	CL	23,27,31,35,39	21,23,25,27,29,31,33, 35,37,39 (CL)		
	HISPA27D%+	-30.00	PU	CL	23,27,31,35,39	23,27,31,35,39 (CL)		
	HISP33D1%+	-30.00	PU	CL	23,27,31,35,39	23,27,31,35,39 (CL)		
	HISP33D2%+	-30.00	PU	CL	23,27,31,35,39	23,27,31,35,39 (CL)		
	HISPASA2%	-30.00	P	CL	1,3,5,7,9,11,13, 15,17,19	Not included in the feasibility study[1].		
	HISPASA4%+	-30.00	PE	CL	23,27,31,35,39	23,27,31,35,39 (CL)		
GNB	GNB30400	-30.00	P	CL	2,6,10,14,18	2,4,6,8,10,12,14,16,18,20 (CL)		
TUN	TUN15000	**-30.00**	P	CR	22,26,30,34	-- at 25° W	2,4,6,8,10,12,14,16,18, 20 (CR)	
TUN	TUN27200#	**-30.00**	P	CR	38 at 25° W	--	--	1 (CL)

* Composite beam
% Existing system
\+ Grouped together
\# Multinational beam
1 Not covered by Principle 3 of Annex 1 of Resolution 532 (WRC-97). Subject to WRC-2000 decision.

Orbital position 25° W

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
ALB	ALB29600	**-24.80**	P	CL	22,26,30,34,38	1,3,5,7,9,11,13,15,17,19 (CL) at 7° W		22,24,26,28,30,32,34,36, 38,40 (CL) +
ALG	ALG25100*	**-24.80**	P	CR	2,6,10,14,18	2,4,6,8,10,12,14,16,18,20 (CL)		
	ALG25200*	**-24.80**	P	CR	4,8,12,16,20	2,4,6,8,10,12,14,16,18,20 (CL)		
AGL	AGL29500	**-24.80**	P	CR	23,27,31,35,39	-- at 13° W	1,3,5,7,9,11,13,15,17,19 (CL)	
GHA	GHA10800	**-25.20**	P	CR	23,27,31,35,39	21,23,25,27,29,31,33,35, 37,39 (CR)		
HOL	HOL21300	**-25.20**	P	CR	23,27,31,35,39	-- at 19°W	22,24,26,28,30,32,34,36, 38,40 (CL) at 13°W	22,24,26,28,30,32,34,36, 38,40 (CL) +
LBY	LBY32100*	**-25.20**	P	CL	3,7,11,15,19	22,24,26,28,30,32,34,36, 38,40 (CR)		
	LBY28000*	**-25.20**	P	CL	1,5,9,13,17	22,24,26,28,30,32,34,36, 38,40 (CR)		
MRC	MRC20900	**-25.20**	P	CL	21,25,29,33,37	1,3,5,7,9,11,13,15,17,19 (CR)		
TCD	TCD14300	**-24.80**	P	CL	2,6,10,14,18	-- at 13° W	1,3,5,7,9,11,13,15,17,19 (CR) at 7°W	1,3,5,7,9,11,13,15,17,19 (CR) +
TGO	TGO22600	**-24.80**	P	CL	2,6,10,14,18	22,24,26,28,30,32,34,36, 38,40 (CL)		

* Composite beam
\+ Orbital position changed as a result of the feeder-link feasibility study.

Orbital position 19° W

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
AUT	AUT01600	**-18.80**	P	CL	4,8,12,16,20	21,23,25,27,29,31,33,35,37,39 (CR)		
BEN	BEN23300	**-19.20**	P	CL	3,7,11,15,19	1,3,5,7,9,11,13,15,17,19 (CL)		
COD	ZAI32200*	**-19.20**	P	CR	4,8,12,16,20	2,4,6,8,10,12,14,16,18,20 (CR)		
	ZAI32300*	**-19.20**	P	CR	2,6,10,14,18	2,4,6,8,10,12,14,16,18,20 (CR)		
D	D 08700	**-18.80**	P	CL	2,6,10,14,18	1,3,5,7,9,11,13,15,17,19 (CR)		
GNE	GNE30300	**-18.80**	P	CL	23,27,31,35,39	21,23,25,27,29,31,33,35,37,39 (CL)		
LIE	LIE25300	**-18.80**	P	CR	3,7,11,15,19	22,24,26,28,30,32,34,36,38,40 (CL)		
MTN	MTN22300*	**-19.20**	P	CR	22,26,30,34,38	-- at 37° W	2,4,6,8,10,12,14,16,18, 20 (CR)	
	MTN28800*	**-19.20**	P	CR	24,28,32,36,40	-- at 37° W	2,4,6,8,10,12,14,16,18, 20 (CR)	
NIG	NIG11900	**-19.20**	P	CR	22,26,30,34,38	22,24,26,28,30,32,34,36,38,40 (CR)		
NMB	NMB02500	**-18.80**	P	CL	21,25,29,33,37	21,23,25,27,29,31,33,35,37,39 (CL)		
SUI	SUI14000	**-18.80**	P	CL	22,26,30,34,38	2,4,6,8,10,12,14,16,18,20 (CL)		
UGA	UGA05100	**-19.20**	P	CR	3,7,11,15,19	-- at 11° E	1,3,5,7,9,11,13,15,17, 19 (CL)	

* Composite beam

Orbital position 13° W

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
CAF	CAF25800	**-13.20**	P	CL	24,28,32,36,40	22,24,26,28,30,32,34,36, 38,40 (CL)		
CME	CME30000	**-13.20**	P	CR	1,5,9,13,17	21,23,25,27,29,31,33,35, 37,39 (CR)		
COG	COG23500	**-13.20**	P	CL	22,26,30,34,38	1,3,5,7,9,11,13,15,17,19 (CL)		
CZE	CZE14400	**-12.80**	P	CL	23,27,31,35,39	22,24,26,28,30,32,34,36, 38,40 (CR)		
GAB	GAB26000	**-13.20**	P	CR	3,7,11,15,19	1,3,5,7,9,11,13,15,17,19 (CR)		
HNG	HNG10600	**-12.80**	P	CR	22,26,30,34,38	2,4,6,8,10,12,14,16,18,20 (CR)		
HRV	HRV14800	**-12.80**	P	CL	1,5,9,13,17	21,23,25,27,29,31,33,35, 37,39 (CL)		
MLT	MLT14700	**-13.20**	P	CR	4,8,12,16,20	2,4,6,8,10,12,14,16,18,20 (CR)		
MWI	MWI30800	**-12.80**	P	CL	24,28,32,36,40	-- at 1° W	2,4,6,8,10,12,14,16,18,20 (CL)	
PSE**	YYY00001	**-12.80**	P	CR	1,5,9,13,17	-- at 11° E	2,4,6,8,10,12,14,16,18,20 (CL)	
SVK	SVK14400	**-12.80**	P	CR	3,7,11,15,19	1,3,5,7,9,11,13,15,17,19 (CL)		

** Palestinian Authority (based on Resolution 99 (Minneapolis, 1998))

Orbital position 7° W *(first part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
DNK	DNK08900*	**-7.20**	P	CL	12,16,20	-- at 5° E	1,3,5,7,9,11,13,15,17,19 (CL)	
	DNKFRO*+	**-7.20**	--	--	--	-- at 5° E	1,3,5,7,9,11,13,15,17,19 (CL)	
EGY	EGY02600	**-7.20**	P	CL	4,8,12,16,20	22,24,26,28,30,32,34,36, 38,40 (CR)		
F	F2_A2722	-7.00	P	CL	2,4,6,8,10,12, 14,16,18,20	Not included in the feasibility study[1].		
	F2_A2733	-7.00	P	CR	3,7,11,15,19	Not included in the feasibility study[1].		
	F2_A2788	-7.00	P	CL	24,28,32,36,40	Not included in the feasibility study[1].		
	F3_A2722 F3_A3322 F3_D2722 F3_D3322	-7.00	P	LE	2,4,6,8,10,12, 14,16,18,20	Not included in the feasibility study[1].		
	F3_A2728 F3_A3328 F3_D2728 F3_D3328	-7.00	P	LE	24,28,32,36,40	Not included in the feasibility study[1].		
	F3_A2751 F3_A3351 F3_D2751 F3_D3351	-7.00	P	LE	1,3,5,7,9,11, 13,15,17,19	Not included in the feasibility study[1].		

* Composite beam
\+ New minimum size spot beam
1 Not covered by Principle 3 of Annex 1 of Resolution 532 (WRC-97).

Orbital position 7° W *(second part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
F	F 09300	**-6.80**	P	CL	1,5,9,13,17	1,3,5,7,9,11,13,15,17,19 (CR)		
F	MYT09800*	**-6.80**	P	CR	24,28,32,36,40	22,24,26,28,30,32,34,36, 38,40 (CL)		
	REU09700*	**-6.80**	P	CR	22,26,30,34,38	22,24,26,28,30,32,34,36, 38,40 (CL)		
KEN	KEN24900	**-7.20**	P	CR	21,25,29,33,37	-- at 11° E	22,24,26,28,30,32,34,36, 38,40 (CR)	
MCO	MCO11600	**-7.20**	P	CR	21,25,29,33,37	21,23,25,27,29,31,33,35, 37,39 (CR)		
MLI	MLI32700*	**-7.20**	P	CR	2,6,10,14,18	-- at 37° W	22,24,26,28,30,32,34,36, 38,40 (CR)	
	MLI32800*	**-7.20**	P	CR	4,8,12,16,20	-- at 37° W	22,24,26,28,30,32,34,36, 38,40 (CR)	
SDN	SDN23000*	**-6.80**	P	CL	23,27,31,35,39	2,4,6,8,10,12,14,16,18,20 (CL)		
	SDN23100*	**-6.80**	P	CR	22,26,30,34,38	2,4,6,8,10,12,14,16,18,20 (CL)		
	SDN23200*	**-6.80**	P	CR	24,28,32,36,40	2,4,6,8,10,12,14,16,18,20 (CL)		
STP	STP24100	**-7.20**	P	CL	4,8,12,16,20	-- at 13° W	22,24,26,28,30,32,34,36, 38,40 (CL)	
SWZ	SWZ31300	**-7.20**	P	CR	1,5,9,13,17	-- at 1° W	22,24,26,28,30,32,34,36, 38,40 (CR)	
YUG	YUG14800	**-6.80**	P	CR	23,27,31,35,39	22,24,26,28,30,32,34,36, 38,40 (CL)		

* Composite beam

Orbital position 4° W

ADM	**Beam name**	**Orbital position (° E)**	**Status code**	**Pol.**	**WRC-97 channels**	**Channels found at Step 3**	**Channels found at Step 4**	**Channels found at Step 5 or 6**
ISR	ISR11000	**-4.00**	P	CR	21,25,29,33,37	1,3,5,7,9,11,13,15,17,19 (CL)		

Orbital position 1° W *(first part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
BOT	BOT29700	-1.00	P	CL	2,6,10,14,18	22,24,26,28,30,32,34,36, 38,40 (CR)		
BUL	BUL02000	-1.00	P	CR	4,8,12,16,20	21,23,25,27,29,31,33,35, 37,39 (CR)		
D	D2-21600	-1.00	P	CL	21,25,29,33,37	Not included in the feasibility study[2].		
MOZ	MOZ30700	-1.00	P	CL	4,8,12,16,20	21,23,25,27,29,31,33,35, 37,39 (CL)		
ZMB	ZMB31400	-1.00	P	CR	3,7,11,15,19	2,4,6,8,10,12,14,16,18,20 (CR)		
ZWE	ZWE13500	-1.00	P	CL	22,26,30,34,38	1,3,5,7,9,11,13,15,17,19 (CL)		

2 Covered by beam D 08700 at 18.8° W

Orbital position 1° W *(second part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
IRQ	IRQ25600	**-1.20**	P	CR	24,28,32,36,40	-- at 11° E	22,24,26,28,30,32,34,36, 38,40 (CL)	
NOR	BIFROST	-0.80	PU	--	--	4,8,12,16,20 (CR)		
	BIFROS21%	-0.80	PU	CL	23,27,31,35,39	23,27,31,35,39 (CL)		
	BIFROS22%	-0.80	PU	CR	2,6,10,14,18,24, 28,32,36,40	2,6,10,14,18,24, 28,32,36,40 (CR)		
	NOR12000+	**-0.80**	P	CL	14,18,38	22,24,26,28,30,32,34,36, 38,40 (CR)		
	NOR12101#	**-0.80**	P	CL	28	--	--	--
	NOR12102#	**-0.80**	P	CL	32	--	--	--

Multinational beam
% Existing system
+ Grouped with BIFROS22

Orbital position 5° E *(first part)*

ADM	**Beam name**	**Orbital position (° E)**	**Status code**	**Pol.**	**WRC-97 channels**	**Channels found at Step 3**	**Channels found at Step 4**	**Channels found at Step 5 or 6**
AFS	AFS02100	5.00	P	CL	21,25,29,33,37	1,3,5,7,9,11,13,15,17,19 (CR)		
CYP	CYP08600	**4.80**	P	CR	21,25,29,33,37	21,23,25,27,29,31,33,35, 37,39 (CR)		
DNK	DNK09000#	**5.20**	P	CL	24,36	--	--	33,37 (CR)
	DNK09100#	**5.20**	P	CR	27,35	--	--	27,35 (CR)
FIN	FIN10300	**5.20**	P	CL	2,6,10	--	--	1,22,24,26,28,30,32,34, 36,38 (CL)
	FIN10400#	**5.20**	P	CL	22,26	--	--	--
I	I 08200	**4.80**	P	CL	24,28,32,36,40	1,3,5,7,9,11,13,15,17,19 (CL)		
ISL	ISL05000#	**5.20**	P	CR	23,31,39	--	--	23,31,39 (CR)
LSO	LSO30500	**4.80**	P	CR	24,28,32,36,40	22,24,26,28,30,32,34,36, 38,40 (CR)		

Multinational beam

Orbital position 5° E *(second part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
S	S 13800+	5.00	P	CL	4,8,34	2,4,6,8,10,12,14,16,18,20 (CR)		
	S 13900#	5.00	P	CL	30	--	--	--
	S 13902#%	5.00	PE	CL	40	40 (CL)		
	SIRIUS01%	5.20	PE	CR	4,8	4,8 (CR)		
	SIRIUS02%	5.20	PE	CR	12,16,20	12,16,20 (CR)		

\# Multinational beam

% Existing system

\+ Grouped with SIRIUS01 and SIRIUS02

Orbital position 11° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
BDI	BDI27000	11.00	P	CL	22,26,30,34,38	22,24,26,28,30,32,34,36, 38,40 (CL)		
JOR	JOR22400	11.00	P	CL	23,27,31,35,39	22,24,26,28,30,32,34,36, 38,40 (CL)		
LBN	LBN27900	11.00	P	CL	3,7,11,15,19	1,3,5,7,9,11,13,15,17,19 (CR)		
RRW	RRW31000	11.00	P	CL	4,8,12,16,20	2,4,6,8,10,12,14,16,18,20 (CL)		
SYR	SYR22900	11.00	P	CR	22,26,30,34	2,4,6,8,10,12,14,16,18,20 (CL)		
TZA	TZA22500	11.00	P	CR	23,27,31,35,39	21,23,25,27,29,31,33,35, 37,39 (CR)		

Multinational beam

* Composite beam

Orbital position 13° E *(first part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
F EUT	E127ASCA% E133ASCA%	13.00	PU	--	--	1,3,5,7,9,11,13,15,17, 19,21,23,25,27,29,31, 33,35,37,39 (LE)		
	E127ASCB% E133ASCB%	13.00	PU	--	--	2,4,6,8,10,12,14,16,18, 20,22,24,26,28,30,32, 34,36,38,40 (LE)		
	E127DSCA% E133DSCA%	13.00	PU	--	--	1,3,5,7,9,11,13,15,17, 19,21,23,25,27,29,31, 33,35,37,39 (LE)		
	E127DSCB% E133DSCB%	13.00	PU	--	--	2,4,6,8,10,12,14,16,18, 20,22,24,26,28,30,32, 34,36,38,40 (LE)		
	E127ASZA% E133ASZA%	13.00	PU	--	--	1,3,5,7,9,11,13,15,17, 19,21,23,25,27,29,31, 33,35,37,39 (LE)		
	E127ASZB% E133ASZB%	13.00	PU	--	--	2,4,6,8,10,12,14,16,18, 20,22,24,26,28,30,32, 34,36,38,40 (LE)		
	E127DSZA% E133DSZA%	13.00	PU	--	--	1,3,5,7,9,11,13,15,17, 19,21,23,25,27,29,31, 33,35,37,39 (LE)		
	E127DSZB% E133DSZB%	13.00	PU	--	--	2,4,6,8,10,12,14,16,18, 20,22,24,26,28,30,32, 34,36,38,40 (LE)		

% Existing system

Orbital position 13° E *(second part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
F EUT	E127ASWA% E133ASWA%	13.00	PU	--	--	1,3,5,7,9,11,13,15,17, 19,21,23,25,27,29,31, 33,35,37,39 (LE)		
	E127ASWB% E133ASWB%	13.00	PU	--	--	2,4,6,8,10,12,14,16,18, 20,22,24,26,28,30,32, 34,36,38,40 (LE)		
	E127DSWA% E133DSWA%	13.00	PU	--	--	1,3,5,7,9,11,13,15,17, 19,21,23,25,27,29,31, 33,35,37,39 (LE)		
	E127DSWB% E133DSWB%	13.00	PU	--	--	2,4,6,8,10,12,14,16,18, 20,22,24,26,28,30,32, 34,36,38,40 (LE)		

% Existing system

Orbital position 17° E

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
ARS	ARS00300*	17.00	P	CL	4,8,12,16,20	22,24,26,28,30,32,34,36, 38,40 (CR)		
	ARS27500*	17.00	P	CL	2,6,10,14,18	22,24,26,28,30,32,34,36, 38,40 (CR)		
KWT	KWT11300	17.00	P	CL	22,26,30,34,38	22,24,26,28,30,32,34,36, 38,40 (CL)		
OMA	OMA12300	17.00	P	CL	24,28,32,36,40	1,3,5,7,9,11,13,15,17,19 (CL)		
QAT	QAT24700	17.00	P	CR	1,5,9,13,17	2,4,6,8,10,12,14,16,18,20 (CR)		

* Composite beam

Multinational beam

Orbital position 19.2° E *(first part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
LUX	D33THN1I% D33THN1C%	19.20	PU	--	--	1,5,9,13,17,21,25,29, 33,37 (LE)		
	D33TVN1I% D33TVN1C%	19.20	PU	--	--	2,6,10,14,18 (LE)		
	D33TVN2I% D33TVN2C%	19.20	PU	--	--	22,26,30,34,38 (LE)		
	D33THP1I% D33THP1C%	19.20	PU	--	--	3,7,11,15,19 (LE)		
	D33THP2I% D33THP2C%	19.20	PU	--	--	23,27,31,35,39 (LE)		
	D33TVP1I% D33TVP1C%	19.20	PU	--	--	4,8,12,16,20 (LE)		
	D33TVP2I% D33TVP2C%	19.20	PU	--	--	24,28,32,36,40 (LE)		

% Existing system

Orbital position 19.2° E *(second part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
LUX	D33THN14% D33THN13%	19.20	PU	--	--	1,5,9,13,17,21,25,29, 33,37 (LE)		
	D33TVN14% D33TVN13%	19.20	PU	--	--	2,6,10,14,18 (LE)		
	D33TVN24% D33TVN23%	19.20	PU	--	--	22,26,30,34,38 (LE)		
	D33THP14% D33THP13%	19.20	PU	--	--	3,7,11,15,19 (LE)		
	D33THP24% D33THP23%	19.20	PU	--	--	23,27,31,35,39 (LE)		
	D33TVP14% D33TVP13%	19.20	PU	--	--	4,8,12,16,20 (LE)		
	D33TVP24% D33TVP23%	19.20	PU	--	--	24,28,32,36,40 (LE)		

% Existing system

Orbital position 23° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
ARM	ARM06400	**23.20**	P	CR	24,28,32,36,40	1,3,5,7,9,11,13,15,17,19 (CL)		
AZE	AZE06400	23.00	P	CR	4,8,12,16,20	2,4,6,8,10,12,14,16,18,20 (CR)		
DJI	DJI09900	**22.80**	P	CR	21,25,29,33,37	1,3,5,7,9,11,13,15,17,19 (CL)		
ERI	ERI09200	23.00	P	CR	23,27,31,35,39	21,23,25,27,29,31,33,35, 37,39 (CR)		
ETH	ETH09200	23.00	P	CL	22,26,30,34,38	21,23,25,27,29,31,33,35, 37,39 (CL)		
GEO	GEO06400	**22.80**	P	CR	22,26,30,34,38	22,24,26,28,30,32,34,36, 38,40 (CR)		
LTU	LTU06100	23.00	P	CL	3,7,11,15,19	1,3,5,7,9,11,13,15,17,19 (CL)		
MKD	MKD14800	23.00	P	CR	2,6,10,14,18	22,24,26,28,30,32,34,36, 38,40 (CL)		
SOM	SOM31200	**23.20**	P	CR	3,7,11,15,19	1,3,5,7,9,11,13,15,17,19 (CR)		

Orbital position 28.2° E

ADM	**Beam name**	**Orbital position (° E)**	**Status code**	**Pol.**	**WRC-97 channels**	**Channels found At Step 3**	**Channels found at Step 4**	**Channels found at Step 5 or 6**
LUX	LUX11400+	**28.20**	P	CR	3,7,11,15,19	-- at 19° W	1,3,5,7,9,11,13,15,17,19 (CL)	
	D3128HI1% D3128HI4%	28.20	PU	--	--	1,3,5,7,9,11,13,15,17, 19,21,23 (LE)		
	D3128VI1% D3128VI4%	28.20	PU	--	--	2,4,6,8,10,12,14,16, 18,20,22 (LE)		
	D3228HI1% D3228HI4%	28.20	PU	--	--	25,27,29,31,33,35, 37,39 (LE)		
	D3228VI1% D3228VI4%	28.20	PU	--	--	24,26,28,30,32,34, 36,38,40 (LE)		

\+ Grouped with DBL
% Existing system

Orbital position 29° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
BHR	BHR25500	**29.00**	P	CR	23,27,31,35,39	-- at 17° E	22,24,26,28,30,32,34,36, 38,40 (CL)	
COM	COM20700	29.00	P	CL	3,7,11,15,19	1,3,5,7,9,11,13,15,17,19 (CL)		
MAU	MAU24200*	29.00	P	CR	2,6,10,14,18	22,24,26,28,30,32,34,36, 38,40 (CL)		
	MAU24300*	29.00	P	CR	4,8,12,16	22,24,26,28,30,32,34,36, 38,40 (CL)		
MDG	MDG23600	29.00	P	CL	1,5,9,13,17	21,23,25,27,29,31,33,35, 37,39 (CR)		
* Composite beam								

Orbital position 34° E

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found At Step 3	Channels found at Step 4	Channels found at Step 5 or 6
GRC	GRC10500	**34.00**	P	CR	3,7,11,15,19	-- at 5° E	1,3,5,7,9,11,13,15,17,19 (CL)	
IRN	IRN10900	34.00	P	CL	3,7,11,15,19	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
SVN	SVN14800	34.00	P	CR	4,8,12,16,20	2,4,6,8,10,12,14,16,18,20 (CR)		

Orbital position 36° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
RUS	RSTRSA11	36.00	P	CL	25,27,29,31, 33,35,37,39	Not included in the feasibility study[3].		
	RSTRSA12	36.00	P	CR	26,28,30,32, 34,36,38,40	Not included in the feasibility study[3].		
	RSTRSD11+ RSTRSD13+	36.00	P	CL	25,27,29,31, 33,35,37,39	25,27,29,31, 33,35,37,39 (CL)		
	RSTRSD12* RSTRSD14*	36.00	P	CR	26,28,30,32, 34,36,38,40	26,28,30,32, 34,36,38,40 (CR)		
	RSTREA11% RSTRED11%	36.00	PU	--	--	27,31,35,39 (CL)		
	RSTREA12% RSTRED12%	36.00	PU	--	--	28,32,36,40 (CR)		

% Existing system
+ Grouped with RSTREA11 and RSTRED11
* Grouped with RSTREA12 and RSTRED12
3 According to IRG decision.

Orbital position 38° E

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
BLR	BLR06200	38.00	P	CL	1,5,9,13,17	1,3,5,7,9,11,13,15,17,19 (CL)		
PAK	PAK12700	38.00	P	CR	2,6,10	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
	PAK21000	38.00	P	CR	12,14	Not included in the feasibility study[4].		
	PAK28100	38.00	P	CR	18,22	Not included in the feasibility study[4].		
	PAK28200	38.00	P	CR	20,24	Not included in the feasibility study[4].		
	PAK28300	38.00	P	CR	4,8	Not included in the feasibility study[4].		
TJK	TJK06900	**38.00**	P	CL	1,5,9,13,17	-- at 44° E	1,3,5,7,9,11,13,15,17,19 (CL)	
UKR	UKR06300	38.00	P	CL	3,7,11,15,19	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		

4 Covered by beam PAK12700

Orbital positions 42.5° E and 44° E

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found At Step 3	Channels found at Step 4	Channels found at Step 5 or 6
SEY	SEY00000	**42.50**	--	--	--	21,23,25,27,29,31,33,35, 37,39 (CL)		
ARS	ARS34000#	**44.00**	P	CR	23 at 17°E	--	--	24 (CL)
BIH	BIH14800	**44.20**	P	CR	2,6,10,14,18	-- at 34° E	1,3,5,7,9,11,13,15,17,19 (CR)	
EST	EST06100	**43.80**	P	CL	1,5,9,13,17	-- at 23° E	2,4,6,8,10,12,14,16,18,20 (CR)	
KAZ	KAZ06600	**44.20**	P	CL	24,28,32,36,40	1,3,5,7,9,11,13,15,17,19 (CL)		
KGZ	KGZ07000	**43.80**	P	CL	22,26,30,34,38	1,3,5,7,9,11,13,15,17,19 (CR)		
MLD	MLD30600	**43.80**	P	CR	4,8,12,16	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
ROU	ROU13600	**43.80**	P	CL	3,7,11,15,19	-- at 1° W	22,24,26,28,30,32,34,36, 38,40 (CR)	
SYR	SYR33900#	**43.80**	P	CR	38 at 11°E	--	--	21 (CL)
TKM	TKM06800	**44.20**	P	CR	23,27,31,35,39	21,23,25,27,29,31,33,35, 37,39 (CR)		
UZB	UZB07100	**43.80**	P	CL	3,7,11,15,19	22,24,26,28,30,32,34,36, 38,40 (CL)		
YEM	YEM26600*	**44.20**	P	CR	2,6,10,14,18	-- at 11° E	2,4,6,8,10,12,14,16,18,20 (CL)	
	YEM26700*	**44.20**		CL	1,5,9,13,17	-- at 11° E	2,4,6,8,10,12,14,16,18,20 (CL)	

Orbital positions 50° E and 52.5° E

ADM	**Beam Name**	**Orbital position (° E)**	**Status code**	**Pol.**	**WRC-97 channels**	**Channels found at Step 3**	**Channels found at Step 4**	**Channels found at Step 5 or 6**
AFG	AFG24500*	50.00	P	CR	3,7,11,15	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
	AFG24600*	50.00	P	CR	1,5,9,13	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
CLN	CLN21900	50.00	P	CR	2,6,10,14	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
LVA	LVA06100	**50.00**	P	CL	21,25,29,33,37	-- at 23° E	22,24,26,28,30,32,34,36, 38,40 (CL)	
MDA	MDA06300	**50.00**	P	CR	4,8,12,16,20	-- at 38° E	21,23,25,27,29,31,33,35, 37,39 (CL) at 44°E	22,24,26,28,30,32,34,36, 38,40 (CR) +
NPL	NPL12200	50.00	P	CL	17,19,21,23	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
POL	POL13200	**50.00**	P	CL	1,5,9,13,17	-- at 1° W	2,4,6,8,10,12,14,16,18,20 (CL)	
TUR	TUR14500	**50.00**	P	CR	1,5,9,13,17	1,3,5,7,9,11,13,15,17,19 (CR)		
UAE	UAE27400	**52.50**	P	CR	21,25,29,33,37	21,23,25,27,29,31,33,35, 37,39 (CR)		

* Composite beam
\+ Orbital position changed from 44° E to 50° E as a result of the feeder-link feasibility study.

Orbital position 56° E

ADM	**Beam name**	**Orbital position (° E)**	**Status code**	**Pol.**	**WRC-97 channels**	**Channels found at Step 3**	**Channels found at Step 4**	**Channels found at Step 5 or 6**
IND	IND03900*	56.00	P	CR	1,5,9,13	2,4,6,8,10,12,14,16,18,20,22, 24 (CR)		
	IND04100*	56.00		CL	18,20,22,24	2,4,6,8,10,12,14,16,18,20,22, 24 (CR)		
	IND04300*	56.00	P	CR	3,7,11,15	2,4,6,8,10,12,14,16,18,20,22, 24 (CR)		
	IND04500*	56.00	P	CL	2,6,10,14	2,4,6,8,10,12,14,16,18,20,22, 24 (CR)		
IND	IND04200*	**56.00**	P	CL	18,20,22,24	1,3,5,7,9,11,13,15,17,19,21,2 3 (CL)		
	IND04600*	**56.00**	P	CR	17,19,21,23	1,3,5,7,9,11,13,15,17,19,21,2 3 (CL)		
	IND04800*	**56.00**	P	CL	4,8,12,16	1,3,5,7,9,11,13,15,17,19,21,2 3 (CL)		
RUS	RSTRSA21	56.00	P	CL	25,27,29,31, 33,35,37,39	Not included in the feasibility study[3].		
	RSTRSA22	56.00	P	CR	26,28,30,32, 34,36,38,40	Not included in the feasibility study[3].		
	RSTRSD21+	56.00	P	CL	25,27,29,31, 33,35,37,39	25,27,29,31,33,35,37,39 (CL)		
	RSTRSD22+	56.00	P	CR	26,28,30,32, 34,36,38,40	26,28,30,32,34,36,38,40 (CR)		

* Composite beam
\+ Grouped together
3 According to IRG decision.

Orbital position 62°E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
CHN	CHN15400*	62.00	P	CR	2,6,10,14	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
	CHN15600*	62.00	P	CR	4,8,12	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
	CHN15500	62.00	P	CL	1,5,9,13	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
	CHN18300	62.00		CR	22	Not included in the feasibility study[4].		
	CHN18400	62.00		CR	20	Not included in the feasibility study[4].		
	CHN18500	62.00		CR	18	Not included in the feasibility study[4].		
	CHN18600	62.00		CL	16	Not included in the feasibility study[4].		
	CHN18800	62.00	P	CL	24	Not included in the feasibility study[4].		

* Composite beam
4 Covered by composite beam

Orbital position 68° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
IND	IND03700	68.00	P	CL	2,10,6,14	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
	IND03800*	**68.00**	P	CR	17,19,21,23	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
	IND04000*	**68.00**	P	CL	4,8,12,16	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
	IND04400	68.00		CR	1,5,9,13	Not included in the feasibility study[4].		
	IND04700	68.00	P	CR	3,7,11,15	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		

* Composite beam

4 Covered by composite beam

Orbital position 74° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
BGD	BGD22000	74.00	P	CR	15,18,20,22,24	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
BRU	BRU3300A	74.00	P	CR	12,14,16,18	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
MNG	MNG24800	74.00	P	CR	25,29,33,37,39	21,23,25,27,29,31,33,35, 37,39 (CR)		
SNG	SNG15100	74.00	P	CL	3,7,11,15	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		

Orbital position 80° E *(first part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
CHN	CHN16300	79.80		CL	1	Not included in the feasibility study[4].		
	CHN16400	79.80		CL	5	Not included in the feasibility study[4].		
	CHN16500	79.80		CR	9	Not included in the feasibility study[4].		
	CHN17600	79.80		CL	21	Not included in the feasibility study[4].		
	CHN17700	79.80		CR	24	Not included in the feasibility study[4].		
CHN	CHN17800	79.80		CR	12	Not included in the feasibility study[4].		
	CHN18100	79.80		CR	14	Not included in the feasibility study[4].		
	CHN18200	79.80		CL	17	Not included in the feasibility study[4].		
	CHN18700	79.80		CR	10	Not included in the feasibility study[4].		

4 Covered by composite beam

Orbital position 80° E *(second part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
INS	INS02800*	80.20	P	CL	2,4,6,8	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
	INS03000*	80.20	P	CR	18,20,22,24	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
	INS03200*	80.20	P	CR	17,19,21,23	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		

* Composite beam

Orbital position 86° E

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
BTN	BTN03100	86.00	P	CR	5,9,13,17	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
CBG	CBG29900	**86.00**	P	CR	18,20,22,24	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
RUS	RSTRSA31	86.00		CL	25,27,29,31, 33,35,37,39	Not included in the feasibility study[3].		
	RSTRSA32	86.00		CR	26,28,30,32, 34,36,38,40	Not included in the feasibility study[3].		
	RSTRSD31[+]	86.00	P	CL	25,27,29,31, 33,35,37,39	25,27,29,31,33,35,37,39 (CL)		
	RSTRSD32[+]	86.00	P	CR	26,28,30,32, 34,36,38,40	26,28,30,32,34,36,38,40 (CR)		

3 According to IRG decision.

\+ Grouped together

Orbital position 91.5° E

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
MLA	MLA22700*	**91.50**	P	CR	16,18,20,22,24	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
	MLA22800*	**91.50**	P	CR	2,4,6,8,10	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		

Orbital position 92° E *(first part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
CHN	CHN16000	92.00		CL	3,7,11	Not included in the feasibility study[4].		
	CHN16200	92.00		CL	1,5,9	Not included in the feasibility study[4].		
	CHN16600*	92.00	P	CR	24	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
	CHN16800*	92.00	P	CR	22	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
	CHN16700	92.00		CL	17	Not included in the feasibility study[4].		
	CHN16900	92.00		CR	16	Not included in the feasibility study[4].		
	CHN17000	92.00		CR	12	Not included in the feasibility study[4].		
	CHN17100	92.00		CR	10	Not included in the feasibility study[4].		
	CHN17200	92.00		CR	14	Not included in the feasibility study[4].		

* Composite beam
4 Covered by composite beam

Orbital position 92° E *(second part)*

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
CHN	CHN17300	92.00		CR	8	Not included in the feasibility study[4].		
	CHN17400	92.00		CL	15	Not included in the feasibility study[4].		
	CHN16100*	92.00	P	CL	2,4,6	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
	CHN17500*	92.00	P	CL	12	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
	CHN17900*	92.00	P	CR	19	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
	CHN18000*	92.00	P	CR	13	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		

* Composite beam
4 Covered by composite beam

Orbital position 98° E

ADM	**Beam name**	**Orbital position (° E)**	**Status code**	**Pol.**	**WRC-97 channels**	**Channels found at Step 3**	**Channels found at Step 4**	**Channels found at Step 5 or 6**
PHL	PHL28500	98.00	P	CL	16,18,20,22,24	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
THA	THA14200	**98.00**	P	CL	1,5,9,13	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		

Orbital position 104° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
BRM	BRM29800	**104.00**	P	CL	17,19,21,23	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
INS	INS03500*	104.00	P	CR	1,5,9,13	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
	INS03600*	104.00	P	CR	3,7,11,15,19	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
* Composite beam								

Orbital position 107° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
VTN	VTN32500	**107.00**	P	CL	3,7,11,15	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		

Orbital position 110° E

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
J	000BS-3N%+	109.85	PE	CR	1,3,5,7,9,11,13, 15	1,3,5,7,9,11,13,15 (CR)		
	J 1110E%+	110.00	PE	CR	1,3,5,7,9,11,13, 15	1,3,5,7,9,11,13,15 (CR)		
	J 11100+	110.00	P	CR	1,3,5,7,9,11,13, 15	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
RUS	RUS00400	110.00	P	CL	25,27,31,35,39	25,27,29,31, 33,35,37,39 (CL) 26,28 (CR)		

% Existing system

\+ Grouped together

Orbital position 116° E

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
KOR	KOR11200+	116.00	P	CL	2,4,6,8,10,12	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
	KO11201D%+	116.00	PE	CL	2,4,6,8,10,12	2,4,6,8,10,12 (CL)		
	KOR11201%+	116.00	PE	CL	2,4,6,8,10,12	2,4,6,8,10,12 (CL)		

% Existing system

\+ Grouped together

Orbital position 122° E

ADM	**Beam name**	**Orbital position (° E)**	**Status code**	**Pol.**	**WRC-97 channels**	**Channels found at Step 3**	**Channels found at Step 4**	**Channels found at Step 5 or 6**
CHN	CHN19000	**122.20**	P	CR	1,5,9,13	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
	MAC00000	**122.20**	P	--	--	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
LAO	LAO28400	**121.80**	P	CR	2,4,6,8,10	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
USA	GUM33100*	122.00	P	CL	2,6,10,14,18	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
	MRA33200*	122.00	P	CR	3,7,11,15,19	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		

* Composite beam

Orbital position 128° E

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
PNG	PNG13100	**128.00**	P	CR	2,6,10,14	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
SLM	SLM00000	**128.00**	P	CL	1,5,9,13	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		

Orbital position 134° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
CHN	CHN15700*	**134.00**		CL	3,7,11	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
	CHN15900*	**134.00**	P	CL	18,20,22	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
	CHN15800	**134.00**		CL	15,19,23	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
NRU	NRU30900	134.00	P	CL	3,7,11,15	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		

Orbital position 140° E

ADM	Beam Name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
F	NCL10000	140.00	P	CR	2,6,10,14	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
	WAL10200	140.00	P	CR	2,6,10,14	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
KRE	KRE28600	**140.00**	P	CL	14,16,18,20,22	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
PLW	PLW00000	**140.00**	P	CR	4,8,12,16,20	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		
RUS	RSTRSA51	140.00	P	CL	25,27,29,31, 33,35,37,39	Not included in the feasibility study[3].		
	RSTRSA52	140.00	P	CR	26,28,30,32, 34,36,38,40	Not included in the feasibility study[3].		
	RSTRSD51[+]	140.00	P	CL	25,27,29,31, 33,35,37,39	25,27,29,31, 33,35,37,39 (CL)		
	RSTRSD52[+]	140.00	P	CR	26,28,30,32, 34,36,38,40	26,28,30,32, 34,36,38,40 (CR)		
USA	WAK33400	140.00	P	CR	1,5,9,13,17	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
VUT	VUT12800	140.00	P	CL	3,7,11,15	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		

+ Grouped together
3 According to IRG decision

Orbital position 146° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
FSM	FSM00000	146.00	P	CL	3,7,11,15,19	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
MHL	MHL00000	146.00	P	CR	2,6,10,14,18	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		

Orbital position 152° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
AUS	AUS00400+	152.00	P	CR	3,7,11,15,19,23	3,7,11,15,19,23 (CR)		
	AUS0040A+	152.00	P	CR	3,7,11,15,19,23	3,7,11,15,19,23 (CR)		
	AUS0040B+	152.00	P	CR	3,7,11,15,19,23	3,7,11,15,19,23 (CR)		
	AUS0040C+	152.00	P	CR	3,7,11,15,19,23	3,7,11,15,19,23 (CR)		
	AUS00500	152.00	P	CL	4,8,12,16,20,24	4,8,12,16,20,24 (CL)		
	AUS00600	152.00	P	CL	2,6,10,14,18,22	2,6,10,14,18,22 (CL)		
	AUSA0000*	152.00	P	-	-	1,5,9 (CR)		

* Composite beam
\+ Grouped together

Orbital position 158° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
NZL	CKH05200*	158.00	P	CL	2,6,10,14	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
	CKH05300*	158.00	P	CL	4,8,12,16	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
	NIU05400*	158.00	P	CL	19,23	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
	NZL05500*	158.00	P	CR	1,5,9,13	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
	TKL05800*	158.00	P	CR	20,24	1,3,5,7,9,11,13,15,17,19, 21,23 (CL)		
* Composite beam								

Orbital position 164° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
AUS	AUS00700+	164.00	P	CR	3,7,11,15,19,23	3,7,11,15,19,23 (CR)		
	AUS0070A+	164.00	P	CR	3,7,11,15,19,23	3,7,11,15,19,23 (CR)		
	AUS00800	164.00	P	CL	2,6,10,14,18,22	2,6,10,14,18,22 (CL)		
	AUS00900#	164.00	P	CR	1,5,9,13,17,21	1,5,9,13,17,21 (CR)		
	AUS0090A#	164.00	P	CR	1,5,9,13,17,21	1,5,9,13,17,21 (CR)		
	AUS0090B#	164.00	P	CR	1,5,9,13,17,21	1,5,9,13,17,21 (CR)		
	AUSB0000*	164.00	P	-	-	4,8,12 (CL)		

+ Grouped together
# Grouped together
* Composite beam

Orbital position 170° E

ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
USA	PLM33700*	170.00	P	CR	1,5,9,13,17	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
	SMA33500*	170.00	P	CL	1,5,9,13,17	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
	SMA3300* #	170.00	--	--	--	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
TON	TON21500	170.00	P	CR	4,8,12,16	2,4,6,8,10,12,14,16,18, 20,22,24 (CR)		

* Composite beam

\# New spot beam

Orbital positions 176° E, 178° W and 160° W

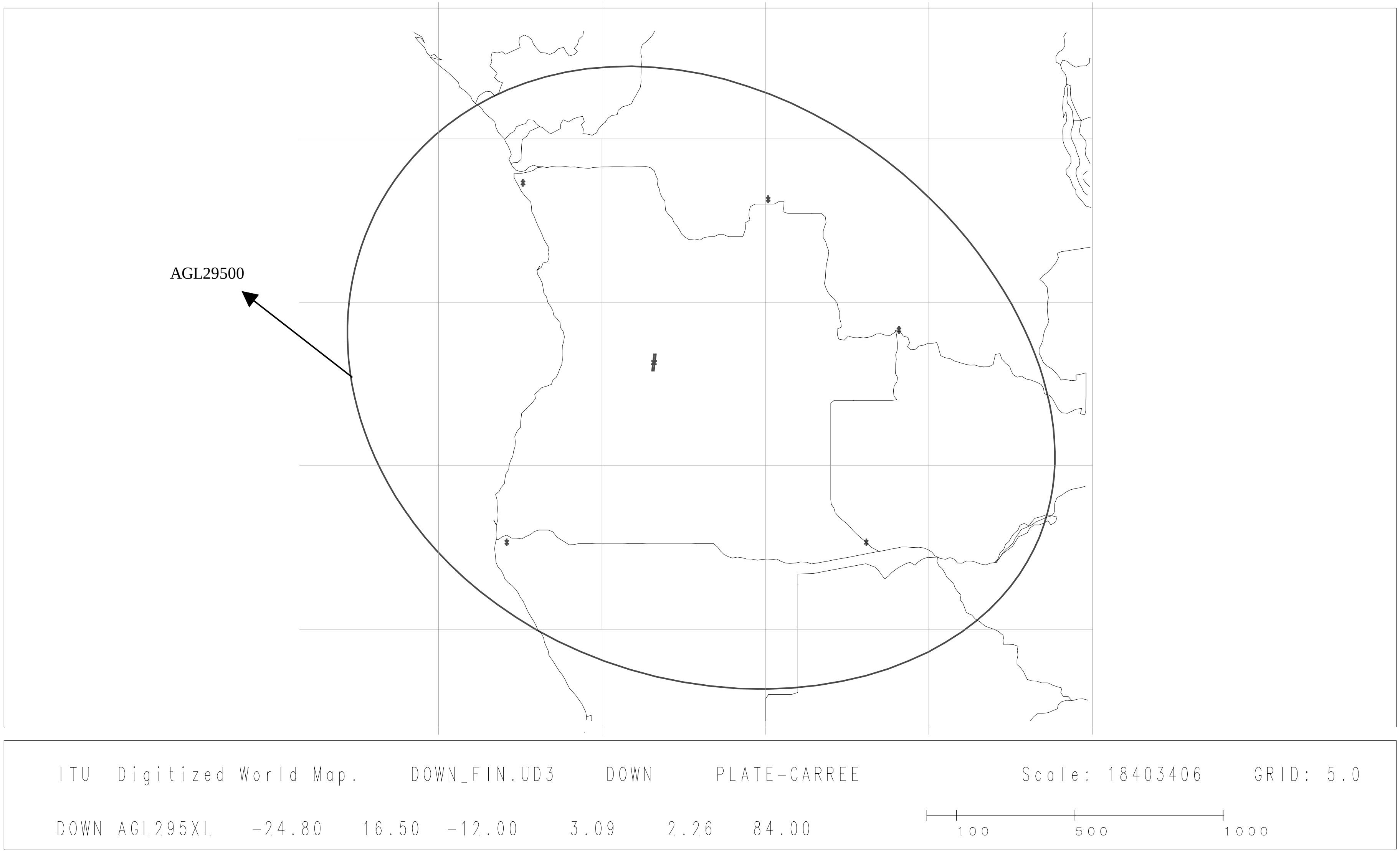
ADM	Beam name	Orbital position (° E)	Status code	Pol.	WRC-97 channels	Channels found at Step 3	Channels found at Step 4	Channels found at Step 5 or 6
KIR	KIR00001*	176.00	P	CL	3,7,11	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
	KIR00002*	176.00	P	CL	15,19,23	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
TUV	TUV00000	176.00	P	CR	2,6,10,14	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		
FJI	FJI19300	**-178.00**	P	CR	1,5,9,13	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
SMO	SMO05700	**-178.00**	P	CR	3,7,11,15	1,3,5,7,9,11,13,15,17,19, 21,23 (CR)		
F	OCE10100	-160.00	P	CL	4,8,12,16	2,4,6,8,10,12,14,16,18, 20,22,24 (CL)		

* Composite beam

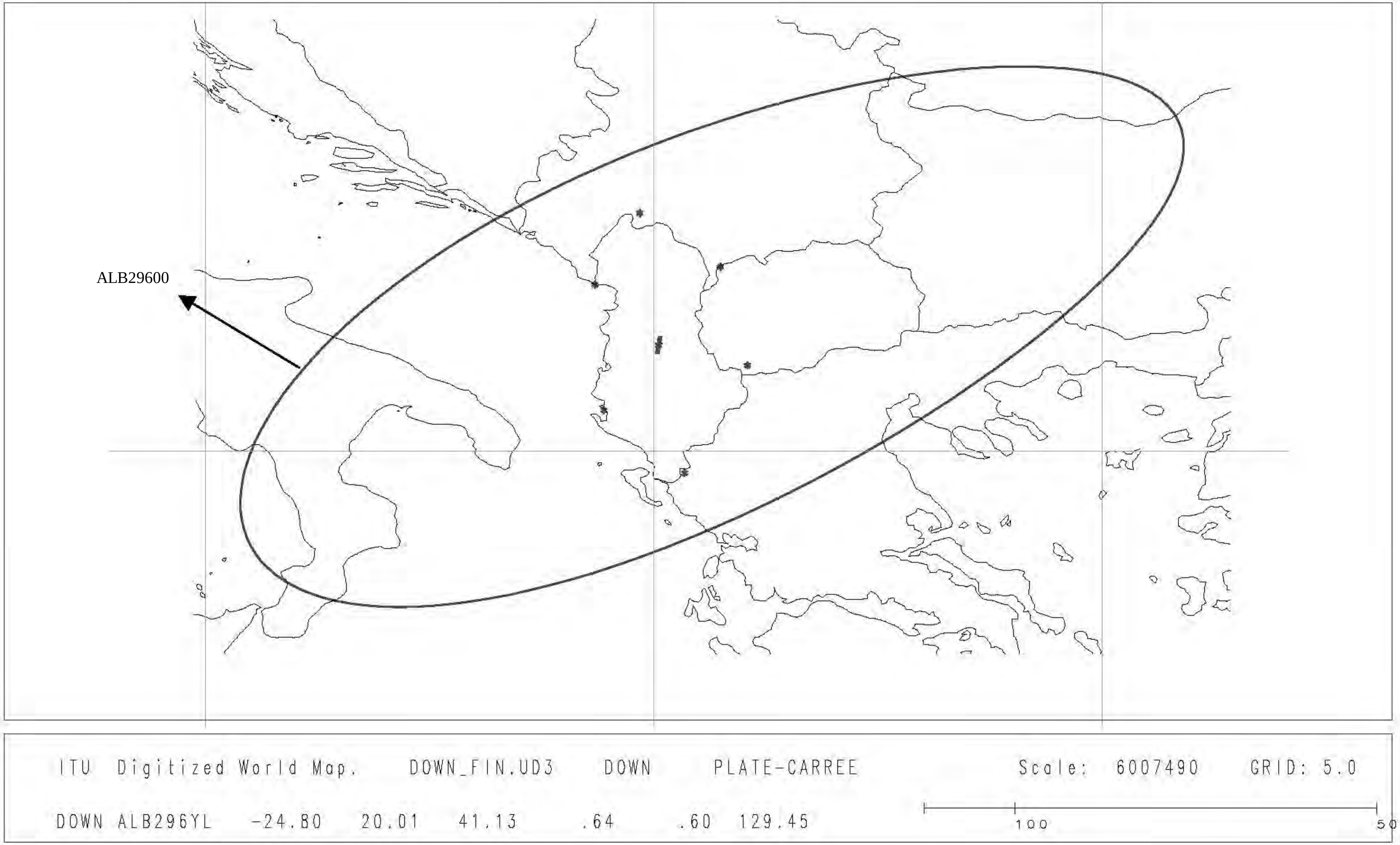
ANNEX 4

Beams that have been Re-calculated due to a change in Orbital Position

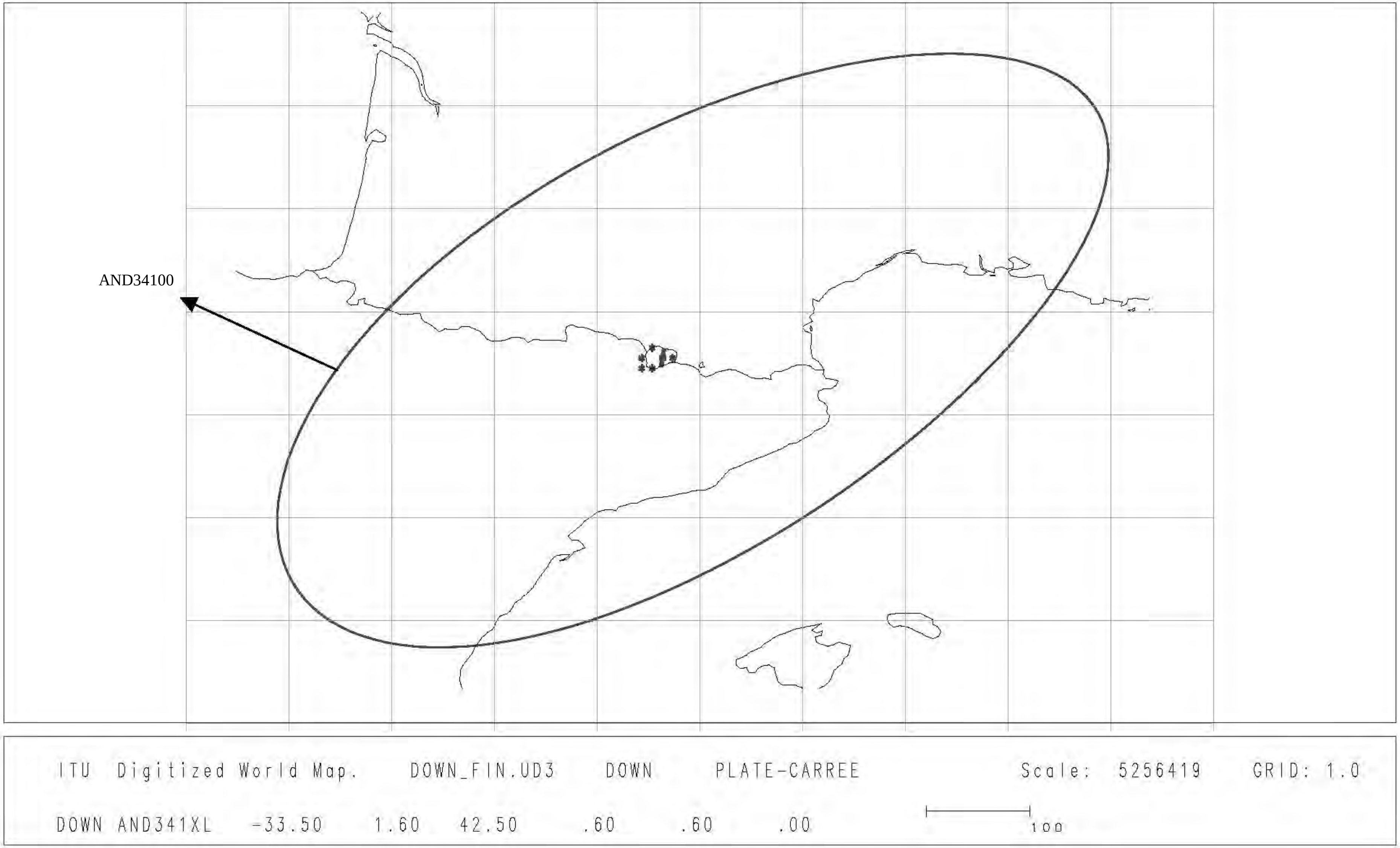
AGL (24.80 W)


AGL29500
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 18403406 GRID: 5.0
DOWN AGL295XL -24.80 16.50 -12.00 3.09 2.26 84.00
100
500
1000

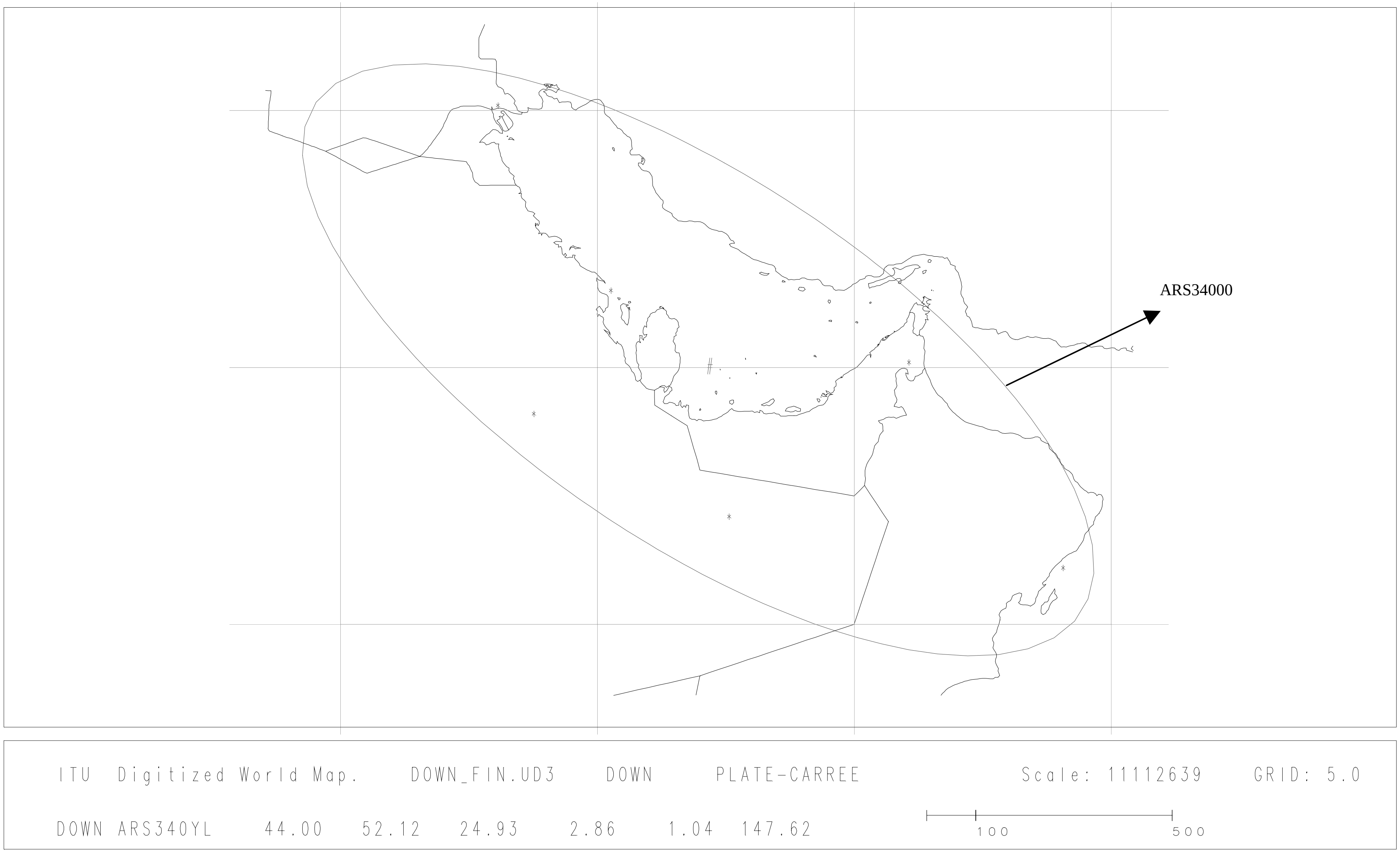
ALB (24.80 W)


ALB29600
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 6007490 GRID: 5.0
DOWN ALB296YL -24.80 20.01 41.13 .64 .60 129.45
100

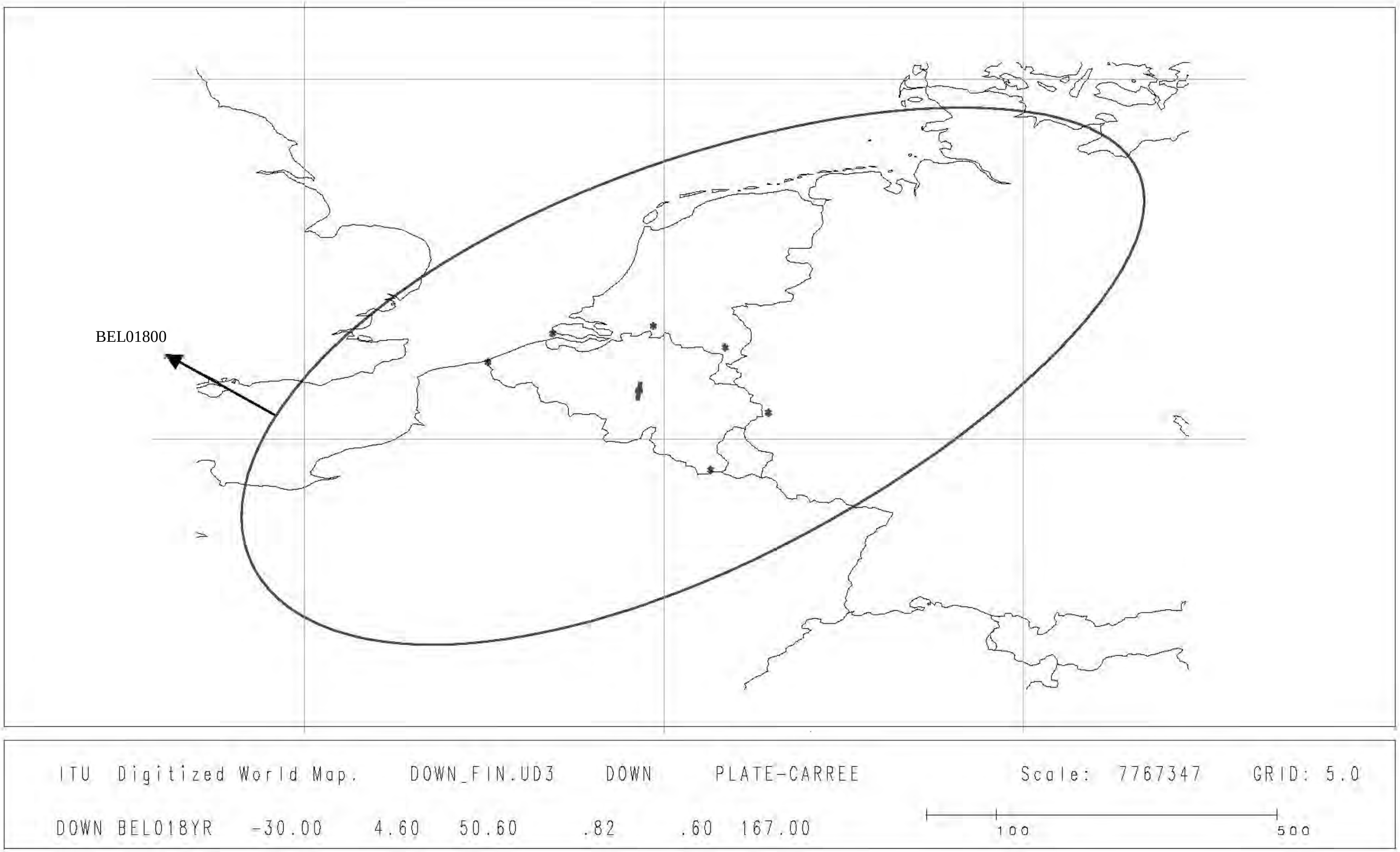
AND (33.50 W)


AND34100
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 5256419 GRID: 1.0
DOWN AND341XL -33.50 1.60 42.50 .60 .60 .00
100

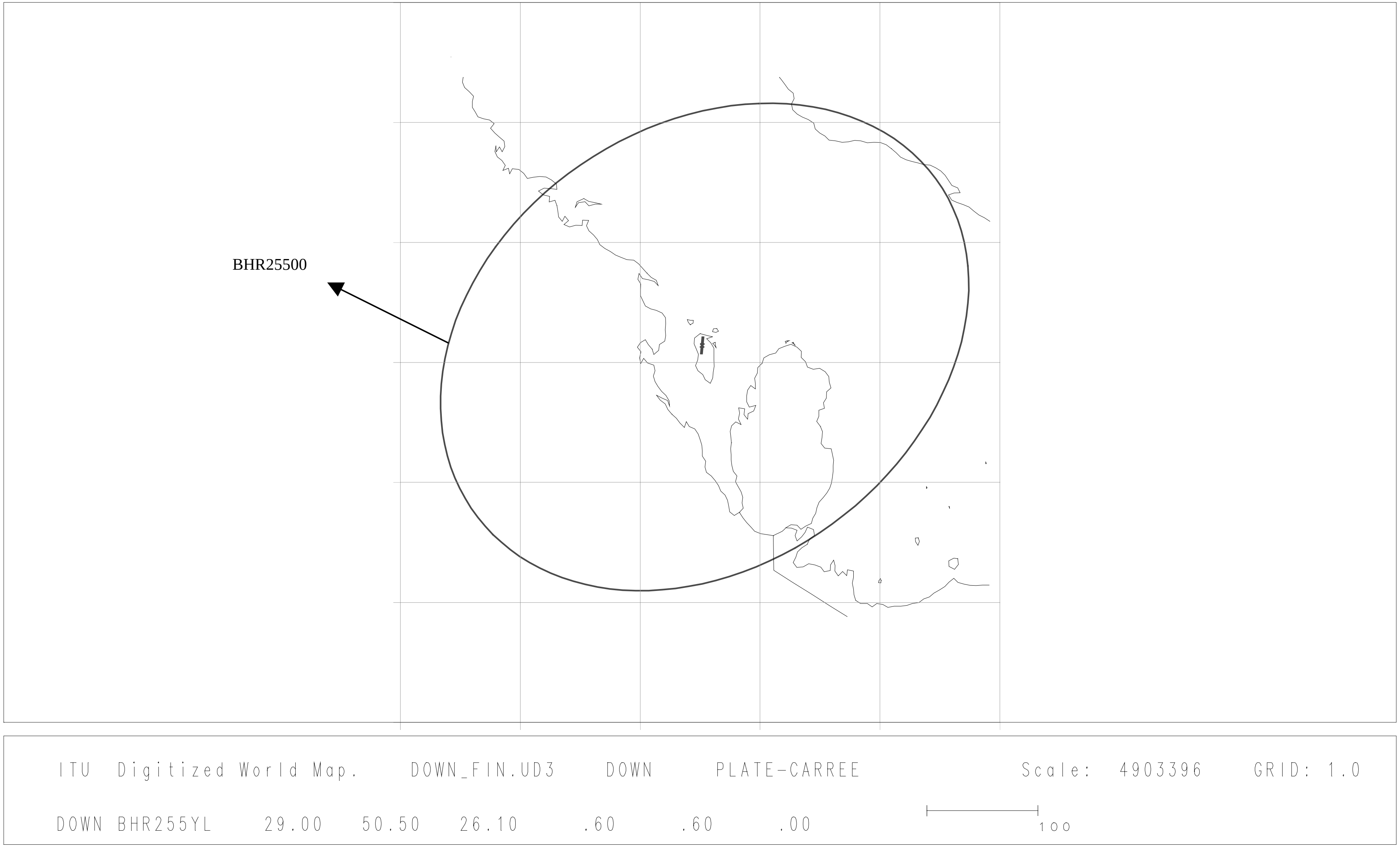
ARS (44.00 E)


ARS34000
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 11112639 GRID: 5.0
DOWN ARS340YL 44.00 52.12 24.93 2.86 1.04 147.62
100
500

BEL (30.00 W)


BEL01800
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 7767347 GRID: 5.0
DOWN BEL018YR -30.00 4.60 50.60 .82 .60 167.00
100
500

BHR (29.00 E)


BHR25500
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 4903396 GRID: 1.0
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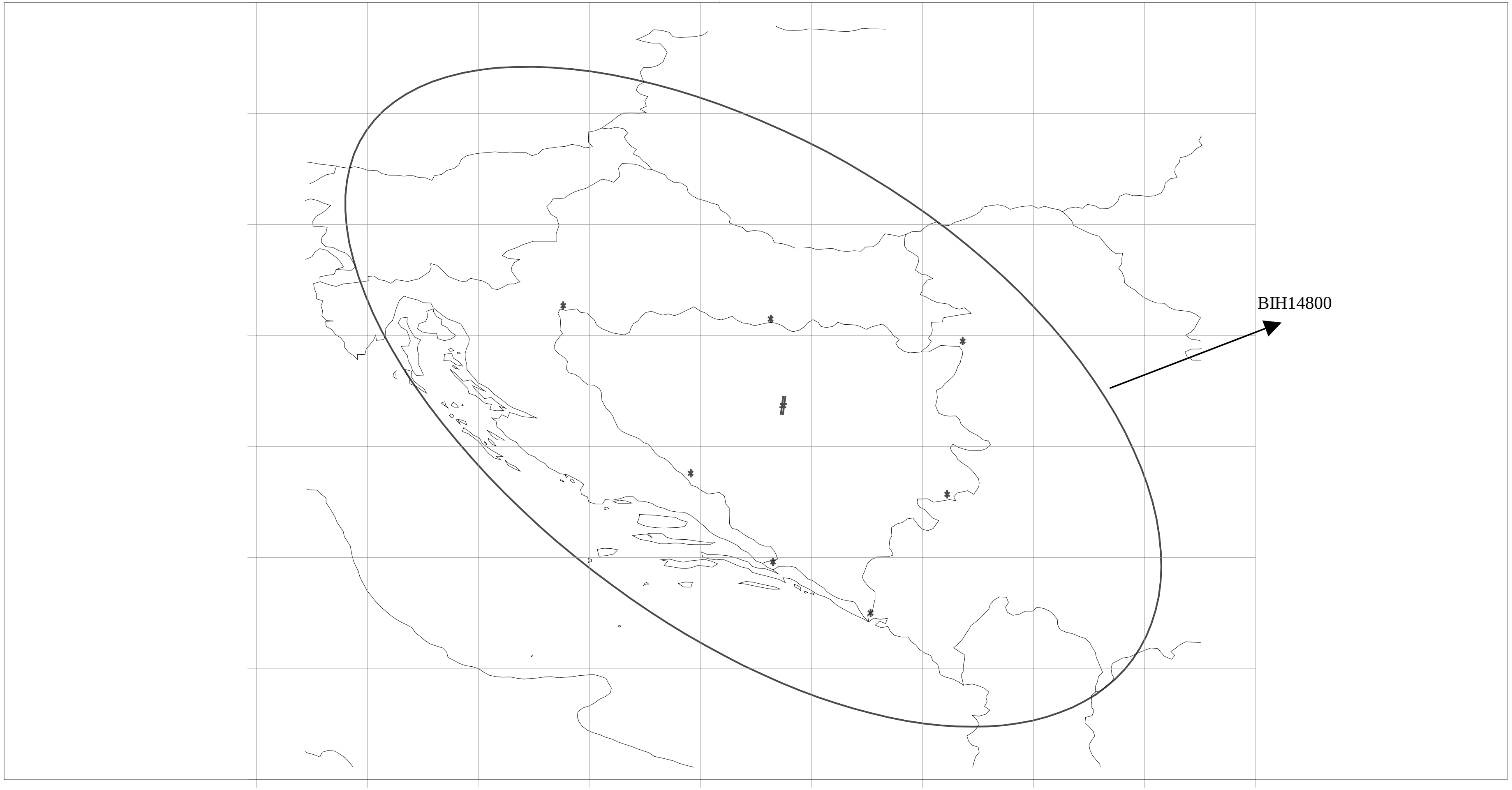
100

BIH (44.20 E)

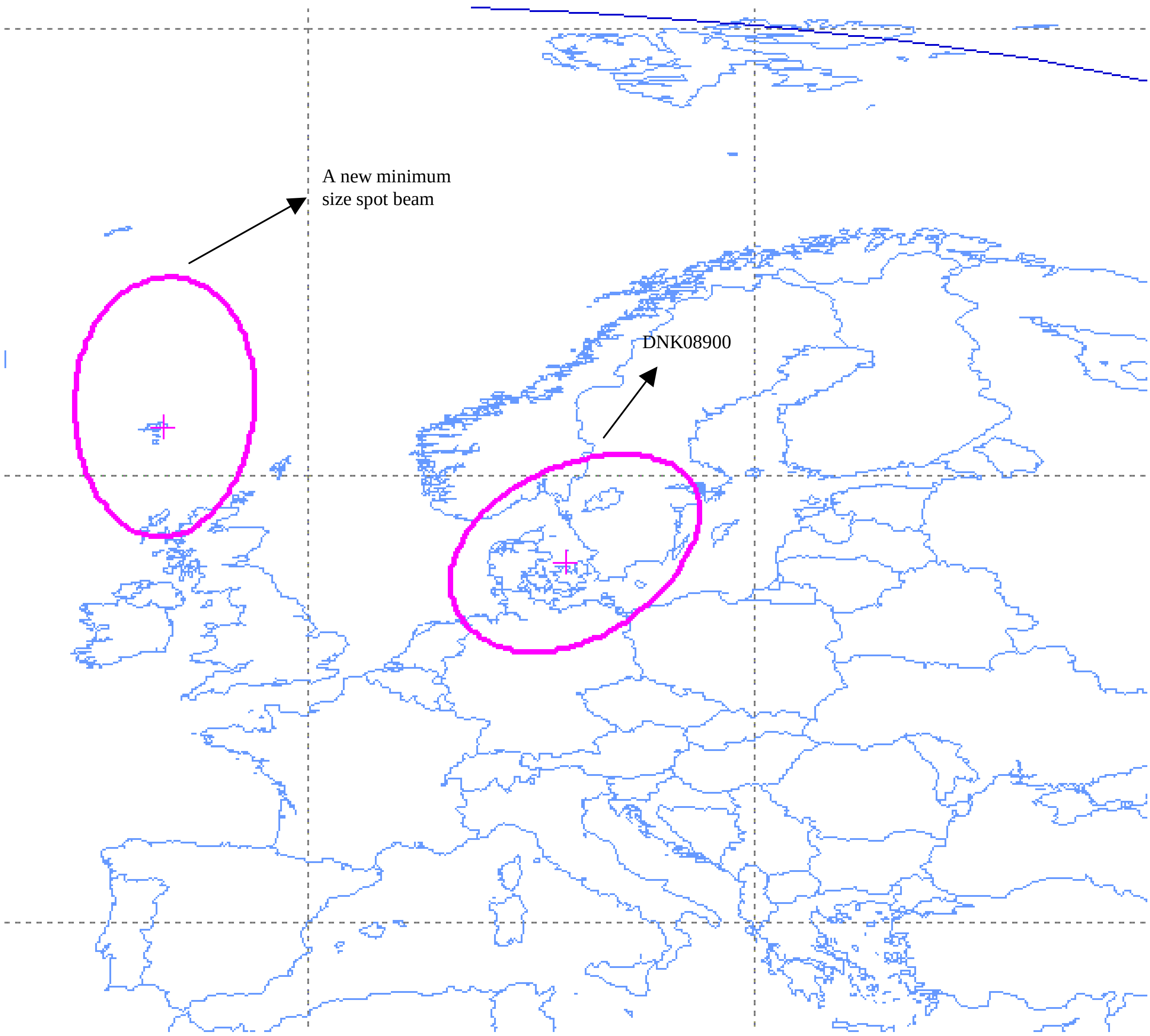


ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 5302755 GRID: 1.0

DOWN BIH148XR 44.20 17.71 44.32 .64 .60 161.69

100

DNK (7.20 W)



EST (43.80 E)

ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 9219271 GRID: 5.0

DOWN EST061YR 43.80 25.06 58.60 .77 .60 12.23

100 500

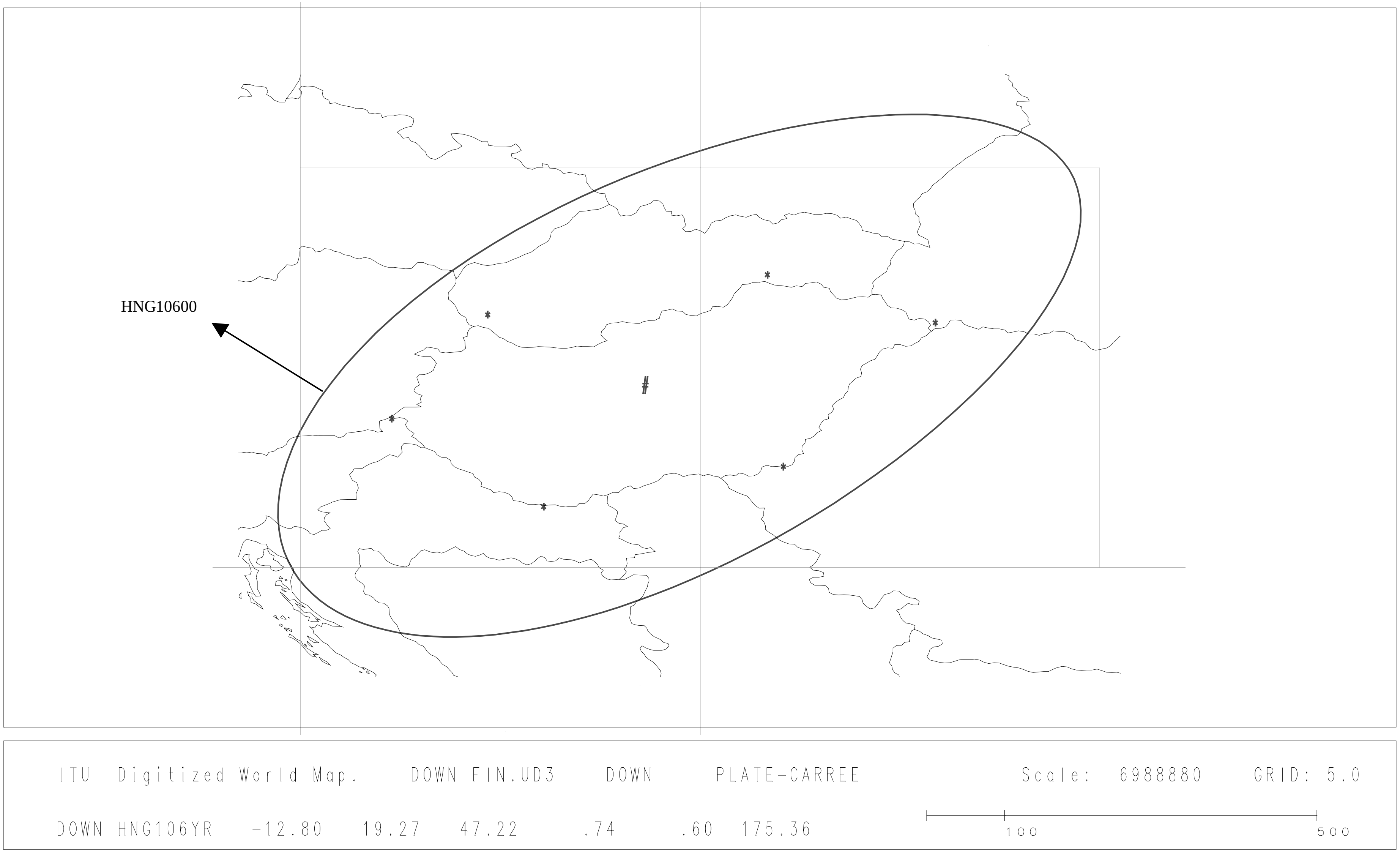
GRC (34.00 E)

ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 9042411 GRID: 5.0

DOWN GRC105XR 34.00 24.78 38.09 1.57 1.14 172.83

100 500

HNG (12.80 W)


HNG10600
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 6988880 GRID: 5.0
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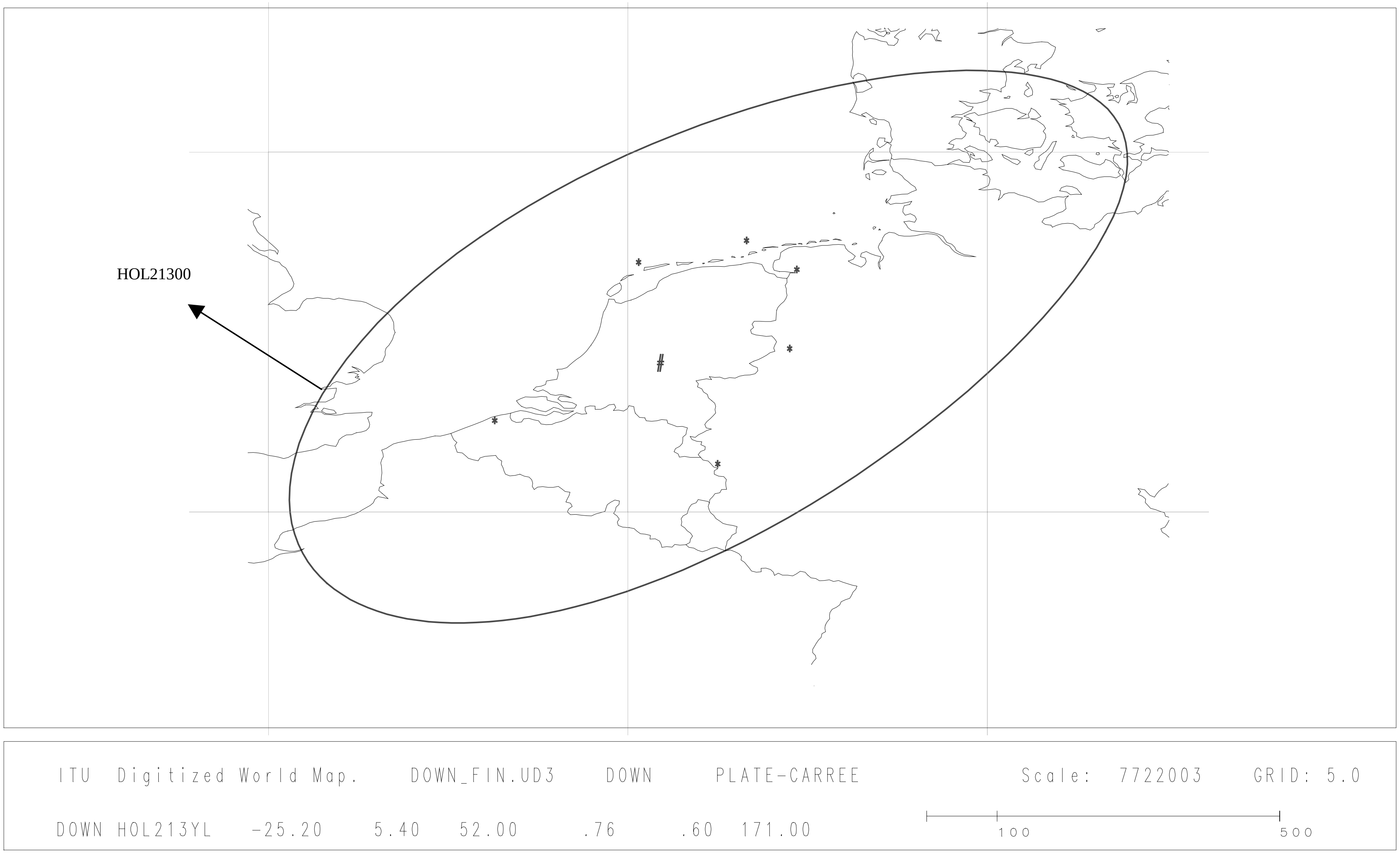
100
500

HOL (25.20 W)


HOL21300
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 7722003 GRID: 5.0
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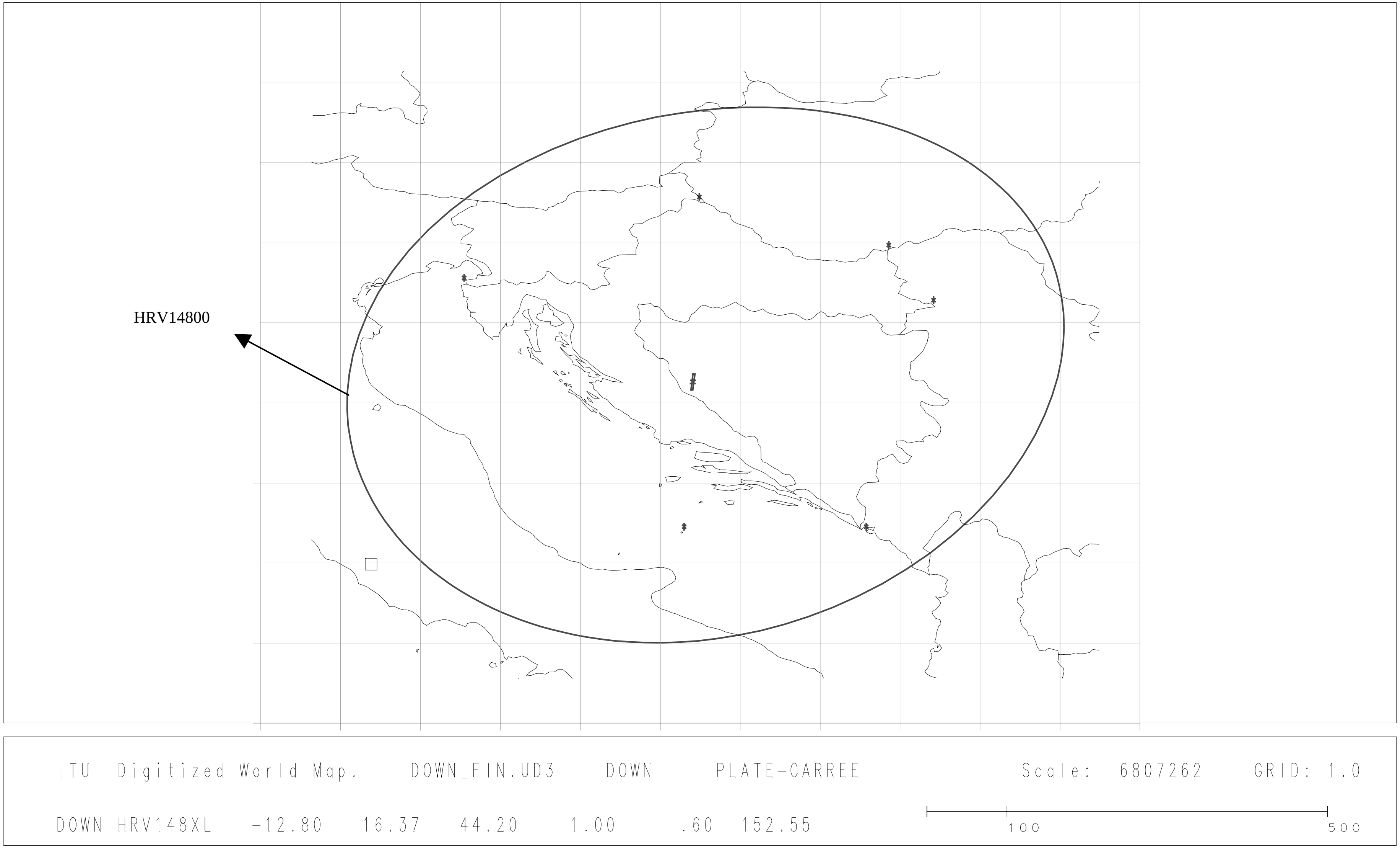
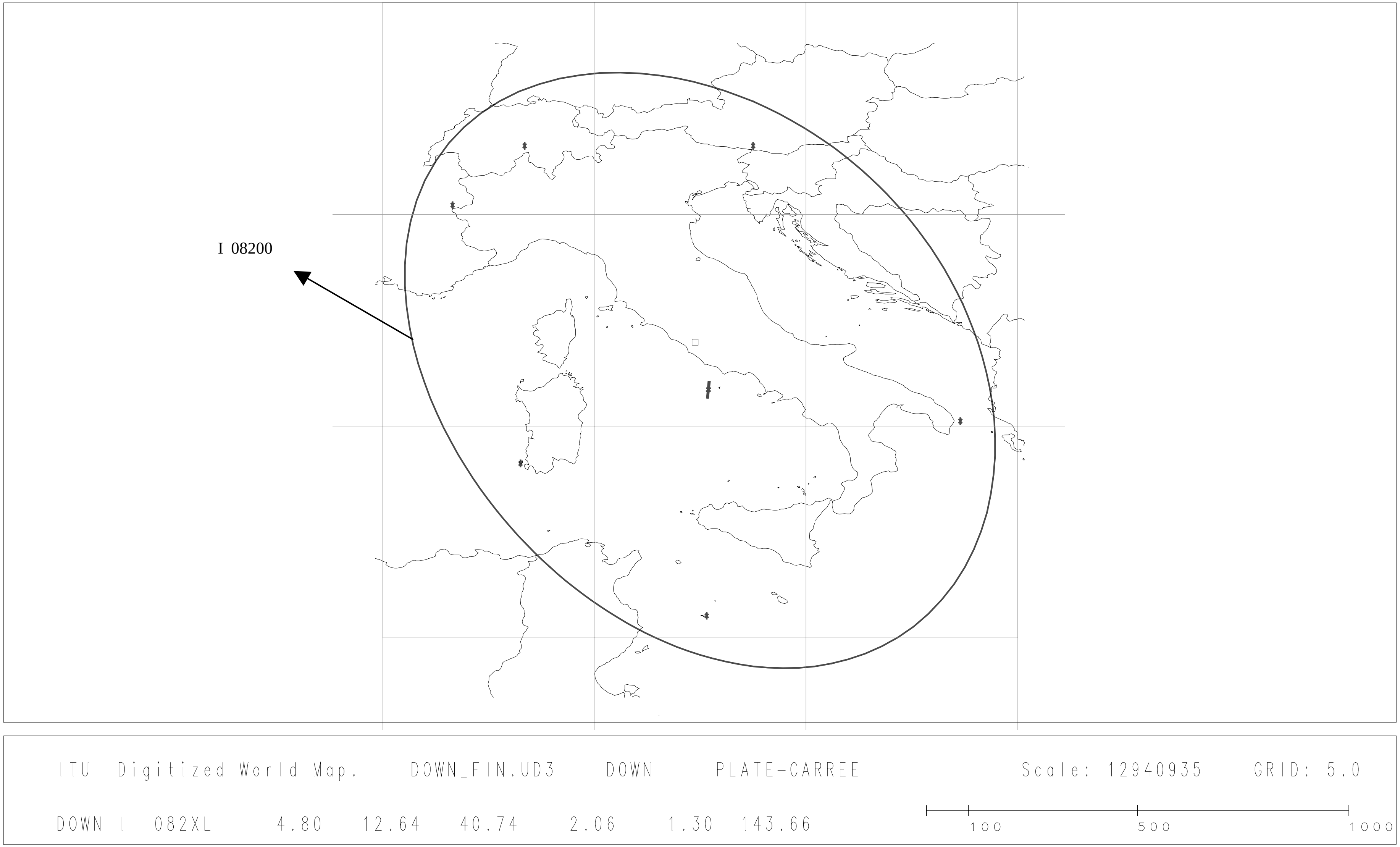
100
500

HRV (12.80 W)


HRV14800
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 6807262 GRID: 1.0
DOWN HRV148XL -12.80 16.37 44.20 1.00 .60 152.55
100
500

I (4.80 E)

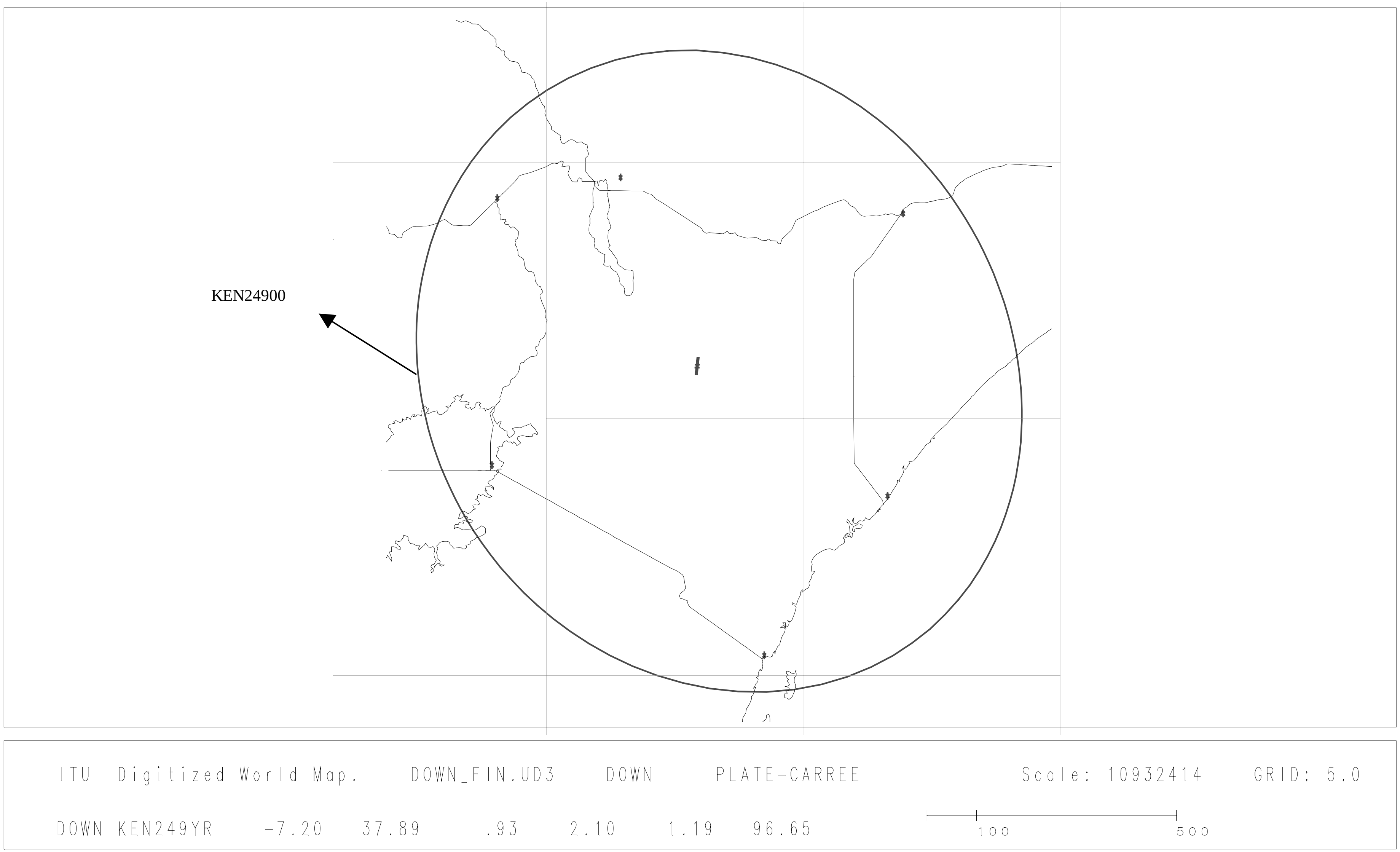

I 08200
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 12940935 GRID: 5.0
DOWN I 082XL 4.80 12.64 40.74 2.06 1.30 143.66
100
500
1000

IRQ (1.20 W)

ITU Digitized World Map.	DOWN_FIN.UD3	DOWN	PLATE-CARREE		Scale: 10234738	GRID: 5.0
DOWN IRQ256YL	-1.20	43.60	33.32	1.76	.79	139.02

100 500

KEN (7.20 W)


KEN24900
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 10932414 GRID: 5.0
DOWN KEN249YR -7.20 37.89 .93 2.10 1.19 96.65
100
500

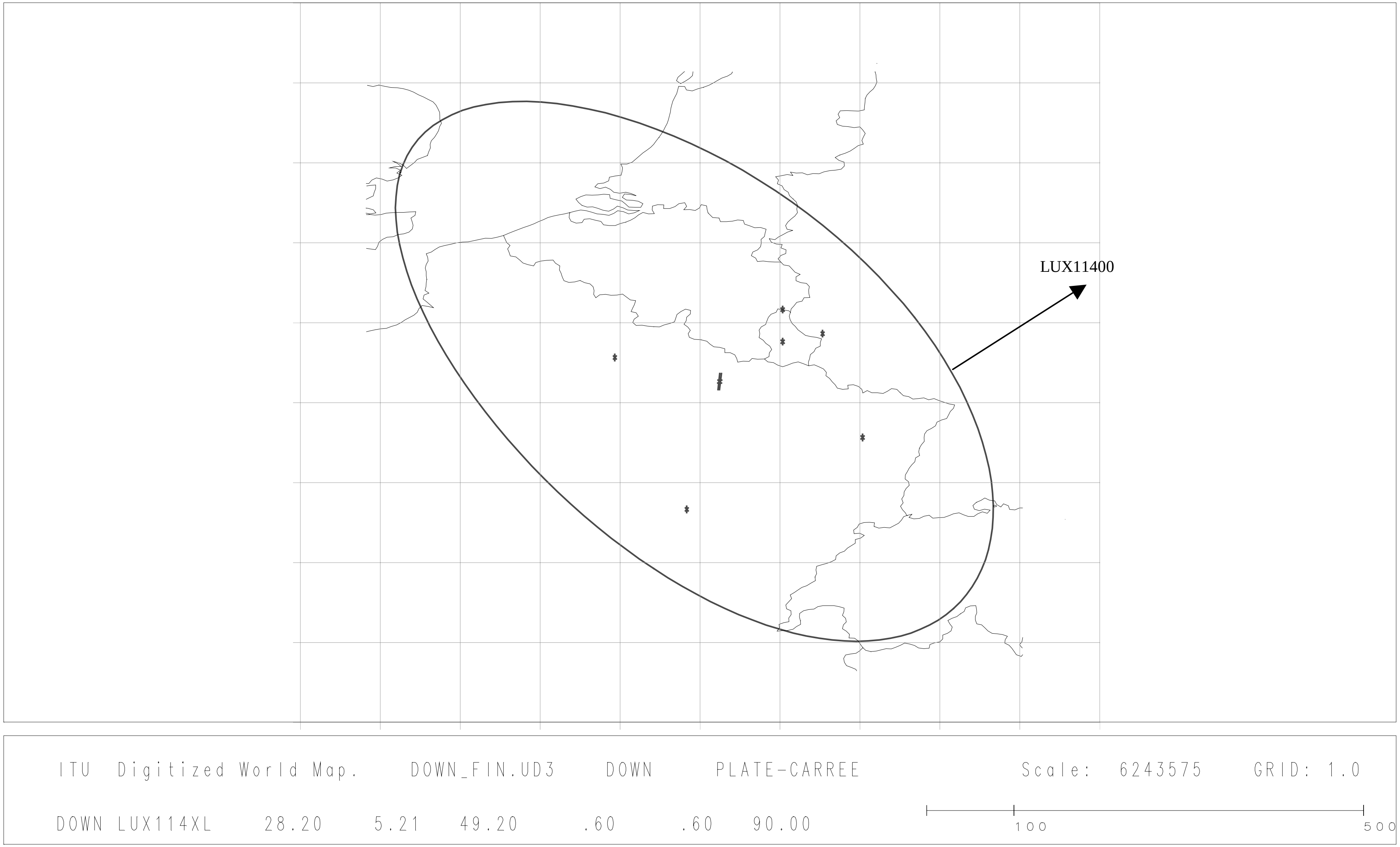
KRE (140.00 E)

ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 7063150 GRID: 5.0

DOWN KRE286YL 140.00 128.45 40.32 1.63 .68 18.89

100 500

LUX (28.20 E)


LUX11400
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 6243575 GRID: 1.0
DOWN LUX114XL 28.20 5.21 49.20 .60 .60 90.00
100
500

LVA (50.00 E)

ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 8762897 GRID: 5.0

DOWN LVA061YL 50.00 24.18 56.80 .79 .60 13.57

100 500

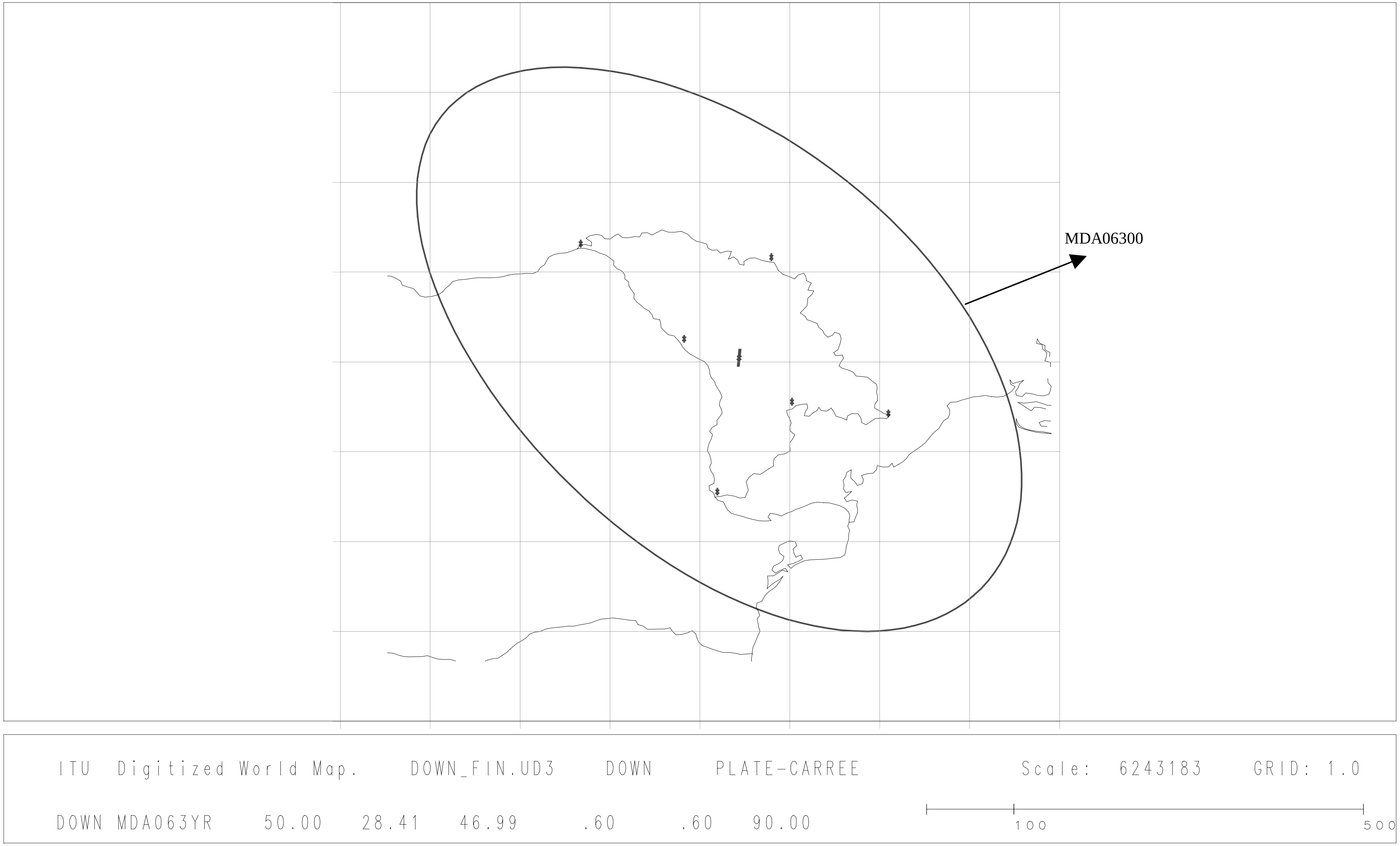
MCO (7.20 W)

ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 6195417 GRID: 5.0

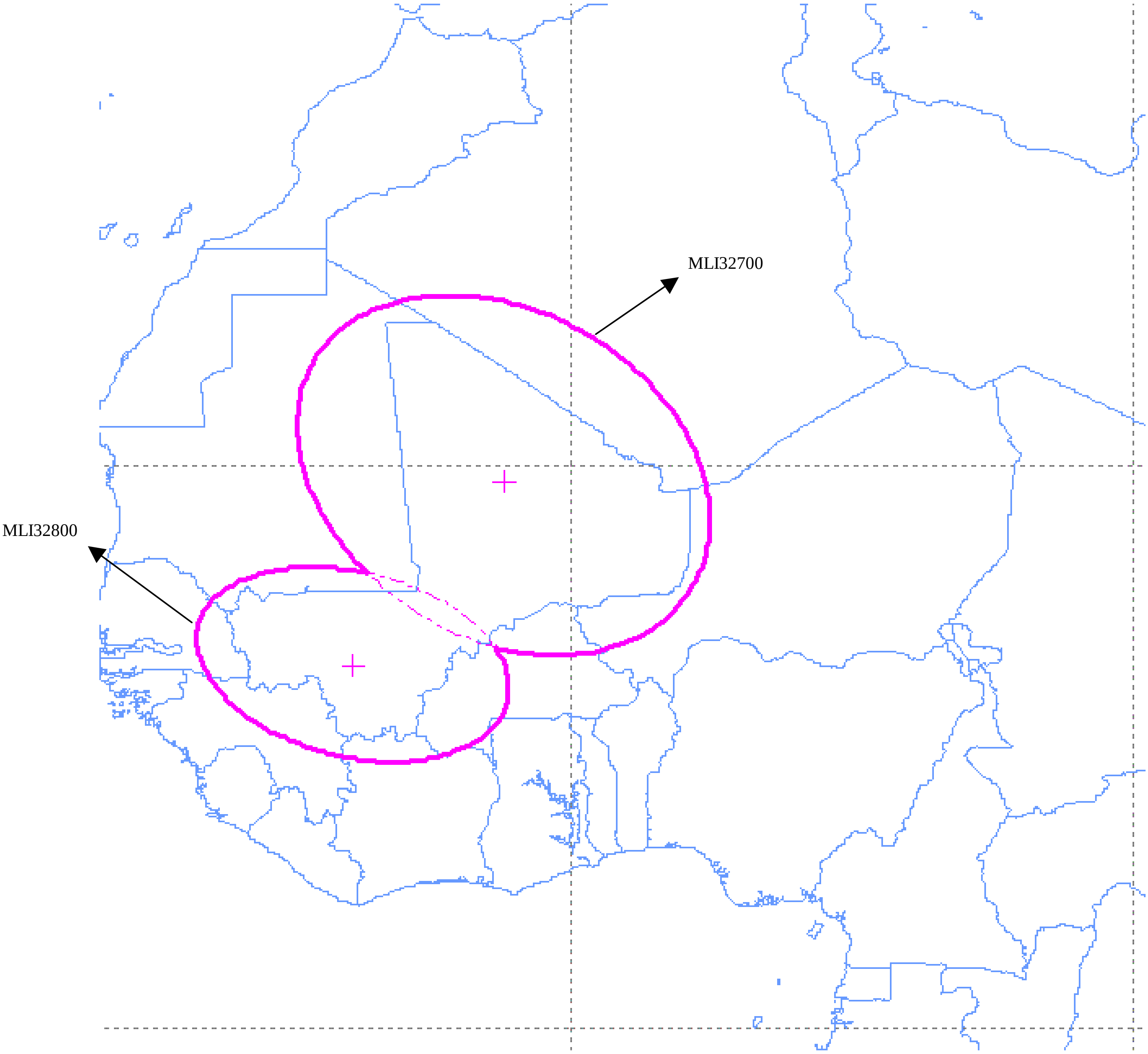
DOWN MCO116XL -7.20 7.82 43.65 1.09 .60 19.87

100 500

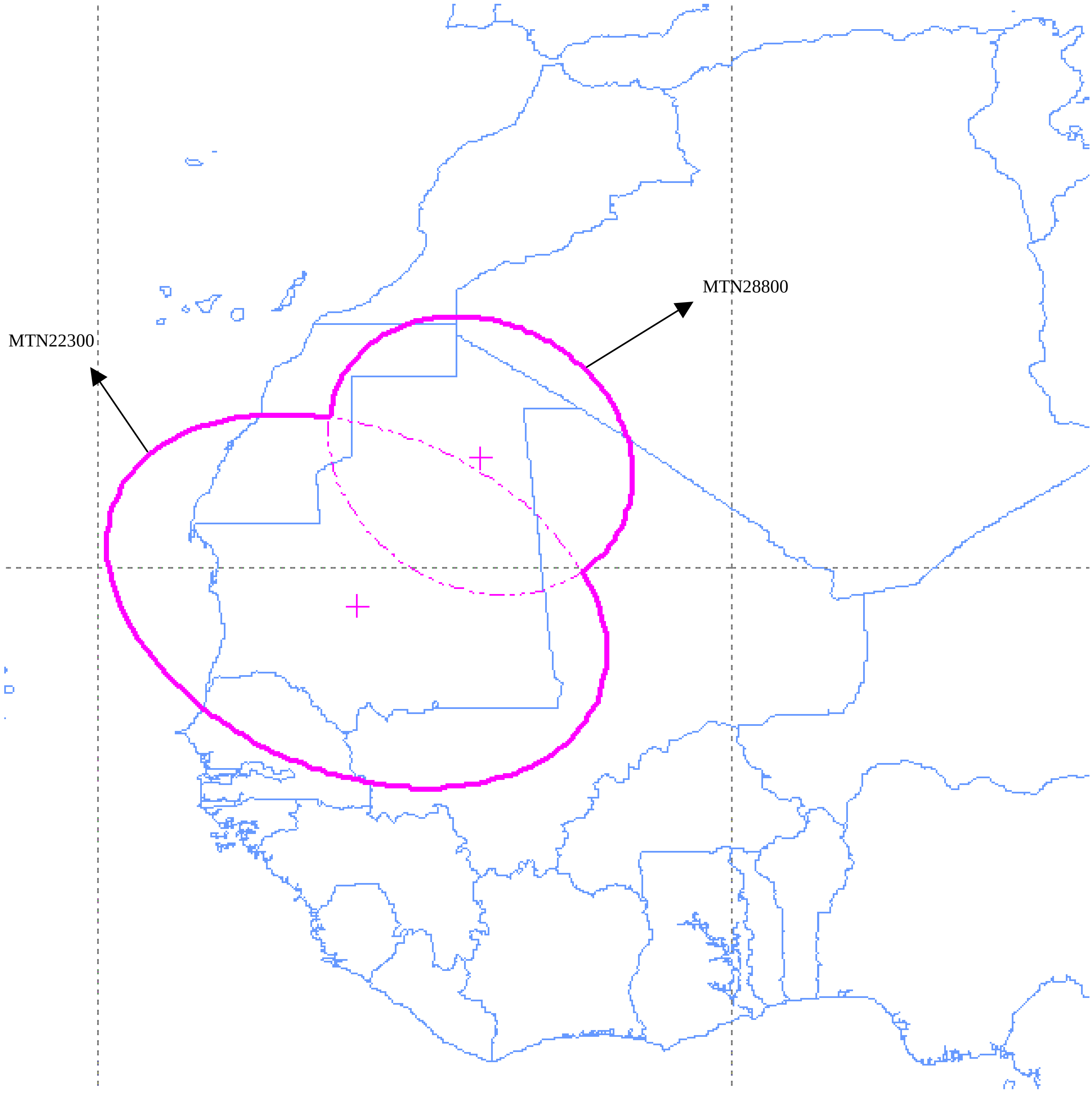
MDA (50.00 E)


MDA06300
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 6243183 GRID: 1.0
DOWN MDA063YR 50.00 28.41 46.99 .60 .60 90.00
100
500

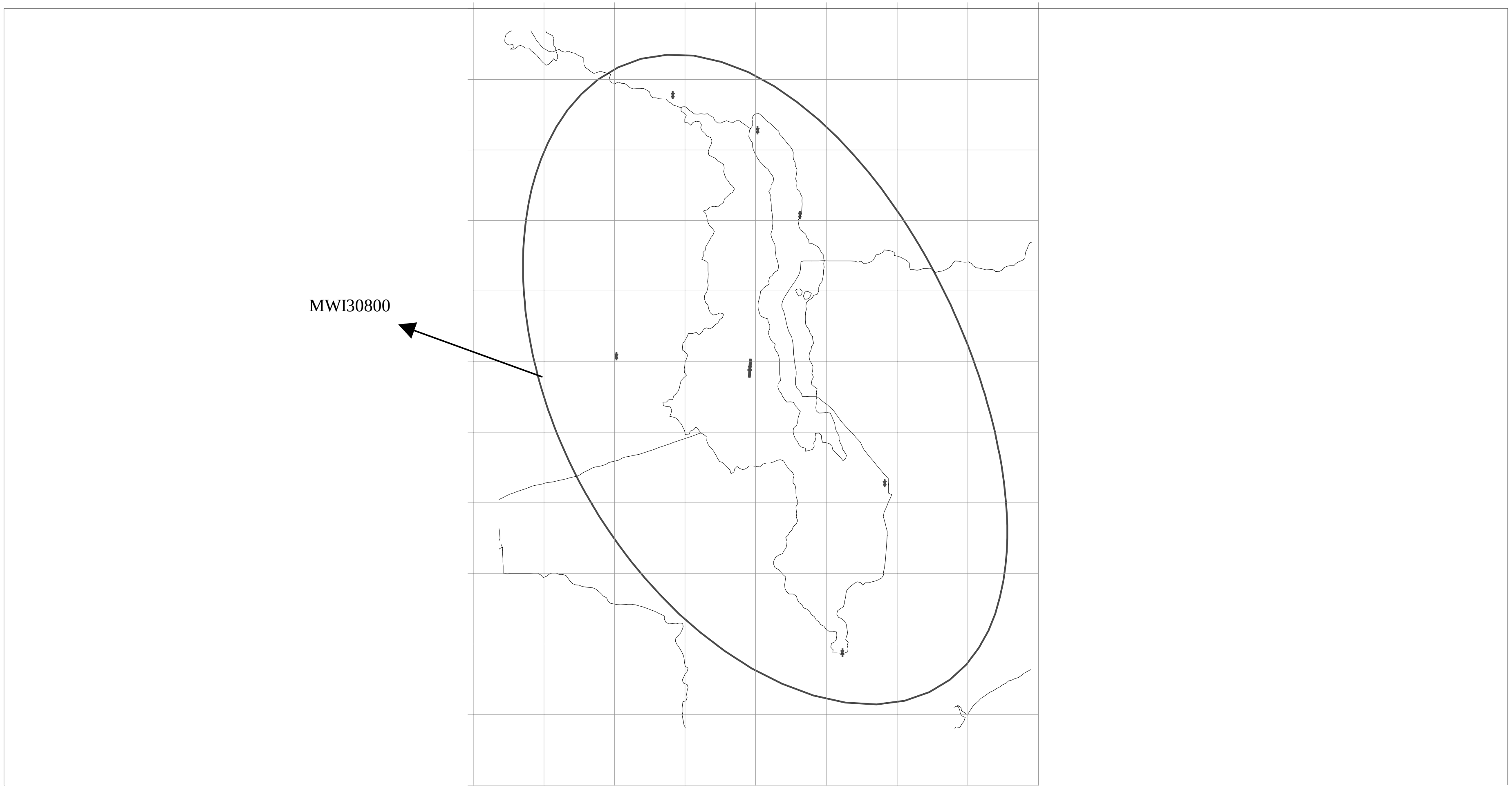
MLI (7.20 W)



MTN (19.20 W)

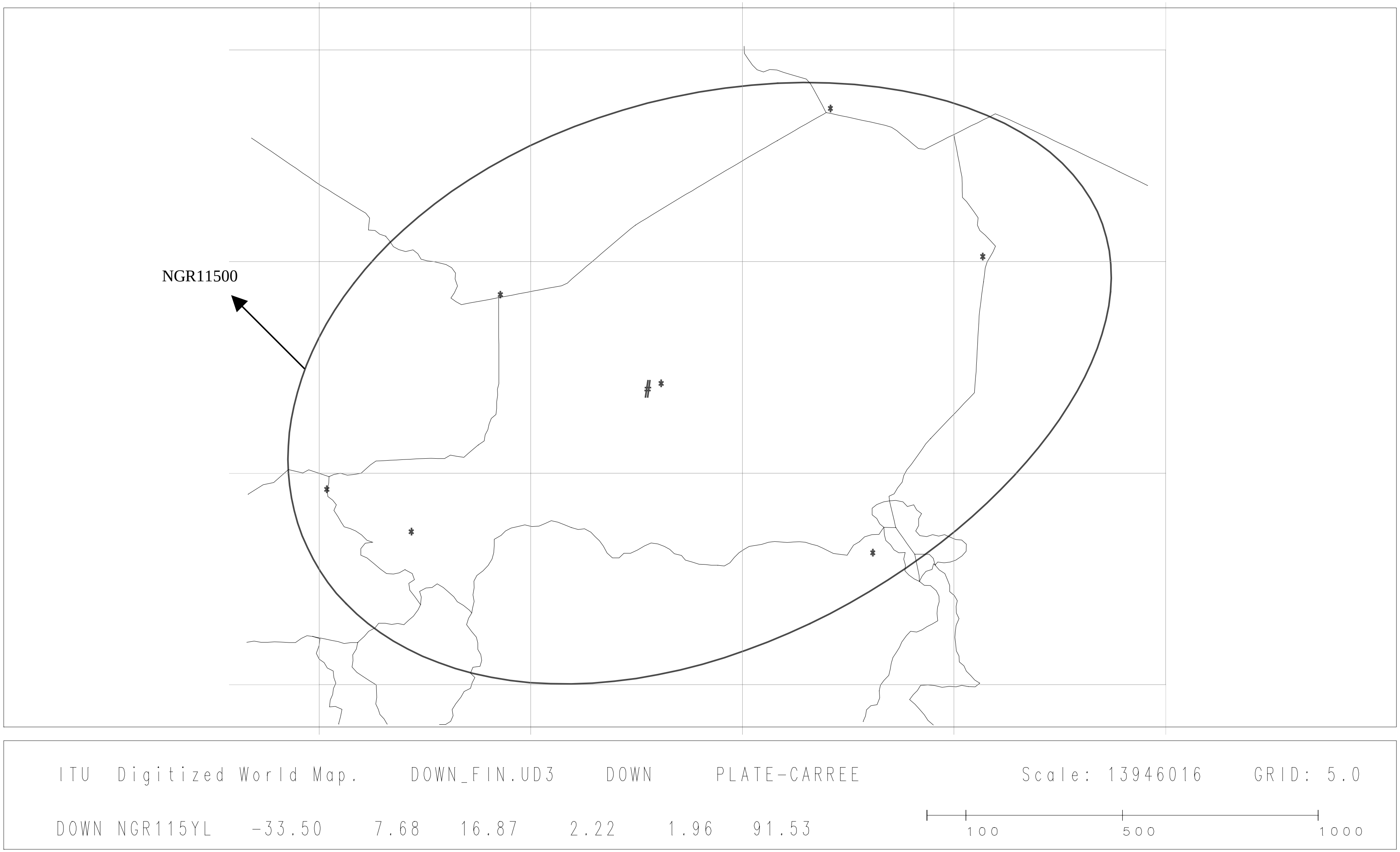


MWI (12.80 W)

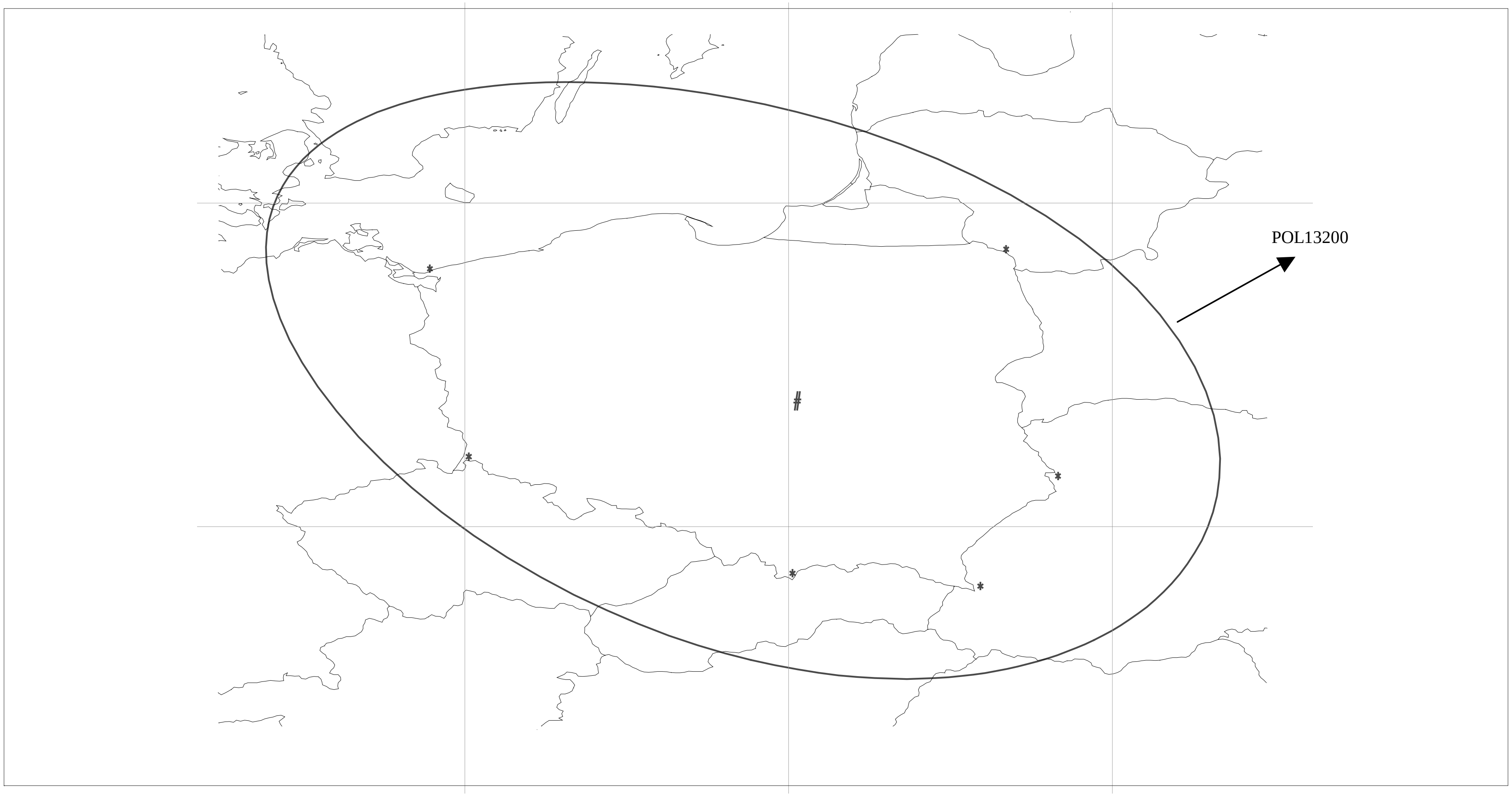


ITU Digitized World Map.	DOWN_FIN.UD3	DOWN	PLATE-CARREE			Scale: 8744393		GRID: 1.0
DOWN MWI308YL	-12.80	33.89	-13.17	1.47	.60	88.52	100	500

NGR (33.50 W)


NGR11500
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 13946016 GRID: 5.0
DOWN NGR115YL -33.50 7.68 16.87 2.22 1.96 91.53
100
500
1000

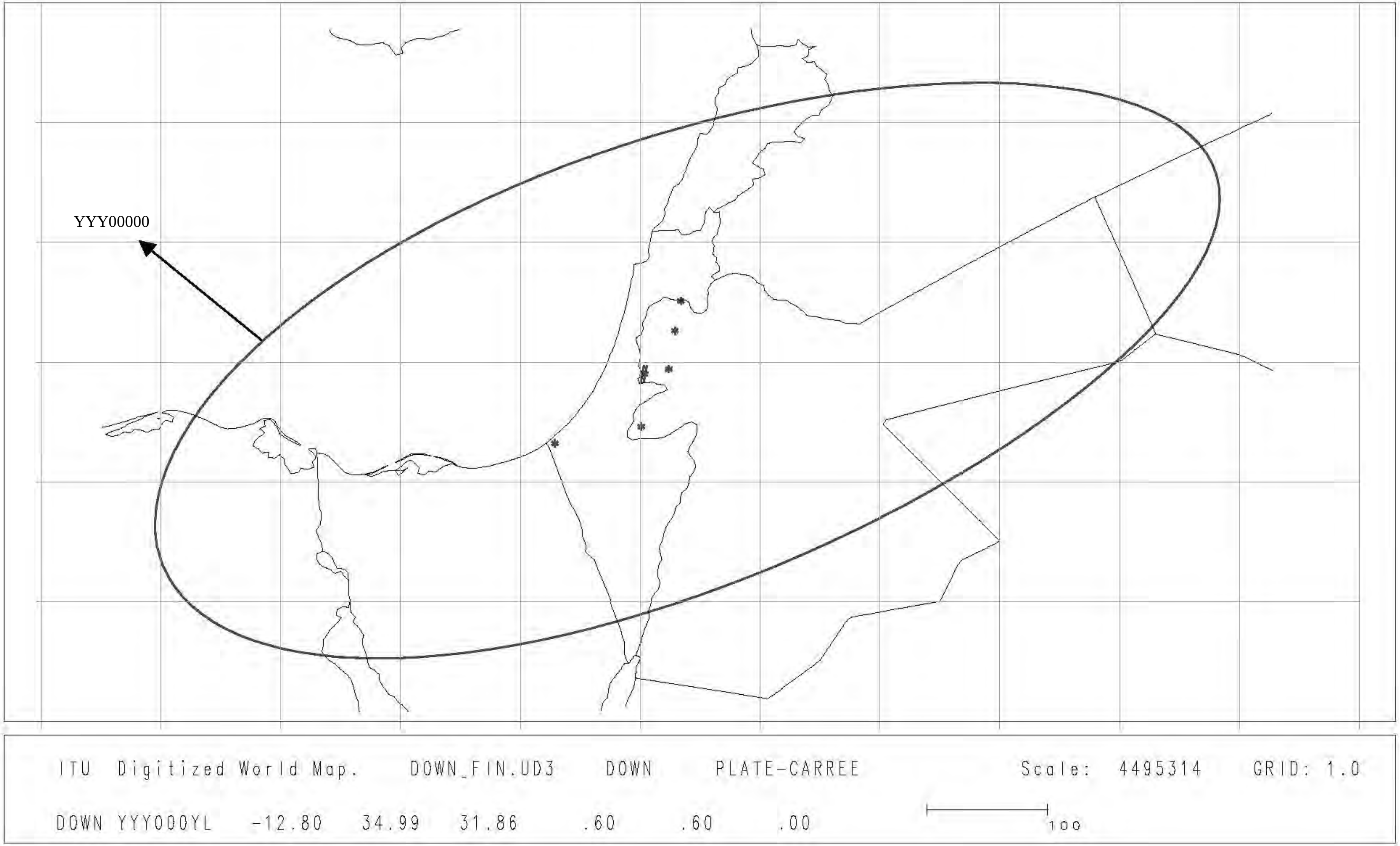
POL (50.00 E)



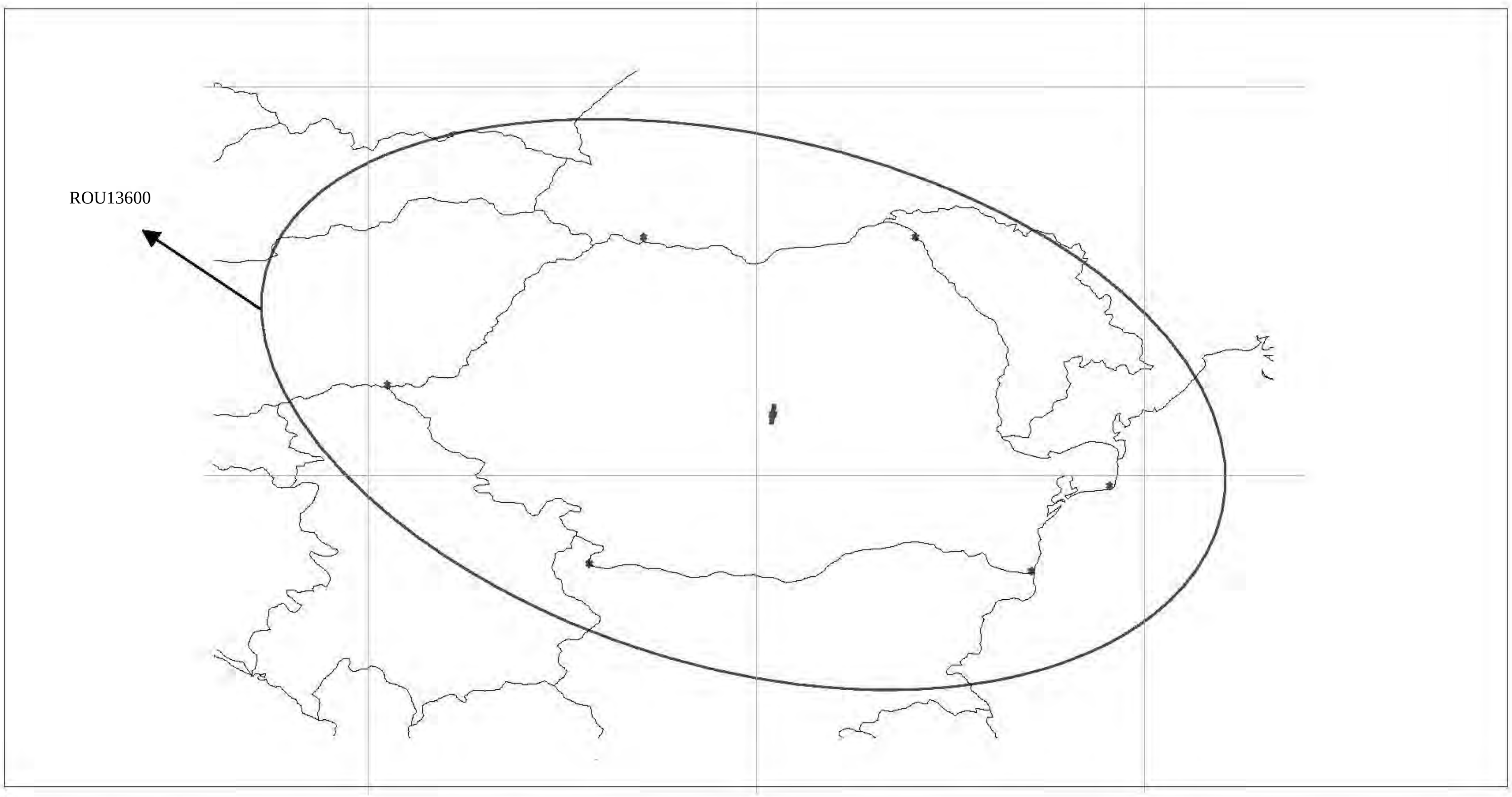
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 9647714 GRID: 5.0

DOWN POL132YL 50.00 20.07 51.86 1.20 .69 17.76 100 500

PSE (12.80 W)

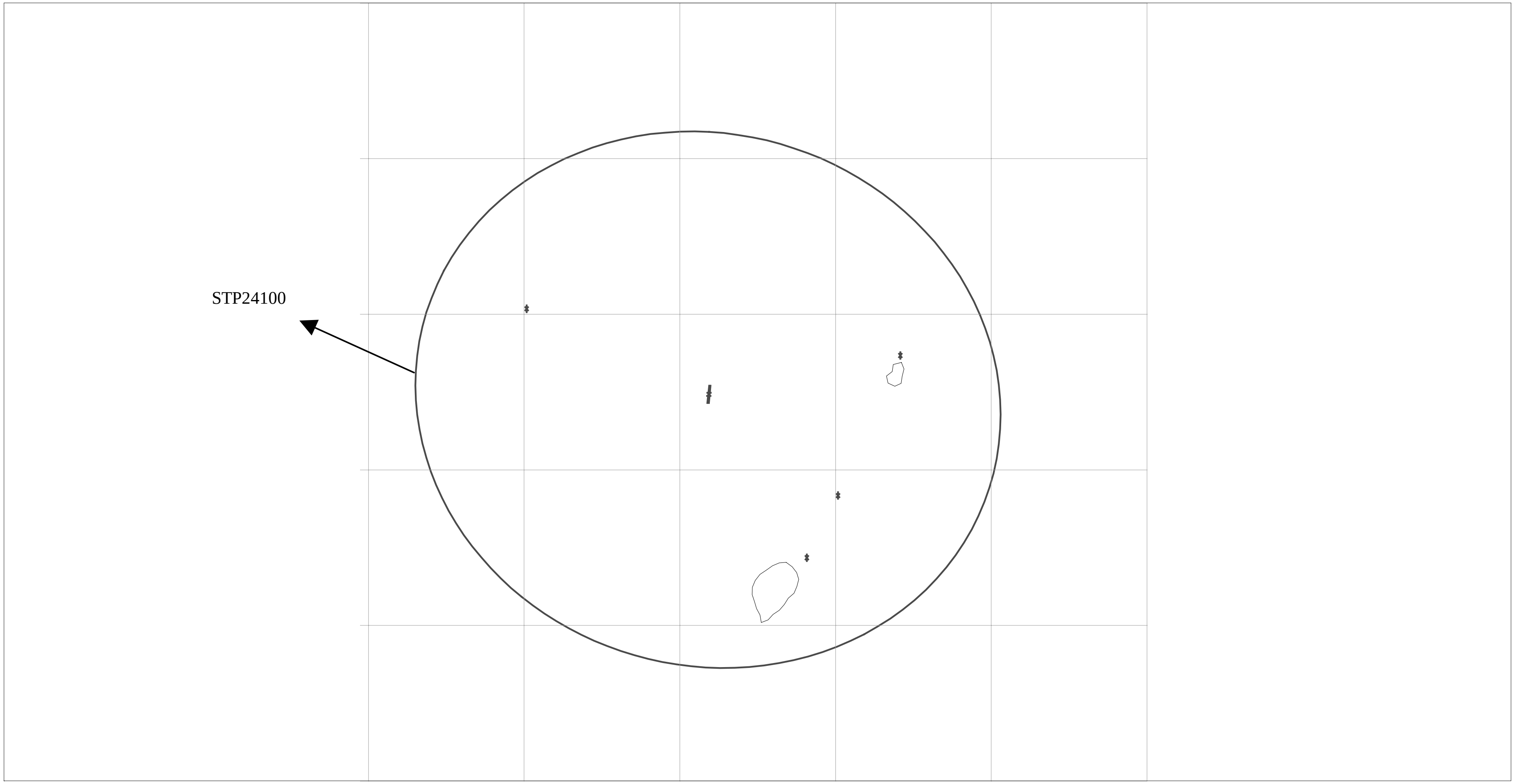

YYY00000
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 4495314 GRID: 1.0
DOWN YYY000YL -12.80 34.99 31.86 .60 .60 .00
100

ROU (43.80 E)



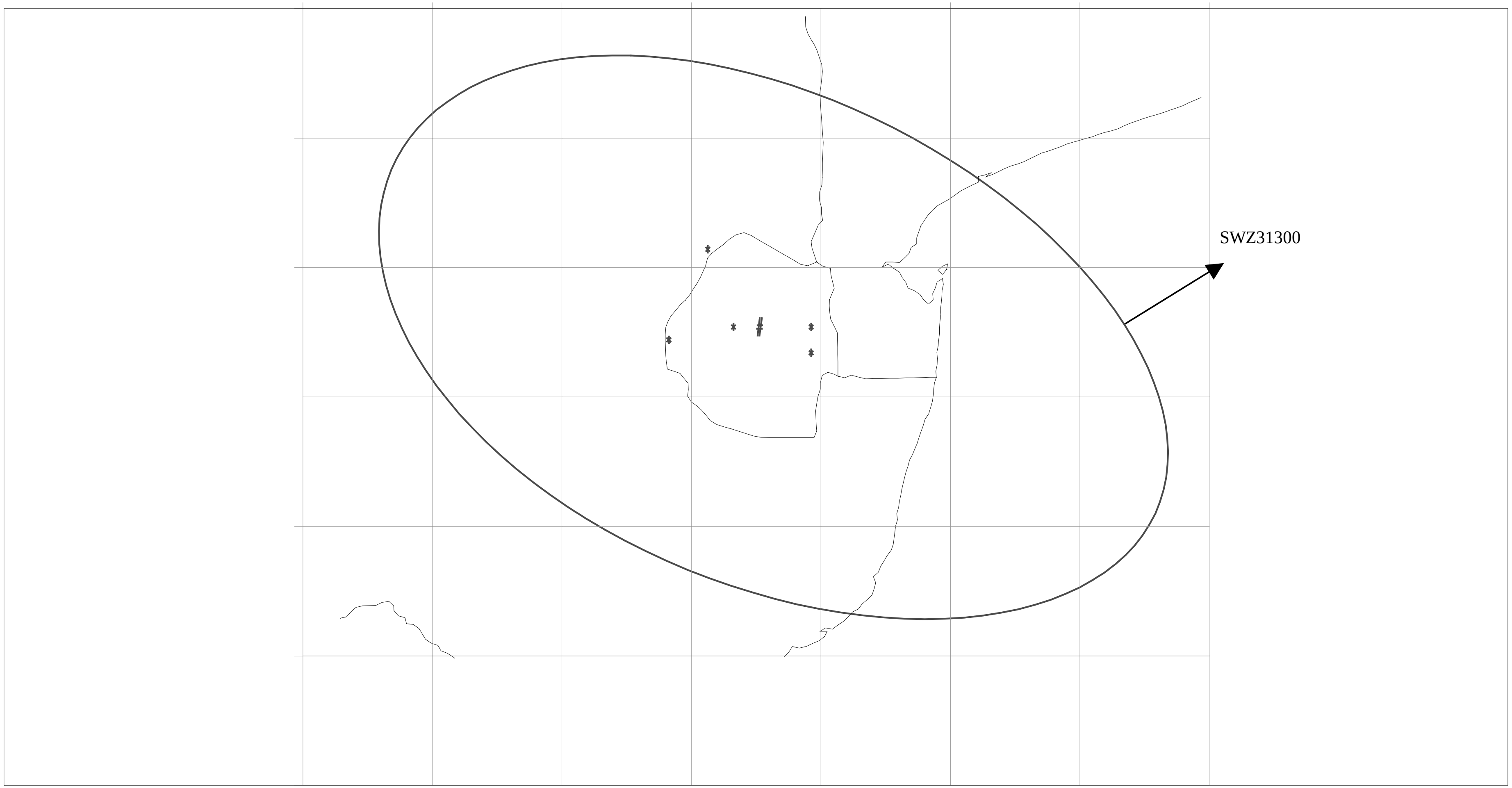
ITU Digitized World Map.	DOWN_FIN.UD3	DOWN	PLATE-CARREE		Scale: 8225680	GRID: 5.0	
DOWN ROU136YR	43.80	25.16	45.72	1.28	.73	.68	100 500

STP (7.20 W)



ITU Digitized World Map.	DOWN_FIN.UD3	DOWN	PLATE-CARREE		Scale: 3487014	GRID: 1.0	
DOWN STP241YL	-7.20	6.17	1.45	.65	.60	153.51	100

SWZ (7.20 W)



ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 4846790 GRID: 1.0

DOWN SWZ313YR -7.20 31.50 -26.50 .62 .60 66.00 100

SYR (43.80 E)

ITU Digitized World Map.	DOWN_FIN.UD3	DOWN	PLATE-CARREE		Scale: 6578715	GRID: 1.0	
DOWN SYR339XL	43.80	38.34	35.27	1.39	.72	31.74	100 500

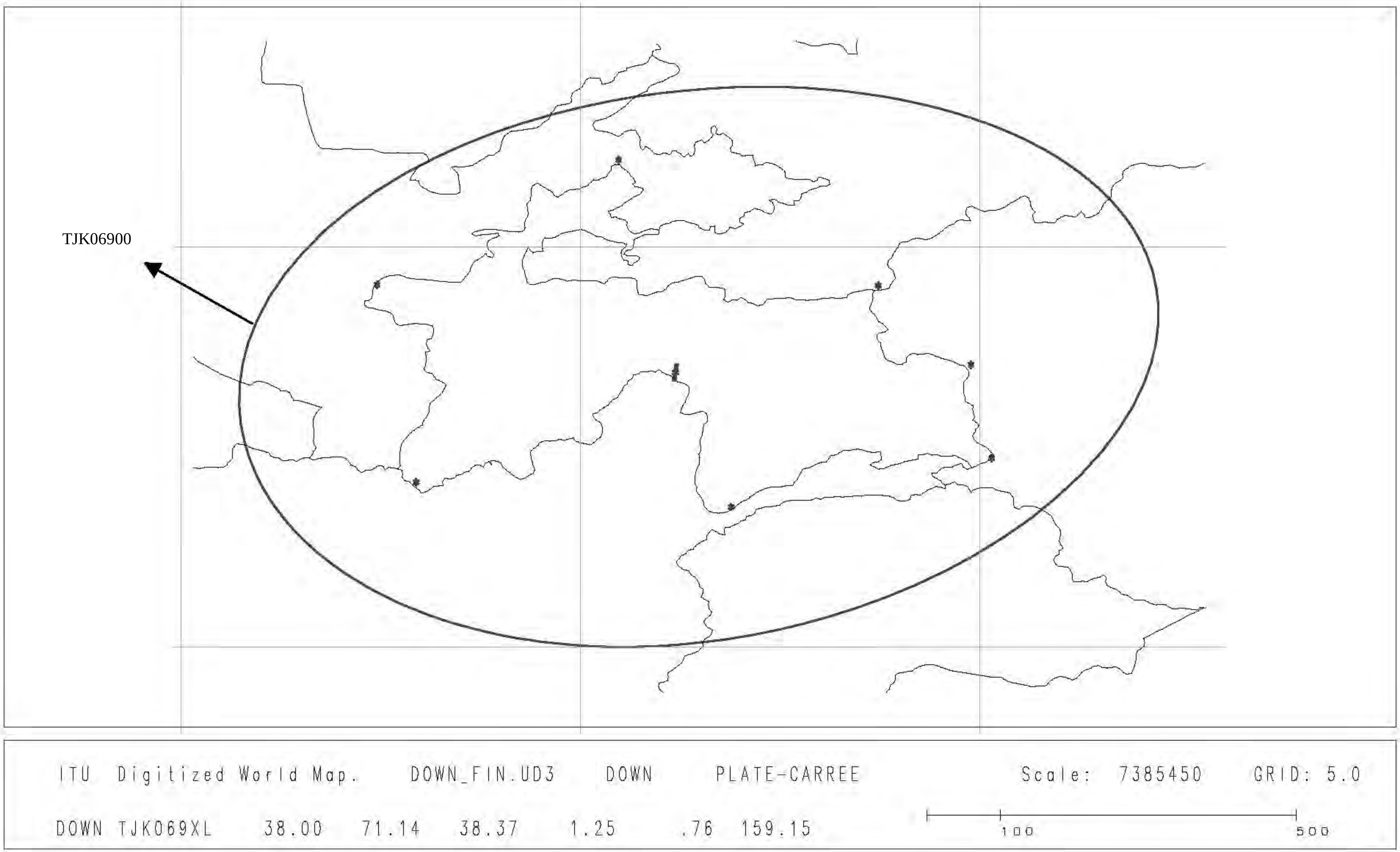
TCD (24.80 W)

ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 17202310 GRID: 5.0

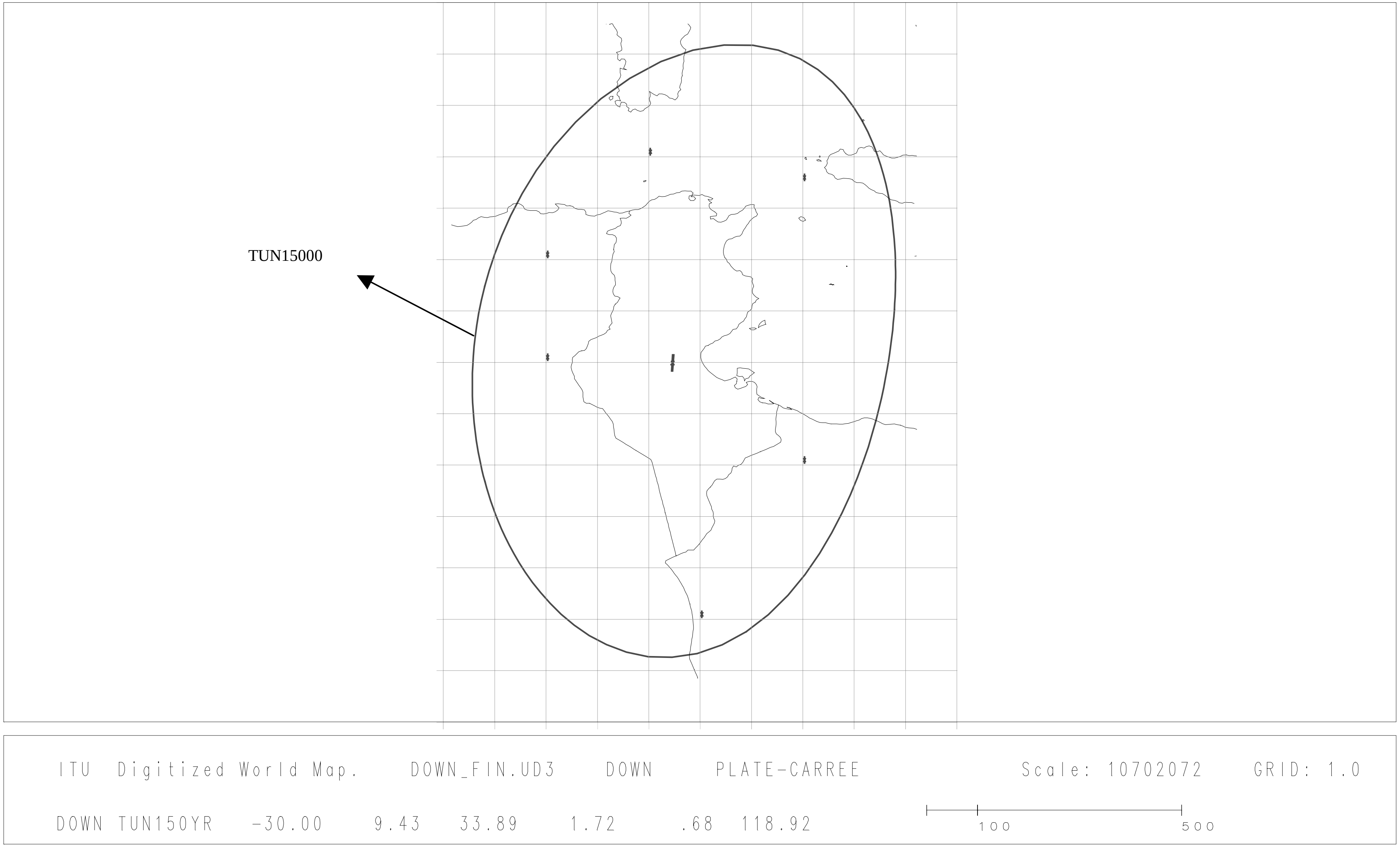
DOWN TCD143XR -24.80 17.77 15.53 3.07 1.36 102.16

100 500 1000

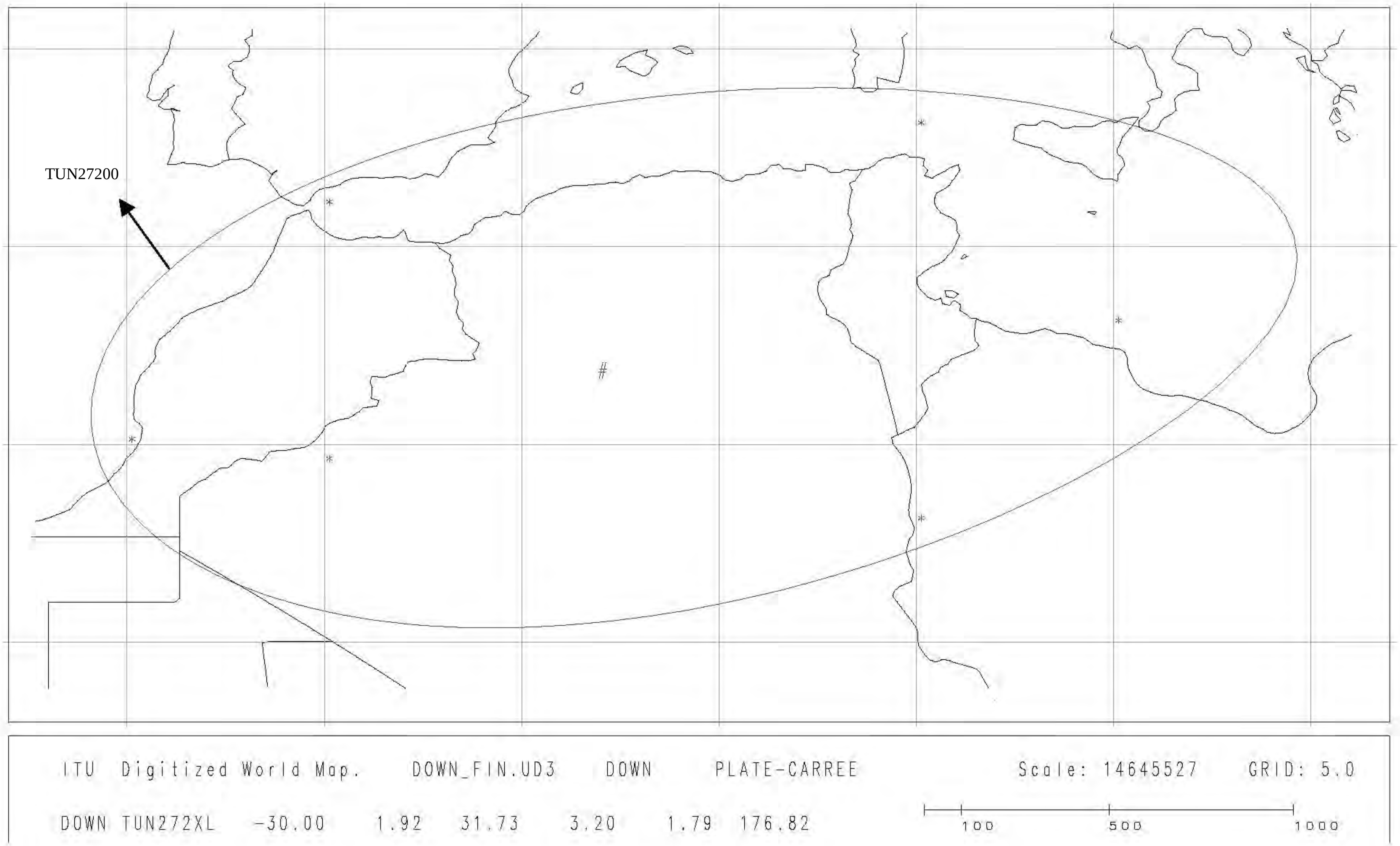
TJK (38.00 E)


TJK06900
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 7385450 GRID: 5.0
DOWN TJK069XL 38.00 71.14 38.37 1.25 .76 159.15
100
500

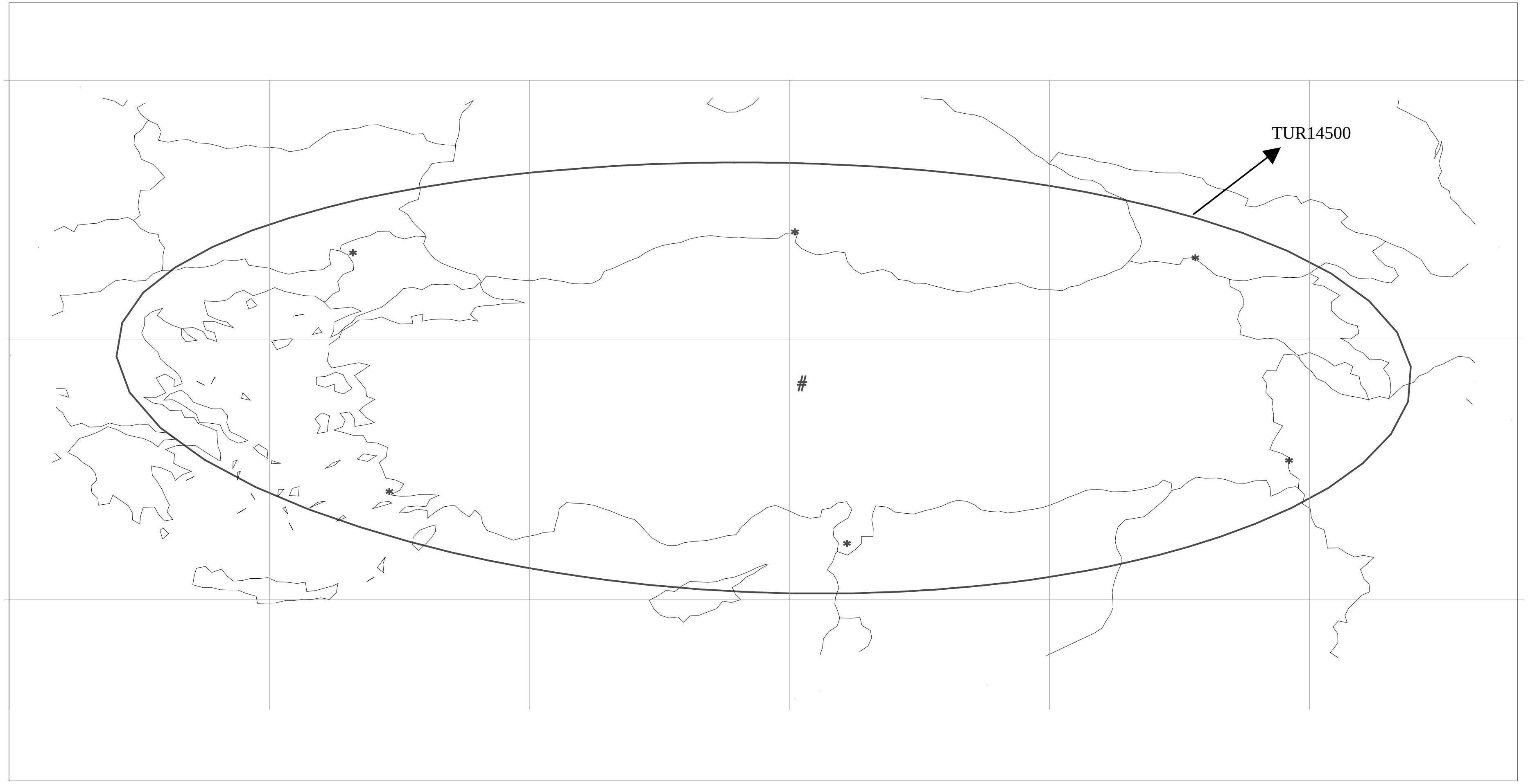
TUN (30.00 W)


TUN15000
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 10702072 GRID: 1.0
DOWN TUN150YR -30.00 9.43 33.89 1.72 .68 118.92
100
500

TUN (30.00 W)


TUN27200
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 14645527 GRID: 5.0
DOWN TUN272XL -30.00 1.92 31.73 3.20 1.79 176.82
100
500
1000

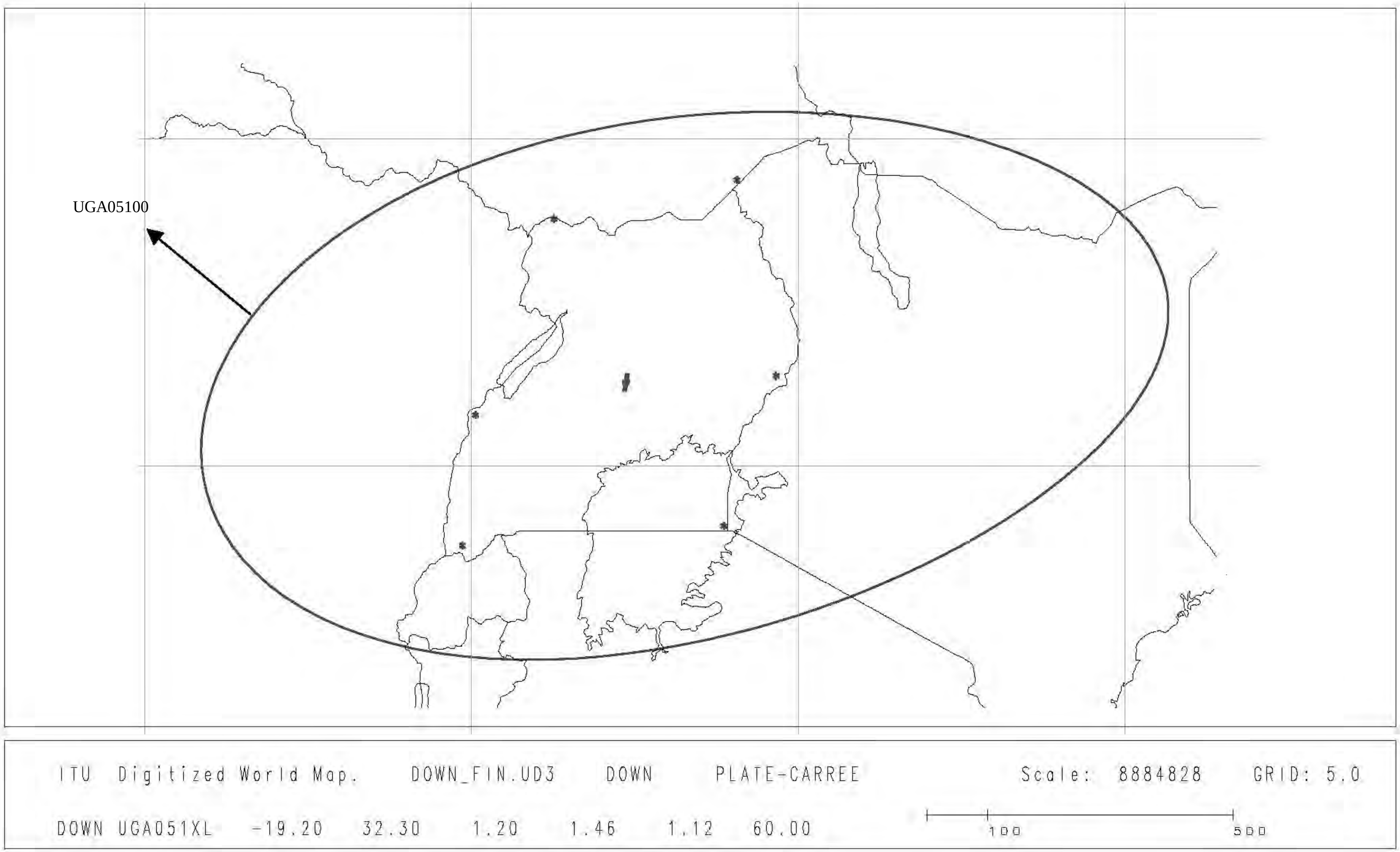
TUR (50.00 E)



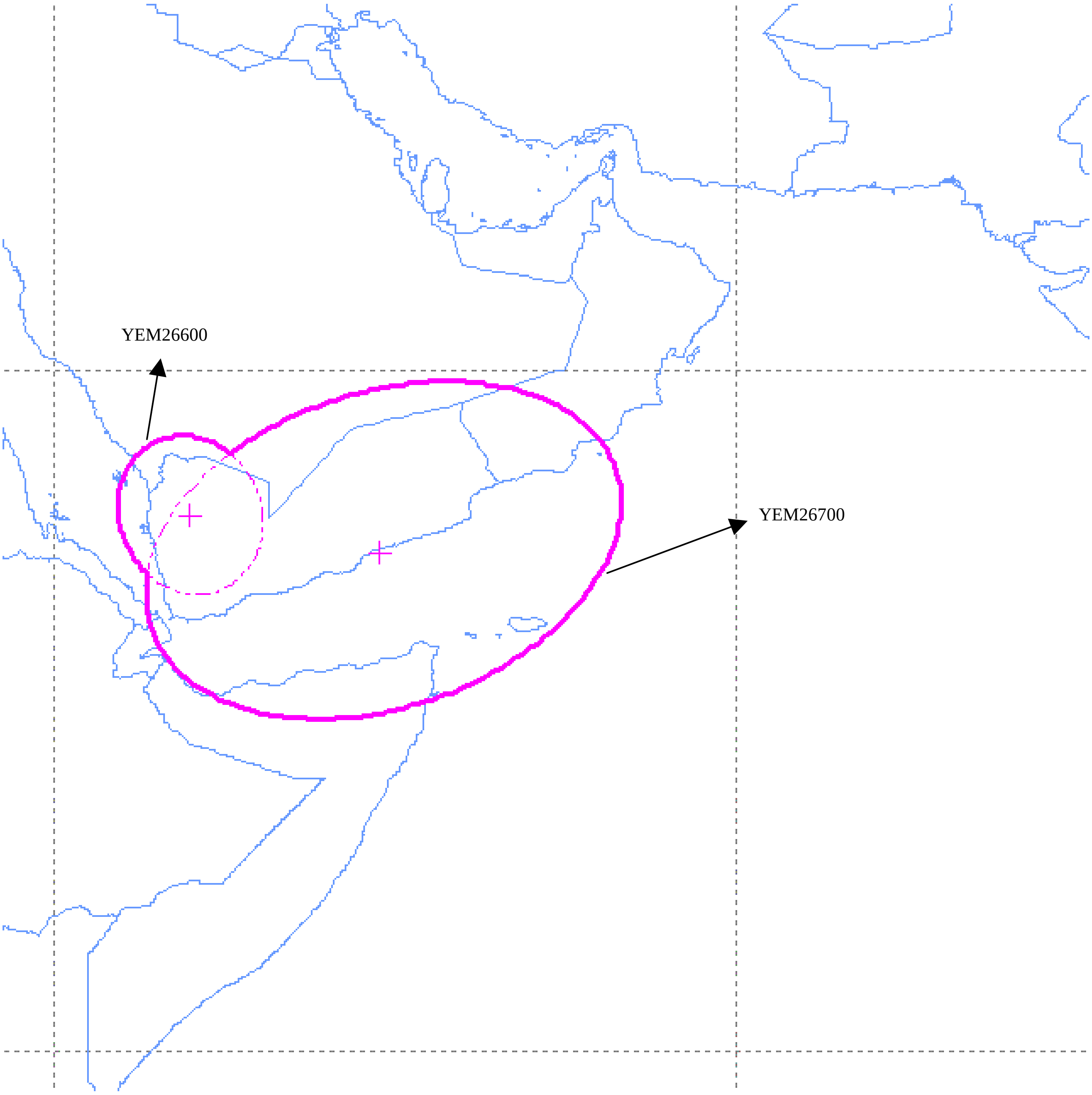
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 11923210 GRID: 5.0

DOWN TUR145XR 50.00 35.13 39.08 3.07 .98 2.54

UGA (19.20 W)


UGA05100
ITU Digitized World Map. DOWN_FIN.UD3 DOWN PLATE-CARREE Scale: 8884828 GRID: 5.0
DOWN UGA051XL -19.20 32.30 1.20 1.46 1.12 60.00
100
500

YEM (44.20 E)



INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 1 to
Document 34-E
7 April 2000
Original: English

PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

ORBITAL POSITIONS USED AS A STARTING POINT IN BSS REPLANNING FEASIBILITY STUDIES

Please find attached to this document additional information to that contained in Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Orbital positions used as a starting point in BSS replanning feasibility studies

ATTACHMENT

Director, Radiocommunication Bureau

ORBITAL POSITIONS USED AS A STARTING POINT IN
BSS REPLANNING FEASIBILITY STUDIES

This document provides the orbital positions used as a starting point in the replanning feasibility studies for WRC-2000. This document also includes orbital position preferences received by the Bureau after Circular Letter CR/132 was published. A list of all orbital position preferences as of the date of this document is provided in Annexes 1, 2 and 3 to this document.

These annexes contain the following information:

- the orbital positions of beams currently contained in Appendices S30 and S30A of the Radio Regulations (except beams included in the Plan after successful application of Article 4 procedures);
- the orbital positions preferred by administrations communicated to the Bureau in response to Circular Letter CR/117. The absence of a number (blank column) indicates that no response was received. Numbers in bold indicate a change in orbital position from that of WRC-97;
- the date on which the response to Circular Letter CR/117 was received by the Bureau; and
- the orbital positions used as a starting point in the replanning feasibility studies.

It should be noted that some orbital positions may have changed from the "starting point" orbital positions listed in Annexes 1, 2 and 3 during the replanning feasibility studies in order to meet the requirements and objectives of Annex 1 to Resolution 532 (WRC-97) and the guidelines established by the IRG. See Addendum 2 and 3 to Document WRC2000/34.

ANNEX 1

Downlink orbital positions (12 GHz)

(except beams included in the Plan after successful application of Article 4 procedures)

Administration symbol	Beam name	WRC-97 orbital position (° E)	Preferred orbital position (° E)	Date received by the Bureau	Starting point orbital position (° E)
AFG	AFG24500 (a)	50.00			50.00
AFG	AFG24600 (a)	50.00			50.00
AFS	AFS02100	5.00			5.00
AGL	AGL29500	-13.00			-13.00
ALB	ALB29600	-7.00			-7.00
ALG	ALG25100 (a)	-25.00	-25	24/3/99	-25.00
ALG	ALG25200 (a)	-25.00	-25	24/3/99	-25.00
AND	AND34100	-37.00			-37.00
ARM	ARM06400	23.00	23	26/3/99	23.00
ARS	ARS00300	17.00	17 (i)	22/3/99	17.00
ARS	ARS27500	17.00	17 (i)	22/3/99	17.00
ARS	ARS34000 (b)	17.00	17 (i)	22/3/99	17.00
AUS	AUS00400 (c)	152.00	152	30/3/99	152.00
AUS	AUS0040A (c)	152.00	152	30/3/99	152.00
AUS	AUS0040B (c)	152.00	152	30/3/99	152.00
AUS	AUS0040C (c)	152.00	152	30/3/99	152.00
AUS	AUS00500 (c)	152.00	152	30/3/99	152.00
AUS	AUS00600 (c)	152.00	152	30/3/99	152.00
AUS	AUS00700 (c)	164.00	164	30/3/99	164.00
AUS	AUS0070A (c)	164.00	164	30/3/99	164.00
AUS	AUS00800 (c)	164.00	164	30/3/99	164.00
AUS	AUS00900 (c)	164.00	164	30/3/99	164.00
AUS	AUS0090A (c)	164.00	164	30/3/99	164.00
AUS	AUS0090B (c)	164.00	164	30/3/99	164.00
AUT	AUT01600	-19.00	-19 **to 34**	26/3/99	-19.00
AZE	AZE06400	23.00			23.00
BDI	BDI27000	11.00			11.00
BEL	BEL01800	-19.00			-19.00
BEN	BEN23300	-19.00			-19.00
BFA	BFA10700	-30.00	-30	26/3/99	-30.00
BGD	BGD22000	74.00			74.00
BHR	BHR25500	17.00			17.00
BIH	BIH14800	34.00			34.00
BLR	BLR06200	38.00	38	31/3/99	38.00
BOT	BOT29700	-1.00			-1.00
BRM	BRM29800	74.00	**104**	26/5/99	104.00
BRU	BRU3300A	74.00			74.00
BTN	BTN03100	86.00			86.00
BUL	BUL02000	-1.00	-1	30/3/99	-1.00
CAF	CAF25800	-13.00			-13.00
CBG	CBG29900	68.00			86.00 (f)
CHN	CHN15400 (a)	62.00	62	30/3/99	62.00
CHN	CHN15500	62.00	62	30/3/99	62.00
CHN	CHN15600 (a)	62.00	62	30/3/99	62.00

(a) Beam taken into account in a “composite beam”.
(b) Multinational beam.
(c) Six channels assigned to this beam in accordance with IRG-4 decision.
(f) Orbital position suggested by AGTE.
(i) Understood as the Kingdom of Saudi Arabia’s preferred orbital position from IRG-4 discussions.

Administration symbol	**Beam name**	**WRC-97 orbital position (° E)**	**Preferred orbital position (° E)**	**Date received by the Bureau**	**Starting point orbital position (° E)**
CHN	CHN15700 (a)	62.00	**134**	21/11/99	134.00
CHN	CHN15800	79.80	**134**	21/11/99	134.00
CHN	CHN15900 (a)	79.80	**134**	21/11/99	134.00
CHN	CHN16000	92.00	-	30/3/99	Not included in the study
CHN	CHN16100 (a)	92.00	92	30/3/99	92.00
CHN	CHN16200	92.00	-	30/3/99	Not included in the study
CHN	CHN16300	79.80	-	30/3/99	Not included in the study
CHN	CHN16400	79.80	-	30/3/99	Not included in the study
CHN	CHN16500	79.80	-	30/3/99	Not included in the study
CHN	CHN16600 (a)	92.00	92	30/3/99	92.00
CHN	CHN16700	92.00	-	30/3/99	Not included in the study
CHN	CHN16800 (a)	92.00	92	30/3/99	92.00
CHN	CHN16900	92.00	-	30/3/99	Not included in the study
CHN	CHN17000	92.00	-	30/3/99	Not included in the study
CHN	CHN17100	92.00	-	30/3/99	Not included in the study
CHN	CHN17200	92.00	-	30/3/99	Not included in the study
CHN	CHN17300	92.00	-	30/3/99	Not included in the study
CHN	CHN17400	92.00	-	30/3/99	Not included in the study
CHN	CHN17500 (a)	92.00	92	30/3/99	92.00
CHN	CHN17600	79.80	-	30/3/99	Not included in the study
CHN	CHN17700	79.80	-	30/3/99	Not included in the study
CHN	CHN17800	79.80	-	30/3/99	Not included in the study
CHN	CHN17900 (a)	92.00	92	30/3/99	92.00
CHN	CHN18000	92.00	92	30/3/99	92.00
CHN	CHN18100	79.80	-	30/3/99	Not included in the study
CHN	CHN18200	79.80	-	30/3/99	Not included in the study
CHN	CHN18300	62.00	-	30/3/99	Not included in the study
CHN	CHN18400	62.00	-	30/3/99	Not included in the study
CHN	CHN18500	62.00	-	30/3/99	Not included in the study
CHN	CHN18600	62.00	-	30/3/99	Not included in the study
CHN	CHN18700	79.80	-	30/3/99	Not included in the study
CHN	CHN18800	62.00	-	30/3/99	Not included in the study
CHN	CHN19000	122.00	122	30/3/99	122.00
CLN	CLN21900	50.00			50.00
CME	CME30000	-13.00			-13.00
COD	ZAI32200 (a)	-19.00			-19.00
COD	ZAI32300 (a)	-19.00			-19.00
COG	COG23500	-13.00			-13.00
COM	COM20700	29.00			29.00
CPV	CPV30100	-30.00			-30.00
CTI	CTI23700	-30.00			-30.00
CVA	CVA08300	-37.00	-37	16/3/99	-37.00
CVA	CVA08500 (b)	-37.00	-37	16/3/99	-37.00
CYP	CYP08600	5.00	5	31/3/99	5.00
CZE	CZE14400	17.00	**-13 to 34**	28/12/99	34.00
D	D 08700	-19.00	-19 **to 34**	25/3/99	-19.00
D	D2-21600	-1.00	**-19 to 34**	25/3/99	Not included in the study
DJI	DJI09900	23.00			23.00
DNK	DNK08900 (a)	5.00	5	6/4/99	5.00
DNK	DNK09000 (b)	5.00	5	6/4/99	5.00
DNK	DNK09100 (b)	5.00	5	6/4/99	5.00

(a) Beam taken into account in a “composite beam”.
(b) Multinational beam.

Administration symbol	Beam name	WRC-97 orbital position (° E)	Preferred orbital position (° E)	Date received by the Bureau	Starting point orbital position (° E)
E	CNR13000 (a)	-30.00	-30	30/3/99	-30.00
E	E 12900 (a)	-30.00	-30	30/3/99	-30.00
EGY	EGY02600	-7.00	-7	24/3/99	-7.00
ERI	ERI09200	23.00	23	23/3/99	23.00
EST	EST06100	23.00			23.00
ETH	ETH09200	23.00			23.00
F	F 09300 (e)	-19.00	**-7**	31/3/99	-7.00
F	MYT09800 (a)	29.00	**-7**	31/3/99	-7.00
F	NCL10000	140.00	140	31/3/99	140.00
F	OCE10100	-160.00	-160	31/3/99	-160.00
F	REU09700 (a)	29.00	**-7**	31/3/99	-7.00
F	WAL10200	140.00	140	31/3/99	140.00
FIN	FIN10300	5.00	5	1/4/99	5.00
FIN	FIN10400 (b)	5.00	5	1/4/99	5.00
FJI	FJI19300	152.00			182.00 (f)
FSM	FSM00000	146.00			146.00
G	G 02700	-33.50	-33.5	25/3/99	-33.50
GAB	GAB26000	-13.00	-13	30/4/99	-13.00
GEO	GEO06400	23.00			23.00
GHA	GHA10800	-25.00	-25	6/4/99	-25.00
GMB	GMB30200	-37.00			-37.00
GNB	GNB30400	-30.00			-30.00
GNE	GNE30300	-19.00			-19.00
GRC	GRC10500	5.00			5.00
GUI	GUI19200	-37.00			-37.00
HNG	HNG10600	-1.00	**-13 to 34**	27/12/99	34.00
HOL	HOL21300	-19.00	-19	26/7/99	-19.00
HRV	HRV14800	34.00	**-13 to 34**	27/12/99	34.00
I	I 08200	-19.00	**29 or 11 or 23 or 17 or 5**	16/3/99	29.00
IND	IND03700	68.00	68	30/3/99	68.00
IND	IND03800 (a)	56.00	**68**	30/3/99	68.00
IND	IND03900 (a)	56.00	56	30/3/99	56.00
IND	IND04000 (a)	56.00	**68**	30/3/99	68.00
IND	IND04100 (a)	56.00	56	30/3/99	56.00
IND	IND04200 (a)	68.00	**56**	30/3/99	56.00
IND	IND04300 (a)	56.00	56	30/3/99	56.00
IND	IND04400	68.00	**--**	30/3/99	Not included in the study
IND	IND04500 (a)	56.00	56	30/3/99	56.00
IND	IND04600 (a)	68.00	**56**	30/3/99	56.00
IND	IND04700	68.00	68	30/3/99	68.00
IND	IND04800 (a)	68.00	**56**	30/3/99	56.00
INS	INS02800 (a)	80.20	80.2	1/4/99	80.20
INS	INS03000 (a)	80.20	80.2	1/4/99	80.20
INS	INS03200 (a)	80.20	80.2	1/4/99	80.20
INS	INS03500 (a)	104.00	104	1/4/99	104.00
INS	INS03600 (a)	104.00	104	1/4/99	104.00
IRL	IRL21100	-33.50			-33.50

(a) Beam taken into account in a “composite beam”.
(b) Multinational beam.
(e) Status changed from “PE” (i.e. “Existing” beam) to “P” (i.e. “Planned” beam).
(f) Orbital position suggested by AGTE.

Administration symbol	**Beam name**	**WRC-97 orbital position (° E)**	**Preferred orbital position (° E)**	**Date received by the Bureau**	**Starting point orbital position (° E)**
IRN	IRN10900	34.00	34	15/3/99	34.00
IRQ	IRQ25600	11.00			11.00
ISL	ISL04900	-33.50	-33.5	31/3/99	-33.50
ISL	ISL05000 (b)	5.00	5	31/3/99	5.00
ISR	ISR11000	-13.00	**-4.00**	10/8/99	-4.00
J	J 11100 (d)	110.00	110	30/3/99	110.00
JOR	JOR22400	11.00			11.00
KAZ	KAZ06600	44.00			44.00
KEN	KEN24900	11.00			11.00
KGZ	KGZ07000	44.00			44.00
KIR	KIR00001 (a)	176.00			176.00
KIR	KIR00002 (a)	176.00			176.00
KOR	KOR11200	110.00	**116**	30/3/99	116.00
KRE	KRE28600	110.00	**140** (j)	10/3/00	110.00
KWT	KWT11300	17.00			17.00
LAO	LAO28400	74.00	**122**	29/3/99	122.00
LBN	LBN27900	11.00			11.00
LBR	LBR24400	-33.50			-33.50
LBY	LBY28000 (a)	-25.00	-25	7/4/99	-25.00
LBY	LBY32100 (a)	-25.00	-25	7/4/99	-25.00
LIE	LIE25300	-37.00	**-19 to 34**	9/4/99	-19.00
LSO	LSO30500	5.00			5.00
LTU	LTU06100	23.00	23.00 (j)	21/2/00 and 20/3/00	23.00
LUX	LUX11400	-19.00			-19.00
LVA	LVA06100	23.00	23.00 (j)	20/3/00	23.00
MAC	MAC00000 (h)	-	122	7/12/99	122.00
MAU	MAU24200 (a)	29.00			29.00
MAU	MAU24300 (a)	29.00			29.00
MCO	MCO11600	-37.00	**-13 or -19 or -7**	5/5/99	-13.00
MDA	MDA06300	38.00			38.00
MDG	MDG23600	29.00			29.00
MHL	MHL00000	146.00			146.00
MKD	MKD14800	23.00			23.00
MLA	MLA22700 (a)	86.00	**91.5**	24/11/99	91.5
MLA	MLA22800 (a)	86.00	**91.5**	24/11/99	91.5
MLD	MLD30600	44.00			44.00
MLI	MLI32700 (a)	-37.00			-37.00
MLI	MLI32800 (a)	-37.00			-37.00
MLT	MLT14700	-13.00			-13.00
MNG	MNG24800	74.00			74.00
MOZ	MOZ30700	-1.00			-1.00
MRC	MRC20900	-25.00	-25	9/11/99	-25.00
MTN	MTN22300 (a)	-37.00			-37.00
MTN	MTN28800 (a)	-37.00			-37.00
MWI	MWI30800	-1.00			-1.00
NGR	NGR11500	-25.00			-25.00
NIG	NIG11900	-19.00			-19.00

(a) Beam taken into account in a “composite beam”.
(b) Multinational beam.
(d) “Existing” beam (beams with notified assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau).
(h) New beam included in the replanning feasibility studies.
(j) Due to the late date of receipt, this preferred orbital position could not be considered in the feasibility studies for WRC-2000.

Administration symbol	Beam name	WRC-97 orbital position (° E)	Preferred orbital position (° E)	Date received by the Bureau	Starting point orbital position (° E)
NMB	NMB02500	-19.00			-19.00
NOR	NOR12000	5.00	**-0.8**	24/3/99	-0.80
NOR	NOR12101 (b)	5.00	**-0.8**	24/3/99	-0.80
NOR	NOR12102 (b) (d)	5.00	**-0.8**	24/3/99	-0.80 (e)
NPL	NPL12200	50.00			50.00
NRU	NRU30900	134.00			134.00
NZL	CKH05200 (a)	158.00	158	31/3/99	158.00
NZL	CKH05300 (a)	158.00	158	31/3/99	158.00
NZL	NIU05400 (a)	158.00	158	31/3/99	158.00
NZL	NZL05500 (a)	158.00	158	31/3/99	158.00
NZL	NZL28700	128.00	-	31/3/99	Not included in the study
NZL	TKL05800 (a)	158.00	158	31/3/99	158.00
OMA	OMA12300	17.00			17.00
PAK	PAK12700 (a)	38.00	38	25/3/99	38.00
PAK	PAK21000	38.00	38	25/3/99	Not included in the study
PAK	PAK28100	38.00	38	25/3/99	Not included in the study
PAK	PAK28200	38.00	38	25/3/99	Not included in the study
PAK	PAK28300	38.00	38	25/3/99	Not included in the study
PHL	PHL28500	98.00			98.00
PLW	PLW00000	146.00			140.00 (f)
PNG	PNG13100	110.00			128.00 (f)
PNG	PNG27100	128.00			Not included in the study
POL	POL13200	-1.00			-1.00
POR	AZR13400 (a)	-30.00	**-37**	31/3/99	-37.00
POR	POR13300 (a)	-30.00	**-37**	31/3/99	-37.00
PSE (g)	YYY00001	11.00			11.00
QAT	QAT24700	17.00	**20** (j)	16/2/00	17.00
ROU	ROU13600	-1.00			-1.00
RRW	RRW31000	11.00			11.00
RUS	RSTRSA11	36.00	36	29/3/99	36.00
RUS	RSTRSA12	36.00	36	29/3/99	36.00
RUS	RSTRSA21	56.00	56	29/3/99	56.00
RUS	RSTRSA22	56.00	56	29/3/99	56.00
RUS	RSTRSA31	86.00	86	29/3/99	86.00
RUS	RSTRSA32	86.00	86	29/3/99	86.00
RUS	RSTRSA51	140.00	140	29/3/99	140.00
RUS	RSTRSA52	140.00	140	29/3/99	140.00
RUS	RSTRSD11	36.00	36	29/3/99	36.00
RUS	RSTRSD12	36.00	36	29/3/99	36.00
RUS	RSTRSD21	56.00	56	29/3/99	56.00
RUS	RSTRSD22	56.00	56	29/3/99	56.00
RUS	RSTRSD31	86.00	86	29/3/99	86.00
RUS	RSTRSD32	86.00	86	29/3/99	86.00
RUS	RSTRSD51	140.00	140	29/3/99	140.00
RUS	RSTRSD52	140.00	140	29/3/99	140.00
RUS	RUS00400	110.00	110	29/3/99	110.00

(a) Beam taken into account in a “composite beam”.
(b) Multinational beam.
(d) “Existing” beam (beams with notified assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau).
(e) Status changed from “PE” (i.e. “Existing” beam) to “P” (i.e. “Planned” beam).
(f) Orbital position suggested by AGTE.
(g) Palestinian Authority (based on Resolution 99 (Minneapolis, 1998)).
(j) Due to the late date of receipt, this preferred orbital position could not be considered in the feasibility studies for WRC-2000.

Administration symbol	**Beam name**	**WRC-97 orbital position (° E)**	**Preferred orbital position (° E)**	**Date received by the Bureau**	**Starting point orbital position (° E)**
S	S 13800	5.00	5.0	1/7/99	5.00
S	S 13900 (b)	5.00	5.0	1/7/99	5.00
S	S 13902 (b) (d)	5.00	5.0	1/7/99	5.00
SDN	SDN23000 (a)	-7.00			-7.00
SDN	SDN23100 (a)	-7.00			-7.00
SDN	SDN23200 (a)	-7.00			-7.00
SEN	SEN22200	-37.00	-37	18/3/99	-37.00
SEY	SEY00000 (h)	-	**42.5 or 37.5**	23/9/99	42.5
SLM	SLM00000	146.00			128.00 (f)
SMO	SMO05700	158.00			182.00 (f)
SMR	SMR31100	-37.00	-37	17/3/99	-37.00
SNG	SNG15100	74.00			74.00
SOM	SOM31200	23.00			23.00
SRL	SRL25900	-33.50			-33.50
STP	STP24100	-13.00			-13.00
SUI	SUI14000	-19.00	-19 **to 34**		-19.00
SVK	SVK14400	17.00	**-13 to 34**	27/12/99	34.00
SVN	SVN14800	34.00			34.00
SWZ	SWZ31300	-1.00			-1.00
SYR	SYR22900	11.00	11	25/3/99	11.00
SYR	SYR33900 (b)	11.00	11	25/3/99	11.00
TCD	TCD14300	-13.00			-13.00
TGO	TGO22600	-25.00			-25.00
THA	THA14200	74.00	**98**	30/3/99	98.00
TJK	TJK06900	44.00			44.00
TKM	TKM06800	44.00			44.00
TON	TON21500	170.00			170.00
TUN	TUN15000	-25.00	-25 **to 10** (j)	31/3/00	-25.00
TUN	TUN27200 (b)	-25.00	-25 **to 10** (j)	31/3/00	-25.00
TUR	TUR14500	5.00	**31 or 42 or 50 or 33 or 56**	8/4/99	31.00
TUV	TUV00000	176.00			176.00
TZA	TZA22500	11.00			11.00
UAE	UAE27400	17.00	**52.5**	24/3/99	52.50
UGA	UGA05100	11.00			11.00
UKR	UKR06300	38.00	38	30/3/99	38.00
USA	GUM33100 (a)	122.00			122.00
USA	MRA33200 (a)	122.00			122.00
USA	PLM33700 (a)	170.00			170.00
USA	SMA33500 (a)	170.00			170.00
USA	WAK33400	140.00			140.00
UZB	UZB07100	44.00			44.00
VTN	VTN32500	86.00	**107**	30/3/99	107.00
VUT	VUT12800	140.00			140.00
YEM	YEM26600 (a)	11.00			11.00
YEM	YEM26700 (a)	11.00			11.00
YUG	YUG14800	-7.00			-7.00
ZMB	ZMB31400	-1.00			-1.00
ZWE	ZWE13500	-1.00			-1.00

(a) Beam taken into account in a “composite beam”.
(b) Multinational beam.
(d) “Existing” beam (beams with notified assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau).
(f) Orbital position suggested by AGTE.
(h) New beam included in the replanning feasibility studies.
(j) Due to the late date of receipt, this preferred orbital position could not be considered in the feasibility studies for WRC-2000.

ANNEX 2

Feeder-link orbital positions (14 GHz)

(except beams included in the Plan after successful application of Article 4 procedures)

Administration symbol	**Beam name**	**WRC-97 orbital position (° E)**	**Preferred orbital position (° E)**	**Date received by the Bureau**	**Starting point orbital position (° E)**
AFS	AFS02100	5.00			5.00
ARS	ARS00301	17.00	17 (i)	22/3/99	17.00
ARS	ARS34001 (b)	17.00	17 (i)	22/3/99	17.00
CPV	CPV30100	-30.00			-30.00
ETH	ETH09200	23.00			23.00
IND	IND03701	68.00	68	30/3/99	68.00
IND	IND03801 (a)	56.00	**68**	30/3/99	68.00
IND	IND03901 (a)	56.00	56	30/3/99	56.00
IND	IND04001 (a)	56.00	**68**	30/3/99	68.00
IND	IND04101 (a)	56.00	56	30/3/99	56.00
IND	IND04201 (a)	68.00	**56**	30/3/99	56.00
IND	IND04301 (a)	56.00	56	30/3/99	56.00
IND	IND04401	68.00	**--**	30/3/99	Not included in the study
IND	IND04501 (a)	56.00	56	30/3/99	56.00
IND	IND04601 (a)	68.00	**56**	30/3/99	56.00
IND	IND04701 (a)	68.00	68	30/3/99	68.00
IND	IND04801 (a)	68.00	**56**	30/3/99	56.00
IRN	IRN10901	34.00	34	15/3/99	34.00
ISR	ISR11000	-13.00	**-4.00**	10/8/99	-4.00
MOZ	MOZ30700	-1.00			-1.00
MRC	MRC20900	-25.00	-25	9/11/99	-25.00
NIG	NIG11900	-19.00			-19.00
NMB	NMB02500	-19.00			-19.00
PAK	PAK12701 (a)	38.00	38	25/3/99	38.00
PAK	PAK21001	38.00	38	25/3/99	Not included in the study
PAK	PAK28301	38.00	38	25/3/99	Not included in the study
PNG	PNG13100	110.00			128.00 (f)
PNG	PNG27100	128.00			Not included in the study
SEN	SEN22201	-37.00	-37	18/3/99	-37.00
SEY	SEY00000 (h)	-	**42.5 or 37.5**	23/9/99	42.5
SNG	SNG15100	74.00			74.00
STP	STP24100	-13.00			-13.00
TGO	TGO22600	-25.00			-25.00
UGA	UGA05100	11.00			11.00
YEM	YEM26700 (a)	11.00			11.00
ZMB	ZMB31400	-1.00			-1.00

(a) Beam taken into account in a “composite beam”.
(b) Multinational beam.
(f) Orbital position suggested by AGTE.
(h) New beam included in the replanning feasibility studies.
(i) Understood as the Kingdom of Saudi Arabia’s preferred orbital position from IRG-4 discussions.

ANNEX 3

Feeder-link orbital positions (17 GHz)

(except beams included in the Plan after successful application of Article 4 procedures)

Administration symbol	Beam name	WRC-97 orbital position (° E)	Preferred orbital position (° E)	Date received by the Bureau	Starting point orbital position (° E)
AFG	AFG24500 (a)	50.00			50.00
AFG	AFG24600 (a)	50.00			50.00
AGL	AGL29500	-13.00			-13.00
ALB	ALB29600	-7.00			-7.00
ALG	ALG25100 (a)	-25.00			-25.00
ALG	ALG25200 (a)	-25.00			-25.00
AND	AND34100	-37.00			-37.00
ARM	ARM06400	23.00	23	26/3/99	23.00
ARS	ARS00300 (a)	17.00	17 (i)	22/3/99	17.00
ARS	ARS27500 (a)	17.00	17 (i)	22/3/99	17.00
ARS	ARS34000 (b)	17.00	17 (i)	22/3/99	17.00
AUS	AUS00400	152.00	152	30/3/99	152.00 (c)
AUS	AUS0040A	152.00	152	30/3/99	152.00 (c)
AUS	AUS00500	152.00	152	30/3/99	152.00 (c)
AUS	AUS00600	152.00	152	30/3/99	152.00 (c)
AUS	AUS00700	164.00	164	30/3/99	164.00 (c)
AUS	AUS0070A	164.00	164	30/3/99	164.00 (c)
AUS	AUS00800	164.00	164	30/3/99	164.00 (c)
AUS	AUS00900	164.00	164	30/3/99	164.00 (c)
AUS	AUS0090A	164.00	164	30/3/99	164.00 (c)
AUT	AUT01600	-19.00	-19 **to 34**	26/3/99	-19.00
AZE	AZE06400	23.00			23.00
BDI	BDI27000	11.00			11.00
BEL	BEL01800	-19.00			-19.00
BEN	BEN23300	-19.00			-19.00
BFA	BFA10700	-30.00	-30	26/3/99	-30.00
BGD	BGD22000	74.00			74.00
BHR	BHR25500	17.00			17.00
BIH	BIH14800	34.00			34.00
BLR	BLR06200	38.00	38	31/3/99	38.00
BOT	BOT29700	-1.00			-1.00
BRM	BRM29800	74.00	**104**	26/5/99	104.00
BRU	BRU3300A	74.00			74.00
BTN	BTN03100	86.00			86.00
BUL	BUL02000	-1.00	-1	30/3/99	-1.00
CAF	CAF25800	-13.00			-13.00
CBG	CBG29900	68.00			86.00 (f)
CHN	CHN15400 (a)	62.00	62	30/3/99	62.00
CHN	CHN15401	62.00	-	30/3/99	Not included in the study
CHN	CHN15500 (a)	62.00	62	30/3/99	62.00
CHN	CHN15501	62.00	-	30/3/99	Not included in the study
CHN	CHN15600 (a)	62.00	62	30/3/99	62.00
CHN	CHN15700 (a)	62.00	**134**	21/11/99	134.00
CHN	CHN15800 (a)	79.80	**134**	21/11/99	134.00
CHN	CHN15900 (a)	79.80	**134**	21/11/99	134.00

(a) Beam taken into account in a “composite beam”.
(b) Multinational beam.
(c) Six channels assigned to this beam in accordance with IRG-4 decision.
(f) Orbital position suggested by AGTE.
(i) Understood as the Kingdom of Saudi Arabia’s preferred orbital position from IRG-4 discussions.

Administration symbol	**Beam name**	**WRC-97 orbital position (° E)**	**Preferred orbital position (° E)**	**Date received by the Bureau**	**Starting point orbital position (° E)**
CHN	CHN16000	92.00	-	30/3/99	Not included in the study
CHN	CHN16100 (a)	92.00	92	30/3/99	92.00
CHN	CHN16200	92.00	-	30/3/99	Not included in the study
CHN	CHN16300	79.80	-	30/3/99	Not included in the study
CHN	CHN16400	79.80	-	30/3/99	Not included in the study
CHN	CHN16500	79.80	-	30/3/99	Not included in the study
CHN	CHN16600 (a)	92.00	92	30/3/99	92.00
CHN	CHN16700	92.00	-	30/3/99	Not included in the study
CHN	CHN16800 (a)	92.00	92	30/3/99	92.00
CHN	CHN16900	92.00	-	30/3/99	Not included in the study
CHN	CHN17000	92.00	-	30/3/99	Not included in the study
CHN	CHN17100	92.00	-	30/3/99	Not included in the study
CHN	CHN17200	92.00	-	30/3/99	Not included in the study
CHN	CHN17300	92.00	-	30/3/99	Not included in the study
CHN	CHN17400	92.00	-	30/3/99	Not included in the study
CHN	CHN17500 (a)	92.00	92	30/3/99	92.00
CHN	CHN17600	79.80	-	30/3/99	Not included in the study
CHN	CHN17700	79.80	-	30/3/99	Not included in the study
CHN	CHN17800	79.80	-	30/3/99	Not included in the study
CHN	CHN17900 (a)	92.00	92	30/3/99	92.00
CHN	CHN18000	92.00	92	30/3/99	92.00
CHN	CHN18100	79.80	-	30/3/99	Not included in the study
CHN	CHN18200	79.80	-	30/3/99	Not included in the study
CHN	CHN18300	62.00	-	30/3/99	Not included in the study
CHN	CHN18400	62.00	-	30/3/99	Not included in the study
CHN	CHN18500	62.00	-	30/3/99	Not included in the study
CHN	CHN18600	62.00	-	30/3/99	Not included in the study
CHN	CHN18700	79.80	-	30/3/99	Not included in the study
CHN	CHN18800	62.00	-	30/3/99	Not included in the study
CHN	CHN19000	122.00	122	30/3/99	122.00
CLN	CLN21900	50.00			50.00
CME	CME30000	-13.00			-13.00
COD	ZAI32200 (a)	-19.00			-19.00
COD	ZAI32300 (a)	-19.00			-19.00
COG	COG23500	-13.00			-13.00
COM	COM20700	29.00			29.00
CTI	CTI23700	-30.00			-30.00
CVA	CVA08300	-37.00	-37	16/3/99	-37.00
CVA	CVA08500 (b)	-37.00	-37	16/3/99	-37.00
CYP	CYP08600	5.00	5	31/3/99	5.00
CZE	CZE14400	17.00	**-13 to 34**	28/12/99	34.00
D	D 08700	-19.00	-19 **to 34**	25/3/99	-19.00
D	D2-21600	-1.00	**-19 to 34**	25/3/99	Not included in the study
DJI	DJI09900	23.00			23.00
DNK	DNK08900 (a)	5.00	5	6/4/99	5.00
DNK	DNK09000 (b)	5.00	5	6/4/99	5.00
DNK	DNK09100 (b)	5.00	5	6/4/99	5.00
E	CNR13000 (a)	-30.00	-30	30/3/99	-30.00
E	E 12900 (a)	-30.00	-30	30/3/99	-30.00

(a) Beam taken into account in a “composite beam”.
(b) Multinational beam.

Administration symbol	**Beam name**	**WRC-97 orbital position (° E)**	**Preferred orbital position (° E)**	**Date received by the Bureau**	**Starting point orbital position (° E)**
EGY	EGY02600	-7.00	-7	24/3/99	-7.00
ERI	ERI09200	23.00	23	23/3/99	23.00
EST	EST06100	23.00			23.00
F	F 09300 (e)	-19.00	**-7**	31/3/99	-7.00
F	MYT09800 (a)	29.00	**-7**	31/3/99	-7.00
F	MYT09801 (a)	29.00	**-7**	31/3/99	-7.00
F	NCL10000 (a)	140.00	140	31/3/99	140.00
F	NCL10001 (a)	140.00	140	31/3/99	140.00
F	OCE10100	-160.00	-160	31/3/99	-160.00
F	REU09700 (a)	29.00	**-7**	31/3/99	-7.00
F	REU09701 (a)	29.00	**-7**	31/3/99	-7.00
F	WAL10200 (a)	140.00	140	31/3/99	140.00
F	WAL10201 (a)	140.00	140	31/3/99	140.00
FIN	FIN10300	5.00	5	1/4/99	5.00
FIN	FIN10400 (b)	5.00	5	1/4/99	5.00
FJI	FJI19300	152.00			182.00 (f)
FSM	FSM00000	146.00			146.00
G	G 02700	-33.50	-33.5	25/3/99	-33.50
GAB	GAB26000	-13.00	-13	30/4/99	-13.00
GEO	GEO06400	23.00			23.00
GHA	GHA10800	-25.00	-25	6/4/99	-25.00
GMB	GMB30200	-37.00			-37.00
GNB	GNB30400	-30.00			-30.00
GNE	GNE30300	-19.00			-19.00
GRC	GRC10500	5.00			5.00
GUI	GUI19200	-37.00			-37.00
HNG	HNG10600	-1.00	**-13 to 34**	27/12/99	34.00
HOL	HOL21300	-19.00	-19	26/7/99	-19.00
HRV	HRV14800	34.00	**-13 to 34**	27/12/99	34.00
I	I 08200	-19.00	**29 or 11 or 23 or 17 or 5**	16/3/99	29.00
IND	IND03700	68.00	68	30/3/99	68.00
IND	IND03800 (a)	56.00	**68**	30/3/99	68.00
IND	IND03900 (a)	56.00	56	30/3/99	56.00
IND	IND04000 (a)	56.00	**68**	30/3/99	68.00
IND	IND04100 (a)	56.00	56	30/3/99	56.00
IND	IND04200 (a)	68.00	**56**	30/3/99	56.00
IND	IND04300 (a)	56.00	56	30/3/99	56.00
IND	IND04400	68.00	**--**	30/3/99	Not included in the study
IND	IND04500 (a)	56.00	56	30/3/99	56.00
IND	IND04600 (a)	68.00	**56**	30/3/99	56.00
IND	IND04700 (a)	68.00	68	30/3/99	68.00
IND	IND04800 (a)	68.00	**56**	30/3/99	56.00

(a) Beam taken into account in a “composite beam”.
(b) Multinational beam.
(e) Status changed from “PE” (i.e. “Existing” beam) to “P” (i.e. “Planned” beam).
(f) Orbital position suggested by AGTE.

Administration symbol	Beam name	WRC-97 orbital position (° E)	Preferred orbital position (° E)	Date received by the Bureau	Starting point orbital position (° E)
IRL	IRL21100	-33.50			-33.50
IRN	IRN10900	34.00	34	15/3/99	34.00
IRQ	IRQ25600	11.00			11.00
ISL	ISL04900	-33.50	-33.5	31/3/99	-33.50
ISL	ISL05000 (b)	5.00	5	31/3/99	5.00
J	J 11100 (d)	110.00	110	30/3/99	110.00
JOR	JOR22400	11.00			11.00
KAZ	KAZ06600	44.00			44.00
KEN	KEN24900	11.00			11.00
KGZ	KGZ07000	44.00			44.00
KIR	KIR00001 (a)	176.00			176.00
KIR	KIR00002 (a)	176.00			176.00
KOR	KOR11200	110.00	**116**	30/3/99	116.00
KRE	KRE28600	110.00	**140** (j)	10/3/00	110.00
KWT	KWT11300	17.00			17.00
LAO	LAO28400	74.00	**122**	29/3/99	122.00
LBN	LBN27900	11.00			11.00
LBR	LBR24400	-33.50			-33.50
LBY	LBY28000 (a)	-25.00	-25	7/4/99	-25.00
LBY	LBY32100 (a)	-25.00	-25	7/4/99	-25.00
LIE	LIE25300	-37.00	**-19 to 34**	9/4/99	-19.00
LSO	LSO30500	5.00			5.00
LTU	LTU06100	23.00	23.00 (j)	21/2/00 and 20/3/00	23.00
LUX	LUX11400	-19.00			-19.00
LVA	LVA06100	23.00	23.00 (j)	20/3/00	23.00
MAC	MAC00000 (h)	-	**122**	7/12/99	122.00
MAU	MAU24200 (a)	29.00			29.00
MAU	MAU24300 (a)	29.00			29.00
MCO	MCO11600	-37.00	**-13 or -19 or -7**	5/5/99	-13.00
MDA	MDA06300	38.00			38.00
MDG	MDG23600	29.00			29.00
MHL	MHL00000	146.00			146.00
MKD	MKD14800	23.00			23.00
MLA	MLA22700 (a)	86.00	**91.5**	24/11/99	**91.5**
MLA	MLA22800 (a)	86.00	**91.5**	24/11/99	**91.5**
MLD	MLD30600	44.00			44.00
MLI	MLI32700 (a)	-37.00			-37.00
MLI	MLI32800 (a)	-37.00			-37.00
MLT	MLT14700	-13.00			-13.00
MNG	MNG24800	74.00			74.00
MTN	MTN22300 (a)	-37.00			-37.00
MTN	MTN28800 (a)	-37.00			-37.00
MWI	MWI30800	-1.00			-1.00
NGR	NGR11500	-25.00			-25.00
NOR	NOR12000	5.00	**-0.8**	24/3/99	-0.80
NOR	NOR12101 (b)	5.00	**-0.8**	24/3/99	-0.80
NOR	NOR12102 (b) (d)	5.00	**-0.8**	24/3/99	-0.80 (e)

(a) Beam taken into account in a "composite beam".
(b) Multinational beam.
(d) "Existing" beam (beams with notified assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau).
(e) Status changed from "PE" (i.e. "Existing" beam) to "P" (i.e. "Planned" beam).
(h) New beam included in the replanning feasibility studies.
(j) Due to the late date of receipt, this preferred orbital position could not be considered in the feasibility studies for WRC-2000.

Administration symbol	**Beam name**	**WRC-97 orbital position (° E)**	**Preferred orbital position (° E)**	**Date received by the Bureau**	**Starting point orbital position (° E)**
NPL	NPL12200	50.00			50.00
NRU	NRU30900	134.00			134.00
NZL	CKH05200 (a)	158.00	158	31/3/99	158.00
NZL	CKH05201 (a)	158.00	158	31/3/99	158.00
NZL	CKH05300 (a)	158.00	158	31/3/99	158.00
NZL	CKH05301 (a)	158.00	158	31/3/99	158.00
NZL	NIU05400 (a)	158.00	158	31/3/99	158.00
NZL	NIU05401 (a)	158.00	158	31/3/99	158.00
NZL	NZL05500 (a)	158.00	158	31/3/99	158.00
NZL	NZL28700	128.00	-	31/3/99	Not included in the study
NZL	TKL05800 (a)	158.00	158	31/3/99	158.00
NZL	TKL05801 (a)	158.00	158	31/3/99	158.00
OMA	OMA12300	17.00			17.00
PAK	PAK12700 (a)	38.00	38	25/3/99	38.00
PAK	PAK21000	38.00	38	25/3/99	Not included in the study
PAK	PAK28100	38.00	38	25/3/99	Not included in the study
PAK	PAK28200	38.00	38	25/3/99	Not included in the study
PAK	PAK28300	38.00	38	25/3/99	Not included in the study
PHL	PHL28500	98.00			98.00
PLW	PLW00000	146.00			140.00 (f)
POL	POL13200	-1.00			-1.00
POR	AZR13400 (a)	-30.00	**-37**	31/3/99	-37.00
POR	POR13300 (a)	-30.00	**-37**	31/3/99	-37.00
PSE (g)	YYY00001	11.00			11.00
QAT	QAT24700	17.00	**20**	16/2/00	**17.00**
ROU	ROU13600	-1.00			-1.00
RRW	RRW31000	11.00			11.00
RUS	RSTRSA11	36.00	36	29/3/99	36.00
RUS	RSTRSA12	36.00	36	29/3/99	36.00
RUS	RSTRSA21	56.00	56	29/3/99	56.00
RUS	RSTRSA22	56.00	56	29/3/99	56.00
RUS	RSTRSA31	86.00	86	29/3/99	86.00
RUS	RSTRSA32	86.00	86	29/3/99	86.00
RUS	RSTRSA51	140.00	140	29/3/99	140.00
RUS	RSTRSA52	140.00	140	29/3/99	140.00
RUS	RSTRSD11	36.00	36	29/3/99	36.00
RUS	RSTRSD12	36.00	36	29/3/99	36.00
RUS	RSTRSD21	56.00	56	29/3/99	56.00
RUS	RSTRSD22	56.00	56	29/3/99	56.00
RUS	RSTRSD31	86.00	86	29/3/99	86.00
RUS	RSTRSD32	86.00	86	29/3/99	86.00
RUS	RSTRSD51	140.00	140	29/3/99	140.00
RUS	RSTRSD52	140.00	140	29/3/99	140.00
RUS	RUS00400	110.00	110	29/3/99	110.00
S	S 13800	5.00	5.0	1/7/99	5.00
S	S 13900 (b)	5.00	5.0	1/7/99	5.00
S	S 13902 (b) (d)	5.00	5.0	1/7/99	5.00

(a) Beam taken into account in a “composite beam”.
(b) Multinational beam.
(d) “Existing” beam (beams with notified assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau).
(f) Orbital position suggested by AGTE.
(g) Palestinian Authority (based on Resolution 99 (Minneapolis, 1998)).

Administration symbol	Beam name	WRC-97 orbital position (° E)	Preferred orbital position (° E)	Date received by the Bureau	Starting point orbital position (° E)
SDN	SDN23000 (a)	-7.00			-7.00
SDN	SDN23100 (a)	-7.00			-7.00
SDN	SDN23200 (a)	-7.00			-7.00
SEN	SEN22200	-37.00	-37	18/3/99	-37.00
SEY	SEY00000 (h)	-	**42.5 or 37.5**	23/9/99	42.5
SLM	SLM00000	146.00			128.00 (f)
SMO	SMO05700	158.00			182.00 (f)
SMR	SMR31100	-37.00	-37	17/3/99	-37.00
SOM	SOM31200	23.00			23.00
SRL	SRL25900	-33.50			-33.50
SUI	SUI14000	-19.00	-19 **to 34**		-19.00
SVK	SVK14400	17.00	**-13 to 34**	27/12/99	34.00
SVN	SVN14800	34.00			34.00
SWZ	SWZ31300	-1.00			-1.00
SYR	SYR22900	11.00	11	25/3/99	11.00
SYR	SYR33900 (b)	11.00	11	25/3/99	11.00
TCD	TCD14300	-13.00			-13.00
THA	THA14200	74.00	**98**	30/3/99	98.00
TJK	TJK06900	44.00			44.00
TKM	TKM06800	44.00			44.00
TON	TON21500	170.00			170.00
TUN	TUN15000	-25.00	-25 **to 10** (j)	31/3/00	-25.00
TUN	TUN27200 (b)	-25.00	-25 **to 10** (j)	31/3/00	-25.00
TUR	TUR14500	5.00	**31 or 42 or 50 or 33 or 56**	8/4/99	31.00
TUV	TUV00000	176.00			176.00
TZA	TZA22500	11.00			11.00
UAE	UAE27400	17.00	**52.5**	24/3/99	52.50
UKR	UKR06300	38.00	38	30/3/99	38.00
USA	GUM33100 (a)	122.00			122.00
USA	GUM33101 (a)	122.00			122.00
USA	MRA33200 (a)	122.00			122.00
USA	MRA33201 (a)	122.00			122.00
USA	PLM33700 (a)	170.00			170.00
USA	PLM33701 (a)	170.00			170.00
USA	SMA33500 (a)	170.00			170.00
USA	SMA33501 (a)	170.00			170.00
USA	WAK33400 (a)	140.00			140.00
USA	WAK33401 (a)	140.00			140.00
UZB	UZB07100	44.00			44.00
VTN	VTN32500	86.00	**107**	30/3/99	107.00
VUT	VUT12800	140.00			140.00
YEM	YEM26600 (a)	11.00			11.00
YUG	YUG14800	-7.00			-7.00
ZWE	ZWE13500	-1.00			-1.00

(a) Beam taken into account in a “composite beam”.
(b) Multinational beam.
(f) Orbital position suggested by AGTE.
(h) New beam included in the replanning feasibility studies.
(j) Due to the late date of receipt, this preferred orbital position could not be considered in the feasibility studies for WRC-2000.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 3 to Document 34-E
17 April 2000
Original: English

PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

COMPLEMENTARY/UPDATED INFORMATION ON COMPATIBILITY ANALYSES WITH OTHER SERVICES AND THE REGION 2 PLAN

Please find attached complementary/updated information to that contained in Attachment 3 to Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Complementary/updated information on compatibility analyses with other services and the Region 2 Plan

ATTACHMENT

Director, Radiocommunication Bureau

COMPLEMENTARY/UPDATED INFORMATION ON COMPATIBILITY ANALYSES WITH OTHER SERVICES AND THE REGION 2 PLAN

Attachment 3 to Document WRC2000/34 contains a description of the methodologies used to carry out the compatibility analyses with other services and the Region 2 Plan.

Section 4.3.2 Methodology

Replace the first paragraph of this section with the following:

The administrations having a fixed-satellite service transmitting space station in the frequency bands 11.7-12.2 GHz (Region 2) and/or 12.2-12.5 GHz (Region 3) which is likely to affect Regions 1 and 3 BSS assignment(s), should be identified with the criteria specified in Annex 4.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Corrigendum 2 to
Document 34-E
12 April 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

COMPLEMENTARY/UPDATED INFORMATION ON BASIC TECHNICAL ASSUMPTIONS FOR THE PLANNING APPROACH

Please find attached complementary/updated information to that contained in Attachment 2 to Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Complementary/updated information on basic technical assumptions for the Planning Approach

ATTACHMENT

Director, Radiocommunication Bureau

COMPLEMENTARY/UPDATED INFORMATION ON BASIC TECHNICAL ASSUMPTIONS FOR THE PLANNING APPROACH

Attachment 2 to Document WRC2000/34 contains a description of the basic technical assumptions used to carry out downlink and feeder-link feasibility studies of the “Planning Approach” prior to the last IRG meeting.

The information provided in this Corrigendum to Document WRC2000/34 incorporates the IRG decisions taken at its last meeting. This information is presented hereafter in terms of revised sections to the text provided in Attachment 2 to Document WRC2000/34, i.e. the Final Report of the IRG (*Notes in italic characters indicate the areas in which the text of the IRG Final Report has to be modified*).

Consequently, with this Corrigendum, the basic technical assumptions used by the Radiocommunication Bureau, on behalf of the IRG, to conduct the downlink and feeder-link feasibility studies are more accurately described.

Section 1 Introduction

Add the following paragraph at the end of this section:

Based on the results of new feasibility studies carried out and presented by the Radiocommunication Bureau, on behalf of the GTE, at the last IRG meeting, and considering new requests formulated by some administrations, the IRG took some decisions which impact on the basic technical assumptions. They are incorporated in the following sections.

Section 2.2 Emission type and channel bandwidth

Replace the last paragraph of this section with the following:

Considering a request from the Administration of Japan at the GTE-4 meeting, and based on the results of an additional study presented at the IRG-5 meeting, the IRG decided to include in the basic studies a bandwidth of 34.5 MHz for the assignments of Japan in the feasibility studies.

During the IRG-5 meeting, the Lao People’s Democratic Republic requested to use a bandwidth of 33 MHz for their assignments in the feasibility studies. The IRG decided to study this request at the end of the basic study, together with other national preferences not yet studied.

Section 2.3 Antenna types

Replace the text of footnote 2 with the following:

[2] Improved space station receiving antenna characteristics may be used in special circumstances to solve compatibility problems (e.g. fast roll-off antenna described in Annex 3 to Appendix S30A). In such cases the Administration for which the improved antenna is to be applied should be consulted. However, in this case, the relevant ITU-R Study Group did not approve new improved space station receiving antenna patterns, as was the case for the space station transmitting antenna.

Section 2.4.1 Possible Regions 1 and 3 channel arrangements

Replace all paragraphs of this section with the following:

Based on the results of an additional study (see Stage 2 of section 2.4.2 of Attachment 2 to Document WRC2000/34), the IRG decided at its last meeting to use four channel arrangements utilizing a continuous band of 400 MHz in Region 1 and 500 MHz in Region 3:

a) ten defined channels in Region 1 and twelve defined channels in Region 3, with 38.36 MHz frequency spacing, grouped in a continuous band of 400 MHz in Region 1 and 500 MHz in Region 3, with one predetermined type of polarization. The channel scheme is based on co-channels only;

b) ten defined channels in Region 1 and twelve defined channels in Region 3, with 38.36 MHz frequency spacing, grouped in a continuous band of 400 MHz in Region 1 and 500 MHz in Region 3, with one predetermined type of polarization. The channel scheme assumes adjacent-channels;

c) ten defined channels in Region 1 and twelve defined channels in Region 3, with 38.36 MHz frequency spacing between co-polarized channels, grouped in a continuous band of 200 MHz in Region 1 and 250 MHz in Region 3, with two predetermined types of polarization (i.e. cross-polarized channels assigned to the same beam will be co-channels). The channel scheme is based on co-channels only; and

d) ten defined channels in Region 1 and twelve defined channels in Region 3, with 38.36 MHz spacing between co-polarized channels, grouped in a continuous band of 200 MHz in Region 1 and 250 MHz in Region 3, with two predetermined types of polarization (i.e. cross-polarized channels assigned to the same beam will be adjacent channels with a frequency spacing of 19.18 MHz).

The four corresponding Region 1 channel rasters are shown in Figure 1.1 below.

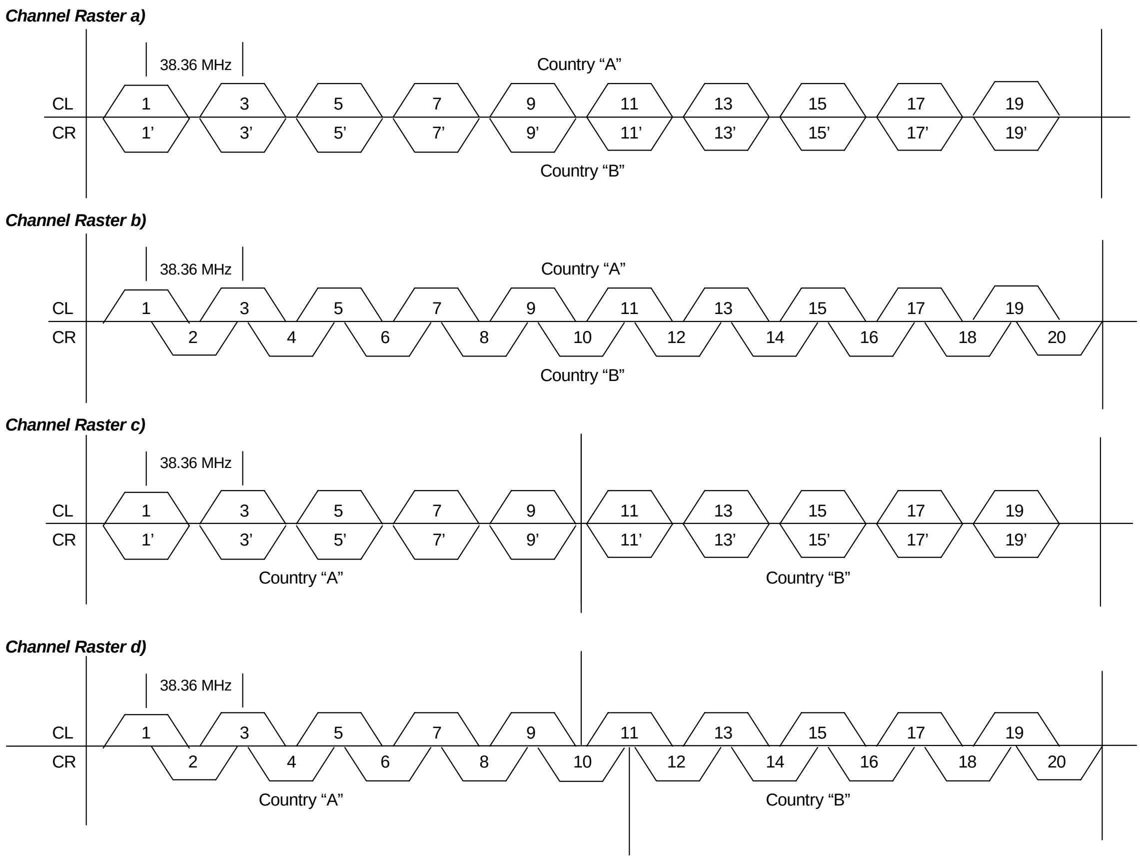

FIGURE 1.1

The four corresponding Region 3 channel rasters are shown in Figure 1.2 below.

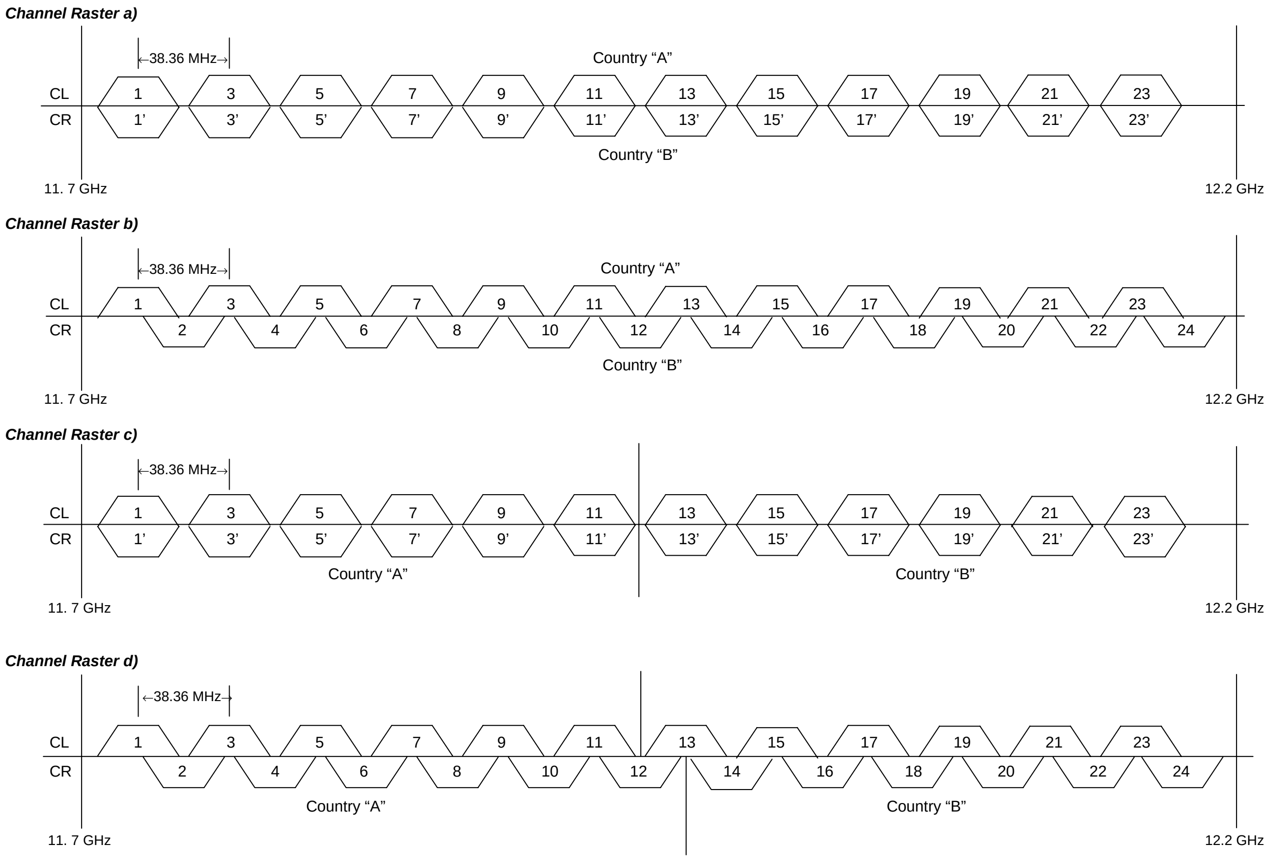

FIGURE 1.2

Studies were generally based upon raster b) of Figures 1.1 and 1.2.

The IRG decided to assume both the 14 GHz and the 17 GHz frequency bands in the feeder-link replanning feasibility studies in order to provide all assignments with the required number of channels and protection and also in order to accommodate specific preferences expressed by some administrations.

With respect to the 14 GHz feeder-link band, it was concluded to use the WRC-97 channel raster, i.e. similar to raster d) above, but reduced to the 14 available channels in that band (seven channels per circular polarization). It was also concluded to initially assign channels from the top of the band whilst not taking into account the internal adjacent channel interference effect.

Section 2.4.2 Alternative Region 3 channel arrangements

Delete this section since the IRG decided to include the alternative Region 3 channel arrangements into the basic feasibility studies.

Section 2.4.4.1 Channels preferred by AUS

Add the following new paragraphs at the end of this section:

Further to the IRG decision mentioned in section 2.4.1 above (i.e. 12 channels in Region 3), three channels per beam were assigned to the additional national coverage beam at two orbital positions (152° E and 164° E).

During the last IRG meeting, the Administration of Australia requested that 12 channels be provided to all Australian test-points including its offshore territories for both the downlink and feeder-link. The IRG decided to study this request at the end of the basic study, together with other national preferences yet to be studied.

Section 2.4.4.4 Channels preferred by IRN

Replace the paragraph of this section with the following:

The Administration of the Islamic Republic of Iran requested to study their feeder-links at both the 14 GHz and 17 GHz frequency bands. The results of an additional study presented at the last meeting of the IRG indicated that the required number of feeder-link channels could be assigned to this country either at 14 GHz or 17 GHz without causing any excess interference to any other beam. Based on these results, the IRG decided that the 17 GHz frequency band will be assumed in the basic study, whereas the 14 GHz frequency band will be studied at the end of the basic study together with other national preferences, yet to be studied.

Section 2.4.4.5 Channels preferred by KOR

Replace the paragraph of this section with the following:

The Administration of the Republic of Korea requested to study their feeder links at both the 14 GHz and 17 GHz frequency bands. The results of an additional study presented at the last IRG meeting indicated that the required number of feeder-link channels could be assigned to this country either at 14 GHz or 17 GHz without causing any excess interference to any other beam. Based on these results, and pursuant to the request of that Administration, the IRG decided to use the 17 GHz frequency band in the basic study for this country.

New sections

Add the following four new sections after section 2.4.4.5:

2.4.4.6 Channels preferred by MRC

At the last IRG meeting, the Administration of the Kingdom of Morocco requested to investigate the use of the 17 GHz frequency band instead of the 14 GHz frequency band for its feeder-link assignments. Should the results indicate that both frequency bands are possible, that Administration, once informed, should make its choice of the use of either the 14 or 17 GHz frequency bands.

The IRG decided that the 17 GHz frequency band will be used in the basic study, whereas the 14 GHz frequency band will be studied at the end of the basic study together with other national preferences, yet to be studied.

2.4.4.7 Channels preferred by SEY

At the last IRG meeting, the Administration of the Republic of Seychelles requested to investigate the use of the 14 GHz frequency band in addition to the 17 GHz frequency band for its feeder-link assignments. Should the results indicate that both frequency bands are possible, the Administration, once informed, should make its choice of the use of either the 14 or 17 GHz frequency bands.

The IRG decided that the 17 GHz frequency band will be assumed in the basic study, whereas the 14 GHz frequency band will be studied at the end of the basic study together with other national preferences, yet to be studied.

2.4.4.8 Channels preferred by J

At the last IRG meeting, the Administration of Japan requested to study the use of 12 channels at 109.85° E in addition to and grouped with its assignments at 110° E. The IRG decided to study this request at the end of the basic study, together with other national preferences.

2.4.4.9 Channels preferred by ISR

After the last IRG meeting, the Administration of the State of Israel requested to perform a comparative study (BSS to BSS in Region 1 as well as a comparative study with other Regions and services) between the use of the 14 GHz or the 17 GHz frequency bands for its feeder-link assignments, indicating that, based on a specific request by Administration at that time, the feeder-link channels of Israel are at 14 GHz in the Appendix S30A Plan. The 17 GHz frequency band will then be used in the basic study, whereas the 14 GHz frequency band will be studied, if time and resources permit, at the end of the basic study together with other national preferences yet to be studied.

Section 2.5.1 Revised downlink test-points for MRC

Add the following sentence at the end of the last paragraph of this section:

(See the recalculated beam in an updated version of Annex C of Attachment 2 to Document WRC2000/34, which is attached to this document.)

Section 2.5.2 Revised downlink test-points for MCO

Add the following sentence at the end of the last paragraph of this section:

(See the recalculated beam in an updated version of Annex C of Attachment 2 to Document WRC2000/34, which is attached to this document.)

Section 2.5.3 Revised downlink test-points for RUS

Add the following sentence at the end of the last paragraph of this section:

(See the recalculated beam in an updated version of Annex C of Attachment 2 to Document WRC2000/34, which is attached to this document.)

New sections

Add the following two new sections after section 2.6.1:

2.6.2 New ellipse for the Mongolian feeder-link beam

At the last IRG meeting, no objection was made to the proposal to consider in the basic feasibility study a new feeder-link beam for Mongolia. This new beam was recalculated using the Appendix S30A Plan test-points of this country in order to provide a complete coverage of its national territory. (See the new beam in an updated version of Annex D of Attachment 2 to Document WRC2000/34, which is attached to this document.)

2.6.3 Preferred ellipse for the Bulgarian feeder-link beam

At the last IRG meeting, the Administration of the Republic of Bulgaria requested to also study the feeder link with its beam at 1° W with the same beam ellipse and orientation of its downlink beam. The IRG decided to study this request at the end of the basic study together with other national preferences yet to be studied.

Section 2.10.2.2 Downlink situation of CHN

Replace the title of this section as follows:

2.10.2.2 Feeder-link and downlink situation of CHN

Add the following paragraphs at the end of this section:

At the last IRG meeting, the Administration of the People's Republic of China requested a change in orbital position from 79.8º E to 134º E for all its feeder-link and downlink elliptical and composite beams. IRG decided to include this modification in the basic feasibility studies and thus to recalculate at 134º E the Chinese elliptical and composite beams previously located at 79.8º E. (See the recalculated beams in an updated version of Annexes C and D of Attachment 2 to Document WRC2000/34, which are attached to this document.)

At that meeting, that Administration also requested to use its WRC-97 large elliptical feeder-link beams at 62º E, 92º E and 134º E (i.e. the beam formerly located at 79.8º E) instead of the feeder-link composite beams referred to in the paragraph above. The IRG decided to study this request at the end of the basic study, together with other national preferences yet to be studied.

Section 2.10.2.3 Feeder-link and downlink situation of IND

Add the following new paragraph at the end of this section:

The IRG decided that the 17 GHz frequency band will be assumed in the basic study, whereas the 14 GHz frequency band will be studied at the end of the basic study together with other national preferences yet to be studied.

Section 2.10.2.4 Downlink situation of the United States

Replace the title of this section as follows:

2.10.2.2 Feeder-link and downlink situation of the United States of America

Add the following new paragraph at the end of this section:

At the last IRG meeting, the Administration of the United States of America requested to split the composite beam between PLM and SMA to have two individual (non-composite) beams. The same request was made for MRA and GUM. The IRG decided to study these requests at the end of the basic study together with other national preferences yet to be studied.

Section 2.10.2.5 Downlink situation of F

Replace the title of this section as follows:

2.10.2.5 Feeder-link and downlink situation of F

Replace the last paragraph of this section with the following:

No objection to this course of action was made at the last meeting of the IRG, which was thus considered in the basic feasibility studies.

Section 2.11 Orbital positions[7]

Replace the last paragraph of this section with the following:

At the request of the APT Group of Technical Experts (AGTE) from Region 3, the default orbital positions proposed by AGTE in Document GTE99-4/9, 24 September 1999, will be used as default orbital positions for Region 3 in the replanning feasibility studies, unless a different preferred orbital position had been requested by an administration in that Region in response to CR/117. The Region 3 administrations for which a default orbital position was proposed by the AGTE which is different from that of Appendices S30 and S30A, will be consulted by the Bureau in order to confirm or otherwise this course of action, noting that absence of reply will mean agreement with the choice of orbital position indicated in Document GTE99-4/9. A list providing all preferred and default orbital positions used as a starting point in the studies was published in Circular Letter CR/132 of 5 January 2000. Based on recent communications from certain administrations, an updated list of orbital positions is provided in Addendum 1 to Document WRC2000/34. (See the recalculated beams in an updated version of Annexes C and D of Attachment 2 to Document WRC2000/34, which are attached to this document.)

Add the following new paragraphs at the end of this section:

From this updated list of orbital positions, it could be noted that the requests made at the last IRG meeting by the Administration of the Islamic Republic of Iran and the Administration of the Lao People's Democratic Republic to change the orbital position of their beam respectively from 34º E to 54º E and from 122º E to another orbital position were not confirmed. Indeed, these Administrations confirmed after this meeting that 34º E and 122º E respectively are still their preferred orbital position.

Addendum 1 to Document WRC2000/34 includes the new orbital positions requested and agreed at the last IRG meeting by the Administration of the People's Republic of China (see section 2.10.2.2 above) and by the Administration of Malaysia (see the recalculated composite beams in an updated version of Annexes C and D of Attachment 2 to Document WRC2000/34, which are attached to this document).

After the last IRG meeting, the Administration of the State of Qatar requested a change in its orbital position from 17º E to 20º E. Considering that this request was submitted after the feasibility studies were commenced, it would be studied, if time and resources permit, at the end of the basic feasibility study together with other national preferences yet to be studied.

After the last IRG meeting, the Administration of Tunisia requested to use for its beams an orbital position within the orbital arc from 17º E to 25º W. Considering that this request was submitted after the feasibility studies were commenced, it would be studied, if time and resources permit, at the end of the basic feasibility study together with other national preferences yet to be studied.

After the last IRG meeting, the Administration of the Democratic People's Republic of Korea requested a change in its orbital position from 110º E to 140º E. Considering that this request was submitted after the feasibility studies were commenced, it would be studied, if time and resources permit, at the end of the basic feasibility study together with other national preferences yet to be studied.

[7] NOTE - During the GTE-3 meeting, the Syrian Administration emphasized the importance for each Administration to enjoy full freedom to select its existing nominal orbital position or to modify it to meet its requirements during the exercise. This should not necessarily be a nominal orbital position. It could be any angular value between nominal orbital positions.

Section 2.11.3 New multinational beam and multiple orbital positions for D[8]

Replace the title of this section as follows:

2.11.3 New multinational beam for AUT, D, LIE and SUI, and multiple orbital positions for D[8]

Add the following new paragraph before the last paragraph of this section:

Based on the results of an additional study presented at the last IRG meeting, the IRG decided to include in the replanning feasibility studies a multinational beam replacing the national beams of these four administrations with ten channels for each of the administrations concerned (see the corresponding new beam in an updated version of Annexes C and D of Attachment 2 to Document WRC2000/34, which are attached to this document).

Section 2.11.5 Requested new beam(s)

Replace the title of this section as follows:

2.11.5 Requested new beams for SEY and CHN/MAC

Replace the last paragraph of this section with the following:

At its last meeting, the IRG confirmed this course of action, which was thus considered in the basic feasibility studies (see the corresponding beams in an updated version of Annexes C and D of Attachment 2 to Document WRC2000/34, which are attached to this document).

Add the following new paragraph at the end of this section:

At the last IRG meeting, Portugal requested the inclusion of a new minimum sized spot beam to cover the territory of Macao, preferably at 122º E. The IRG decided to include this request in the basic feasibility studies (see the corresponding beams in an updated version of Annexes C and D of Attachment 2 to Document WRC2000/34, which are attached to this document).

New sections

Add the following three new sections after section 2.11.5:

2.11.6 New multinational beam for CZE, HNG, HRV and SVK

At the last IRG meeting, the Administrations of Croatia, Hungary, Slovak Republic and Czech Republic requested to investigate the inclusion of a new multinational beam covering their territories with ten channels per country in the replanning feasibility studies replacing their national beams. The Administrations of Croatia, Hungary, Slovak Republic and Czech Republic requested that their current national beams (HRV14800, HNG10600, SVK14400, CZE14400) continue to be taken into account in the ongoing planning study until the final clarification of the acceptability of inclusion of the proposed multinational beam. IRG-5 agreed to investigate the proposal and include the results in its report to be submitted to WRC-2000. The same evaluation process will be followed as was used in studying the request in section 2.11.3 above, i.e.:

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[8] The German Administration has agreed to the conclusions of IRG-4. However, it reserves its right to reiterate the request for including, into the replanning feasibility studies, both national beams of Germany as contained in Appendices S30 and S30A at two orbital positions when the results of the studies described in this section and their further treatment within the IRG are known.

1) Continue the planning exercises based on national coverage with ten channels (principles 1 and 2 of Annex 1 of Resolution 532) at the same orbital position.

2) At the end of this exercise, four identical multinational beams covering the territory of Croatia, Hungary, Slovak Republic and Czech Republic, each with ten channels will be substituted to the national beams of Croatia, Hungary, Slovak Republic and Czech Republic and the e.i.r.p. of this multinational beam be reduced if necessary to a level which does not create more interference than the previous situation (i.e. the four national beams with ten channels). The result of this modification i.e. the level of e.i.r.p. and the EPM associated to this new multinational beam is proposed to the Administrations of Croatia, Hungary, Slovak Republic and Czech Republic for agreement or otherwise.

IRG decided to ask these Administrations to provide to the Bureau new test points before 31 December 1999 if needed.

In providing the requested information after the last IRG meeting, these four countries confirmed the use in the feasibility studies of 34° E, as the preferred orbital position for their beams, and that in the case of an unsuccessful result, to use for their beams a common orbital position within the orbital arc from 34º E to 13º W (see the national beams recalculated at 34º E in an updated version of Annexes C and D of Attachment 2 to Document WRC2000/34, which are attached to this document).

2.11.7 New multinational beam for JOR, LBN and SYR

At the last IRG meeting, the Administrations of Syria and Lebanon requested to investigate the inclusion of the multinational beam SYR33900 covering their territories with ten channels per country in the replanning feasibility studies replacing their national beams, with possible extension to two additional neighbouring countries if so requested by them. The Administrations of Syria and Lebanon requested that their current national beams continue to be taken into account in the ongoing planning study until the final clarification of the acceptability of inclusion of the proposed multinational beam. IRG-5 agreed to investigate the proposal and include the results in its report to be submitted to WRC-2000. The same evaluation process will be followed as was used in studying the request in section 2.11.3, and described in section 2.11.6 above.

IRG decided to ask these two administrations to provide to the Bureau new test points before 31 December 1999 if needed.

In providing the requested information after the last IRG meeting, these two countries, joined by the Administration of Jordan, confirmed the use in the feasibility studies of 11° E, as the preferred orbital position for their beams, and that in the case of an unsuccessful result, to use for their beams a common orbital position at least within the orbital arc from 10.5º E to 11.5º E.

2.11.8 New multinational composite beam for LTU and LVA

After the last IRG meeting, the Administrations of Lithuania and Latvia requested to investigate the inclusion of a multinational composite beam covering their territories with ten channels per country in the replanning feasibility studies replacing their national beams. Both countries requested the use in the feasibility studies of 23° E, as the preferred orbital position for their beams.

Considering that this request was submitted after the last IRG meeting, it would be studied, if time and resources permit, at the end of the basic study together with other national preferences yet to be studied.

Section 2.12 "Existing systems"[9, 3]

Add the following paragraph before section 2.12.1:

The list of the "existing systems" taken into account in the feasibility studies is provided at Annex A.

Section 2.12.1 Case of E

Replace the first paragraph of this section with the following:

New national downlink beam arrangements for Spain, E 12900 and CNR13000, with ten channels (ch. 21, 23, 25, 27, 29, 31, 33, 35, 37, 39 CL) with WRC-97 e.i.r.p., new protection ratios, digital modulation and MODRES receiving earth station antenna type, were created at orbital position 30° W. In order not to exceed a total of ten channels and to be compatible with the "existing" beams HISPASA4, HISPA27D, HISP33D1 and HISP33D2 (ch. 23, 27, 31, 35, 39 CL), all Spanish beams were grouped.

Section 2.12.2 Case of J

Replace the first and second paragraphs of this section with the following:

A new national downlink beam for Japan, J 11100, with ten channels (ch. 1, 3, 5, 7, 9, 11, 13, 15, 17, 19 CR) with reduced e.i.r.p., new protection ratios, digital modulation, 34.5 MHz bandwidth (see section 2.2 above) and MODRES receiving earth station antenna type, was created at orbital position 110° E. In order not to exceed a total of ten channels and to be compatible with the "existing" beam J 11100, now renamed J 1110E, at 110° E (ch. 1, 3, 5, 7, 9, 11, 13, 15 CR) and with "existing" beam 000BS-3N at 109.85° E, all Japanese beams were grouped.

A similar course of action was taken with respect to the feeder-link beam for Japan, J 11100, which was created at orbital position 110° E with ten channels (ch. 1, 3, 5, 7, 9, 11, 13, 15, 17, 19 CR), with new protection ratios, digital modulation, 34.5 MHz bandwidth (see section 2.2 above) and with MODRSS receiving space station antenna type and MODTES transmitting earth station antenna type.

Section 2.12.3 Case of KOR

Add the following sentence at the end of the first paragraph of this section:

(See the recalculated beams in an updated version of Annexes C and D of Attachment 2 to Document WRC2000/34, which are attached to this document.)

Section 2.12.5 Case of NOR

Replace the second paragraph of this section with the following:

According to the request from the Administration of Norway, a new national beam NOR12000 was created at orbital position 0.8° W. This beam has been assigned ten channels (ch. 22, 24, 26, 28, 30,

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[9] See definition in section 2.2. Currently there are thirteen systems which fall into this category (see Annex A).

[3] The Administrations of Morocco and Syria consider that the total number of channels per coverage area shall not exceed either ten channels or the number of channels of an "existing system" which is greater than 10. This is with the understanding that the planning conference will decide on the status of those channels of "existing systems" that exceed the number 10.

32, 34, 36, 38, 40 CR) with WRC-97 e.i.r.p., new protection ratios, digital modulation and MODRES receiving earth station antenna type. In order not to exceed a total of ten channels within a sub-frequency band of 400 MHz, and in order to be compatible with some channels (ch. 23, 27, 31, 35, 39 CL, and 24, 28, 32, 36, 40 CR) of the "existing" system BIFROST-2 at 0.8° W, beams BIFROS21 and BIFROS22 of BIFROST-2 and beam NOR12000 were grouped. Because the orbital position of the national beam NOR12000 was changed from 5° E to 0.8° W, new ellipse parameters were calculated as described in section 2.6 above. (See the recalculated beams in an updated version of Annexes C and D of Attachment 2 to Document WRC2000/34, which are attached to this document.)

Section 2.12.6 Case of F

Add the following sentence at the end of the first paragraph of this section:

(See the recalculated beams in an updated version of Annexes C and D of Attachment 2 to Document WRC2000/34, which are attached to this document.)

Section 2.12.7 Case of LUX

Replace the first and second paragraphs of this section with the following:

Although the Administration of Luxembourg has not requested to move beam LUX11400 from orbital position 19.0° W to orbital position 19.2° E or 28.2° E where its "existing" systems DBL are located, for the replanning feasibility studies, beam LUX11400 has been moved to orbital position 28.2° E in order to be included successfully in the draft new Plan with ten channels (ch. 1, 3, 5, 7, 9, 11, 13, 15, 17, 19 CL), WRC-97 e.i.r.p., new protection ratios, digital modulation and MODRES receiving earth station antenna type. In order to be compatible with the same channels used by the "existing" system DBL at 28.2° E, all beams of this DBL network and beam LUX11400 were grouped. Because the orbital position of the national beam LUX11400 was changed from 19.0° W to 19.2° E, new ellipse parameters were calculated as described in section 2.6 above. (See the recalculated beams in an updated version of Annexes C and D of Attachment 2 to Document WRC2000/34, which are attached to this document.)

Despite the fact that the feeder-link part of these DBL systems are not yet considered as "existing" feeder-link systems, a similar course of action was taken with respect to the feeder-link beam for Luxembourg, LUX11400, which was created at orbital position 28.2° E with ten channels (ch. 1, 3, 5, 7, 9, 11, 13, 15, 17, 19 CL) with new protection ratios, digital modulation and with MODRSS receiving space station antenna type and MODTES transmitting earth station antenna type.

Section 2.12.8 Case of RUS

Add the following sentence to the last paragraph of this section:

No objection to the GTE conclusion on this issue was formulated at the last meeting of the IRG.

Section 2.14 Application to feeder-link studies

Add the following paragraph at the end of this section:

In using the 14 GHz frequency band for beams, which already have channel(s) in this band in the Appendix S30A Plan, the polarization direction and the e.i.r.p. level of the "reused" channel(s) have to be maintained if possible.

Annex A Protection ratios applicable to "existing" systems in the replanning studies

Replace the title of this Annex as follows:

Protection ratios applicable to "existing" systems in the feasibility studies

Replace Notes 4 and 5 of the table of this Annex with the following:

4) RST-1, BIFROST-2, BIFROST, EUTELSAT-B 13° E.

5) RST-1, DBL 19.2° E (downlink only), HISPASAT-1 (27 MHz bandwidth), EUTELSAT-B 13° E, DBL 28.2° E (downlink only), HISPASAT-1 (33 MHz bandwidth).

Annex C (to Attachment 2)

Add the following title to this Annex:

**Recalculated elliptical beams and composite beams
at their starting point orbital position
for the downlink feasibility study**

Replace the first paragraph of Annex C of Attachment 2 to Document WRC2000/34 with the following:

The downlink beams plotted in this Annex are based on the default or preferred orbital positions, according to the case.

The Appendix S30 Plan beams, which were considered in the downlink feasibility study but not modified, have not been provided.

Should any of the beams considered in the downlink feasibility study be shifted by more than ±0.2° from its default or preferred orbital positions, according to the case, to another orbital position, it would be then plotted in Annex 4 to Addendum 2 to Document WRC2000/34.

With respect to the figures provided in this Annex and in Annex 4 to Addendum 2 to Document WRC2000/34, it should be noted that:

The tracing of borders does not imply on the part of ITU any position with respect to the status of a country or geographical area, or official recognition of these borders.

Add the beams plotted in Annex C to this Corrigendum to those provided in Annex C of Attachment 2 to Document WRC2000/34.

Annex D (to Attachment 2)

Add the following title to this Annex:

**Recalculated elliptical beams and composite beams
at their starting point orbital position
for the feeder-link feasibility study**

Replace the first paragraph of Annex D of Attachment 2 to Document WRC2000/34 with the following:

The feeder-link beams plotted in this Annex are based on the default or preferred orbital positions, according to the case.

The Appendix S30A Plans beams, which were considered in the feeder-link feasibility study but not modified, have not been provided.

Should any of the beams considered in the feeder-link feasibility study be shifted by more than ±0.2° from its default or preferred orbital positions, according to the case, to another orbital position, it would be then plotted in Annex 3 to Addendum 3 to Document WRC2000/34.

With respect to the figures provided in this Annex and in Annex 3 to Addendum 3 to Document WRC2000/34, it should be noted that:

The tracing of borders does not imply on the part of ITU any position with respect to the status of a country or geographical area, or official recognition of these borders.

Add the beams plotted in Annex D to this Corrigendum to those provided in Annex D of Attachment 2 to Document WRC2000/34.

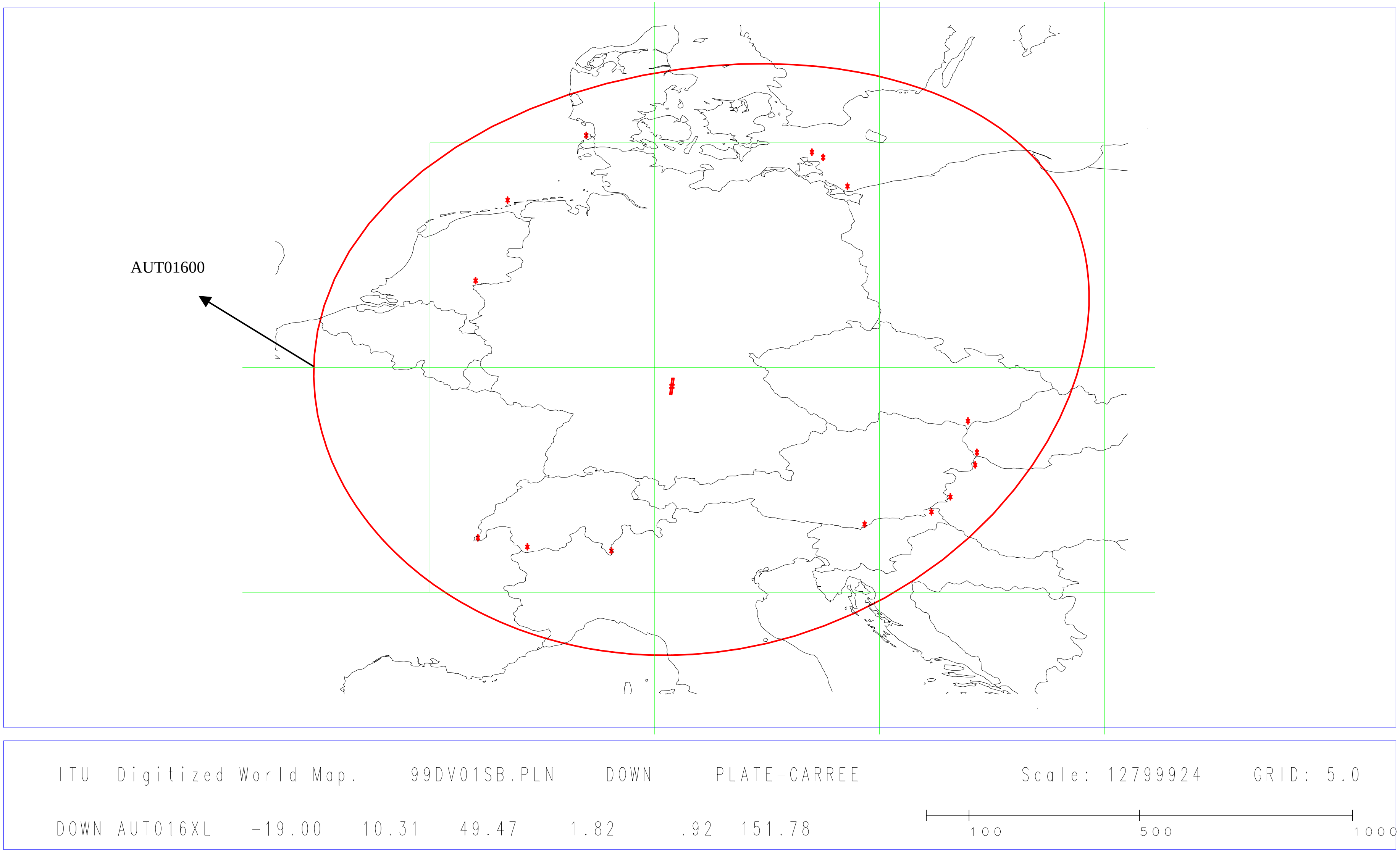
Annexes: 2

ANNEX C

Complementary/updated information to that contained in Annex C of Attachment 2 to Document WRC2000/34

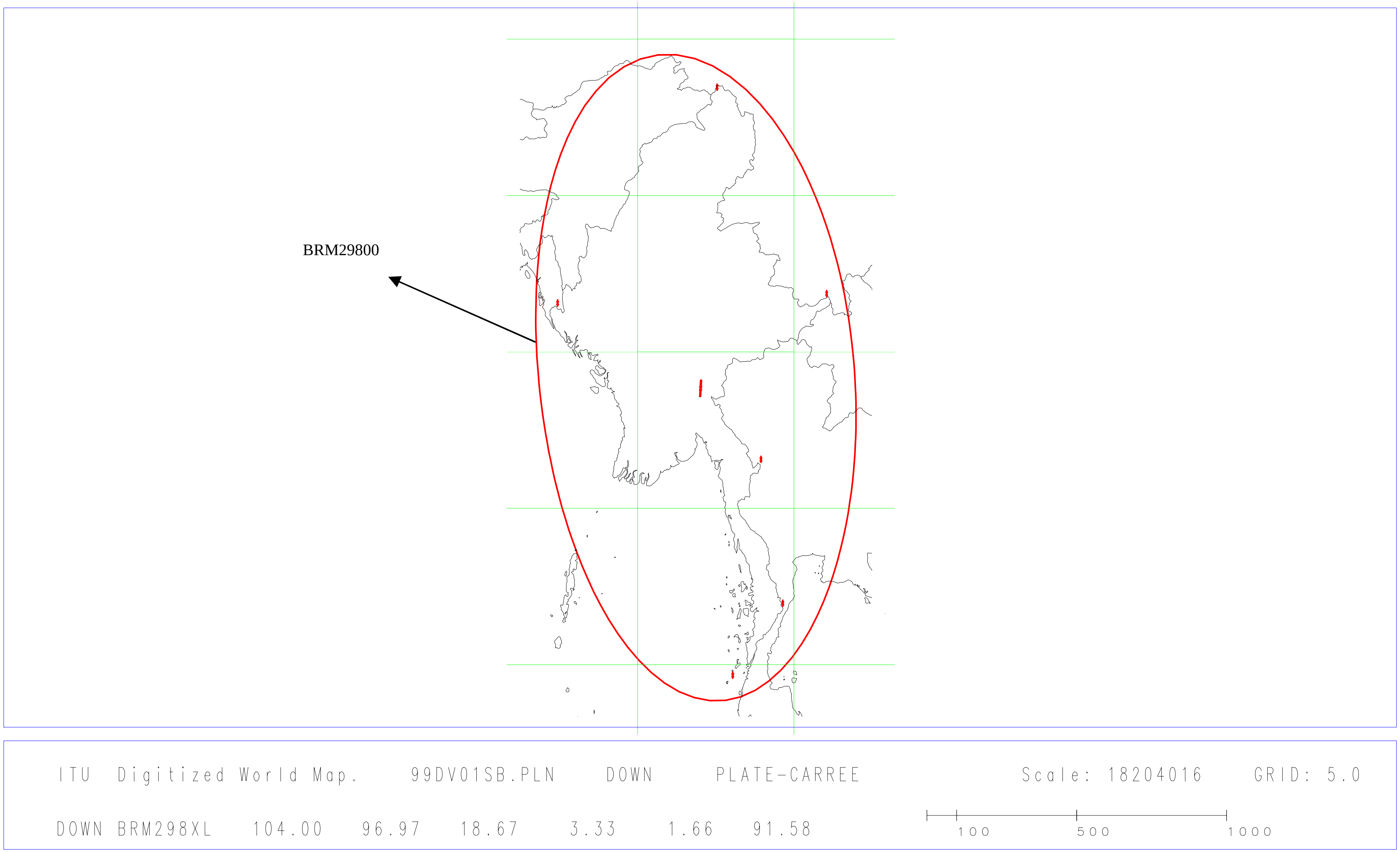
Recalculated elliptical beams and composite beams at their starting point orbital position for the downlink feasibility study

AUT (19° W) (1)

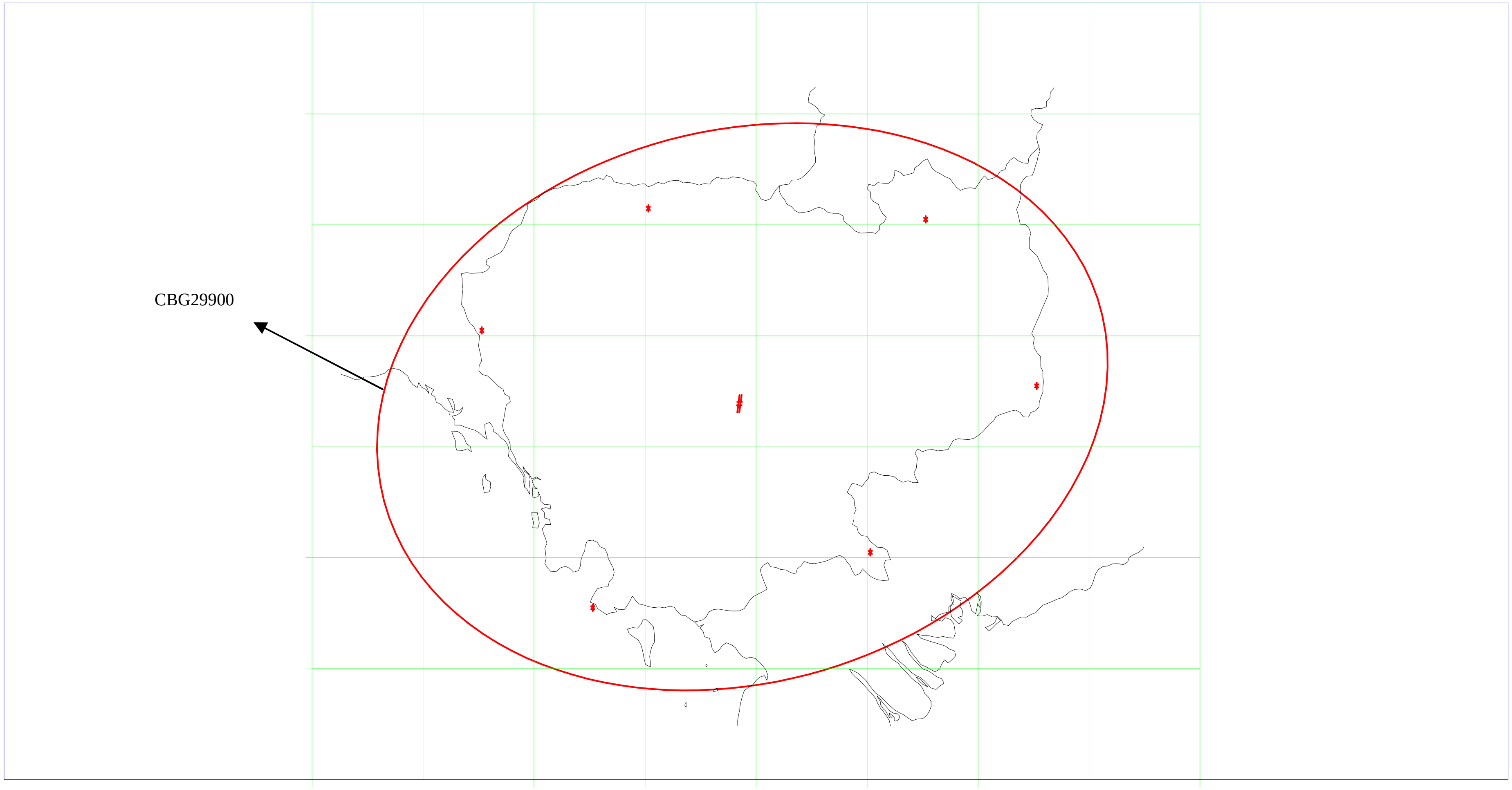


(1) Multinational beam identical for AUT, D, LIE and SUI

BRM (104° E)


BRM29800
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 18204016 GRID: 5.0
DOWN BRM298XL 104.00 96.97 18.67 3.33 1.66 91.58
100 500 1000

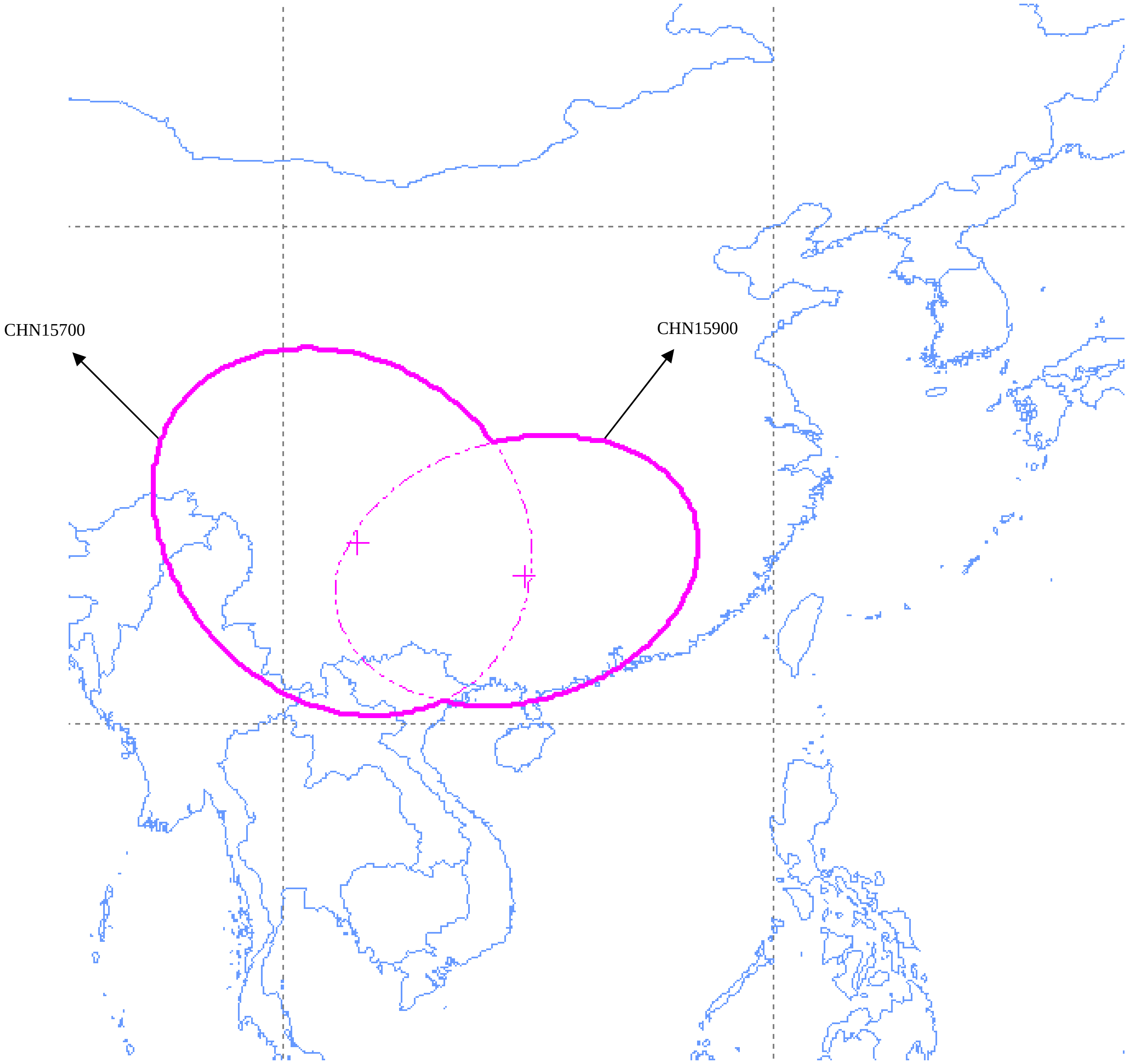
CBG (86° E)



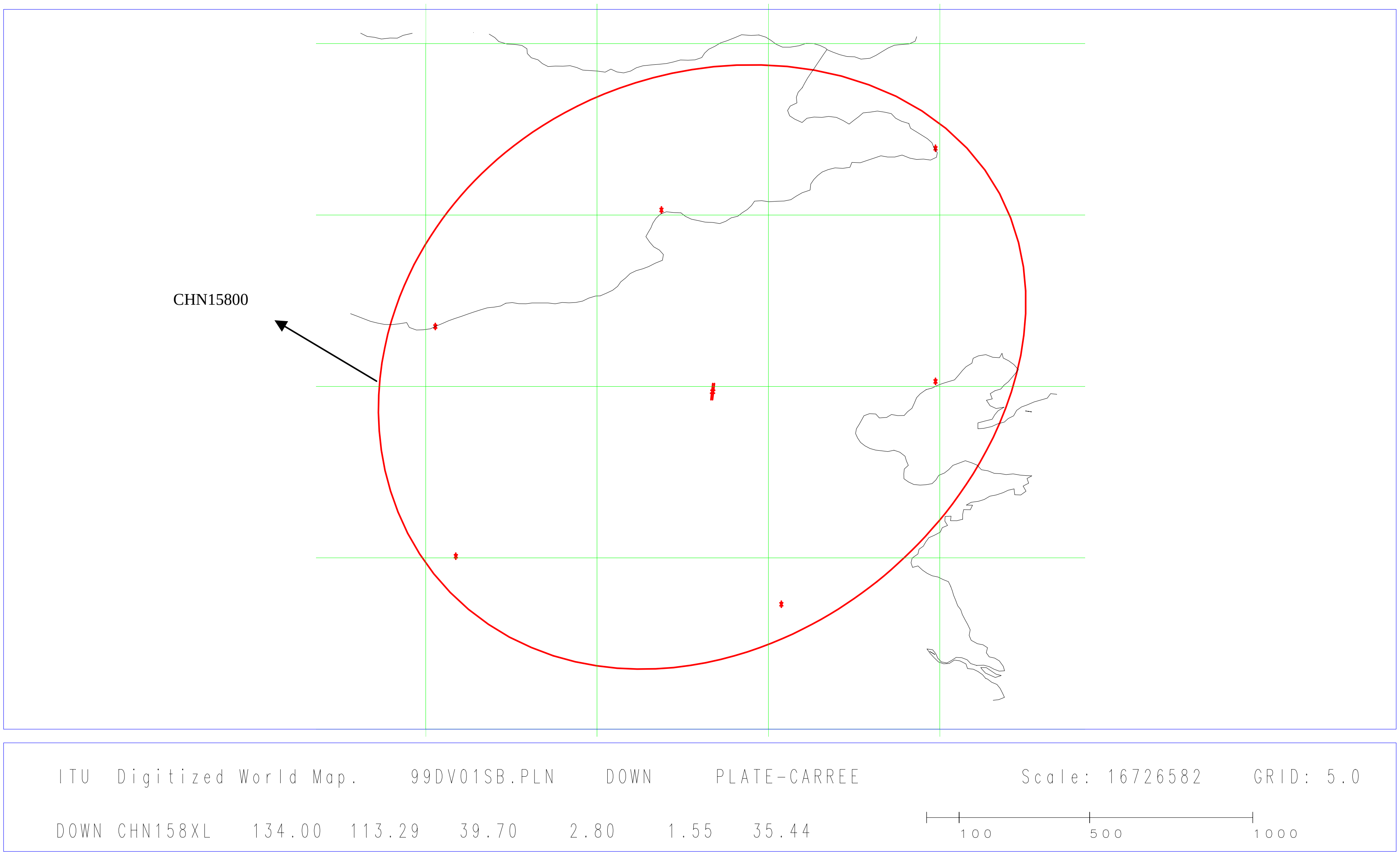
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 5342881 GRID: 1.0

DOWN CBG299XL 86.00 104.82 12.34 1.04 .86 9.45 100

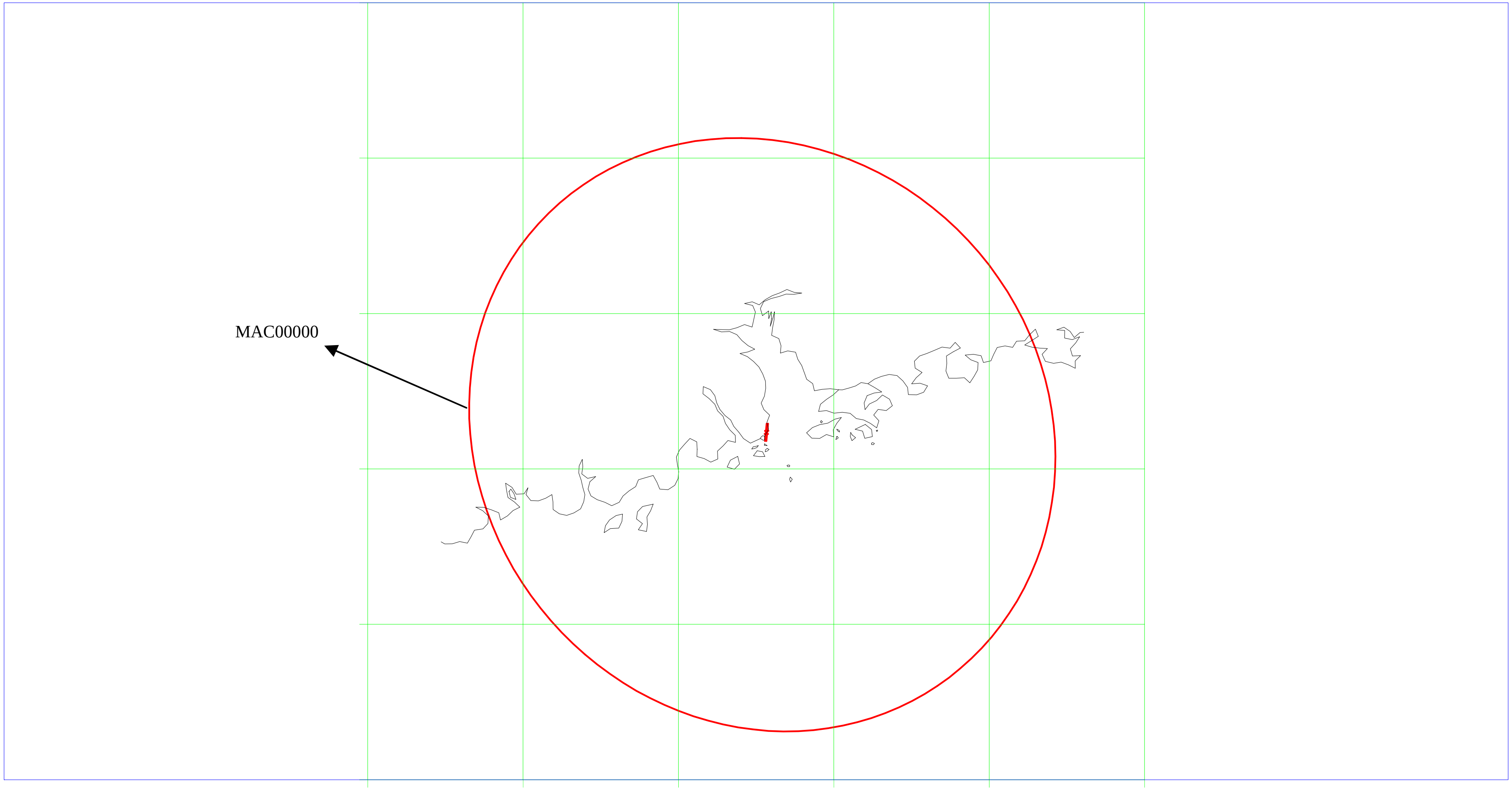
CHN (134° E)



CHN (134° E)


CHN15800
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 16726582 GRID: 5.0
DOWN CHN158XL 134.00 113.29 39.70 2.80 1.55 35.44
100
500
1000

CHN / MAC (122° E)

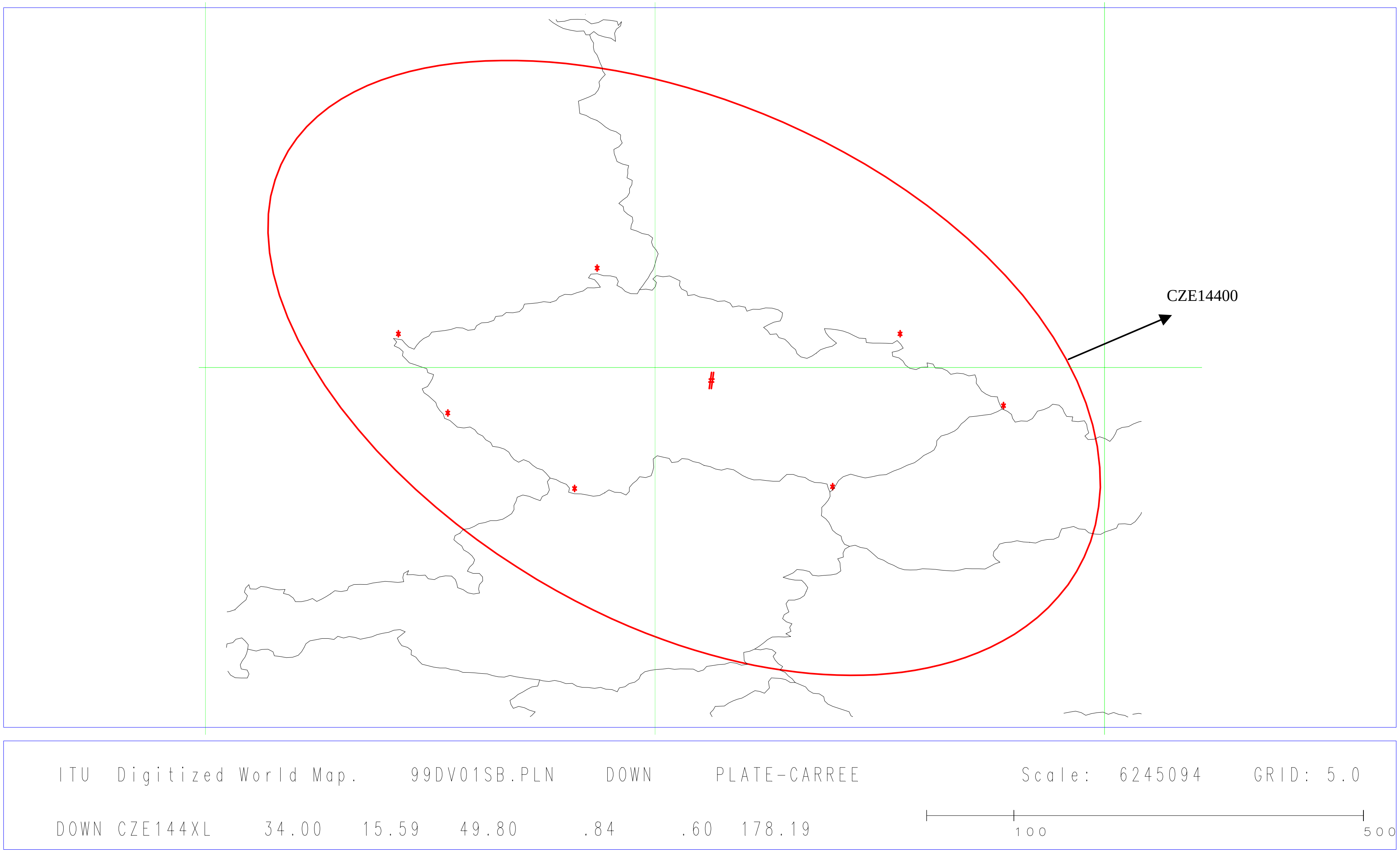


ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 3499983 GRID: 1.0

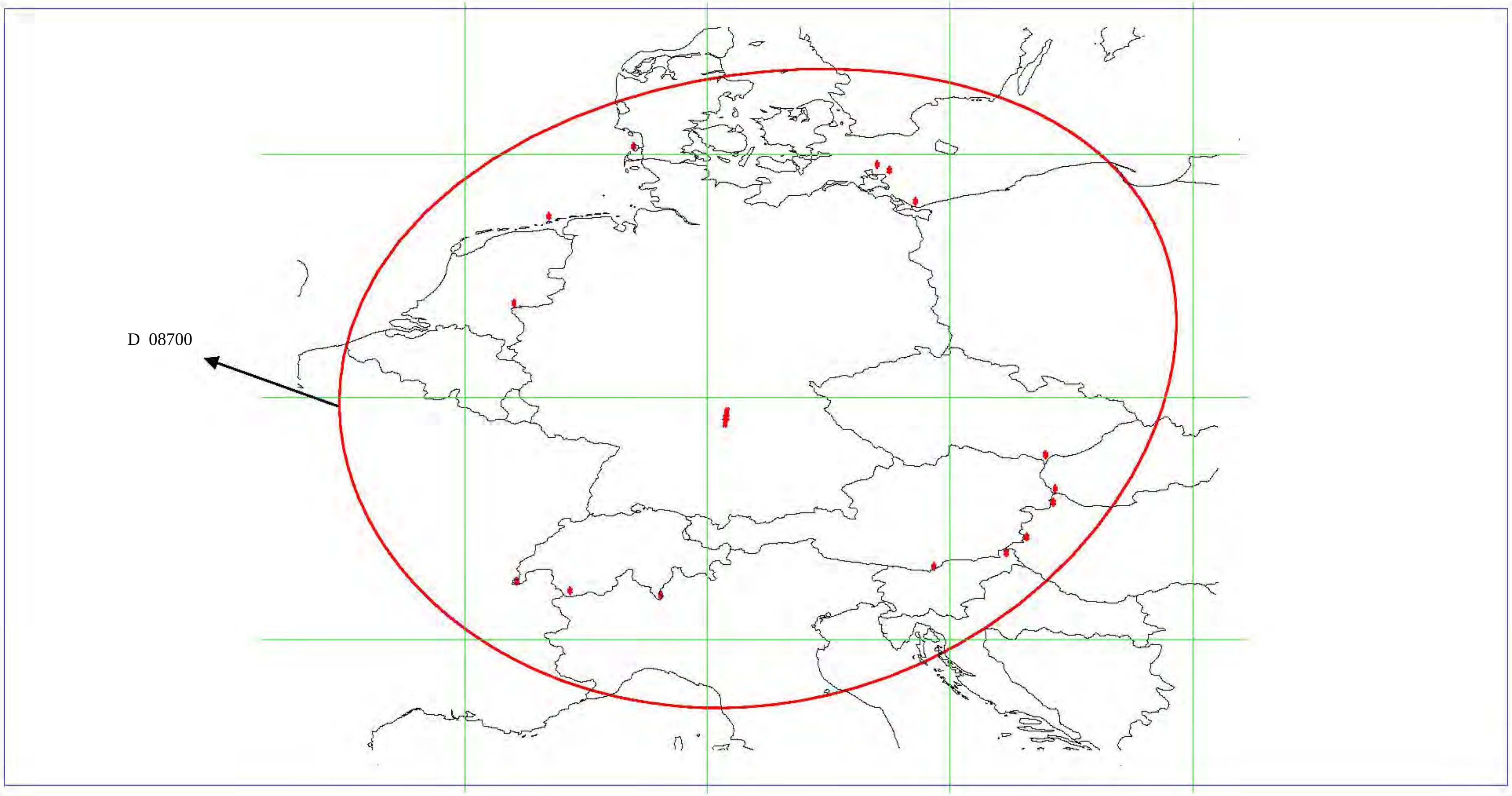
DOWN MAC000XL 122.00 113.55 22.20 .60 .60 .00

100

CZE (34° E)


CZE14400
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 6245094 GRID: 5.0
DOWN CZE144XL 34.00 15.59 49.80 .84 .60 178.19
100
500

D (19° W) (1)

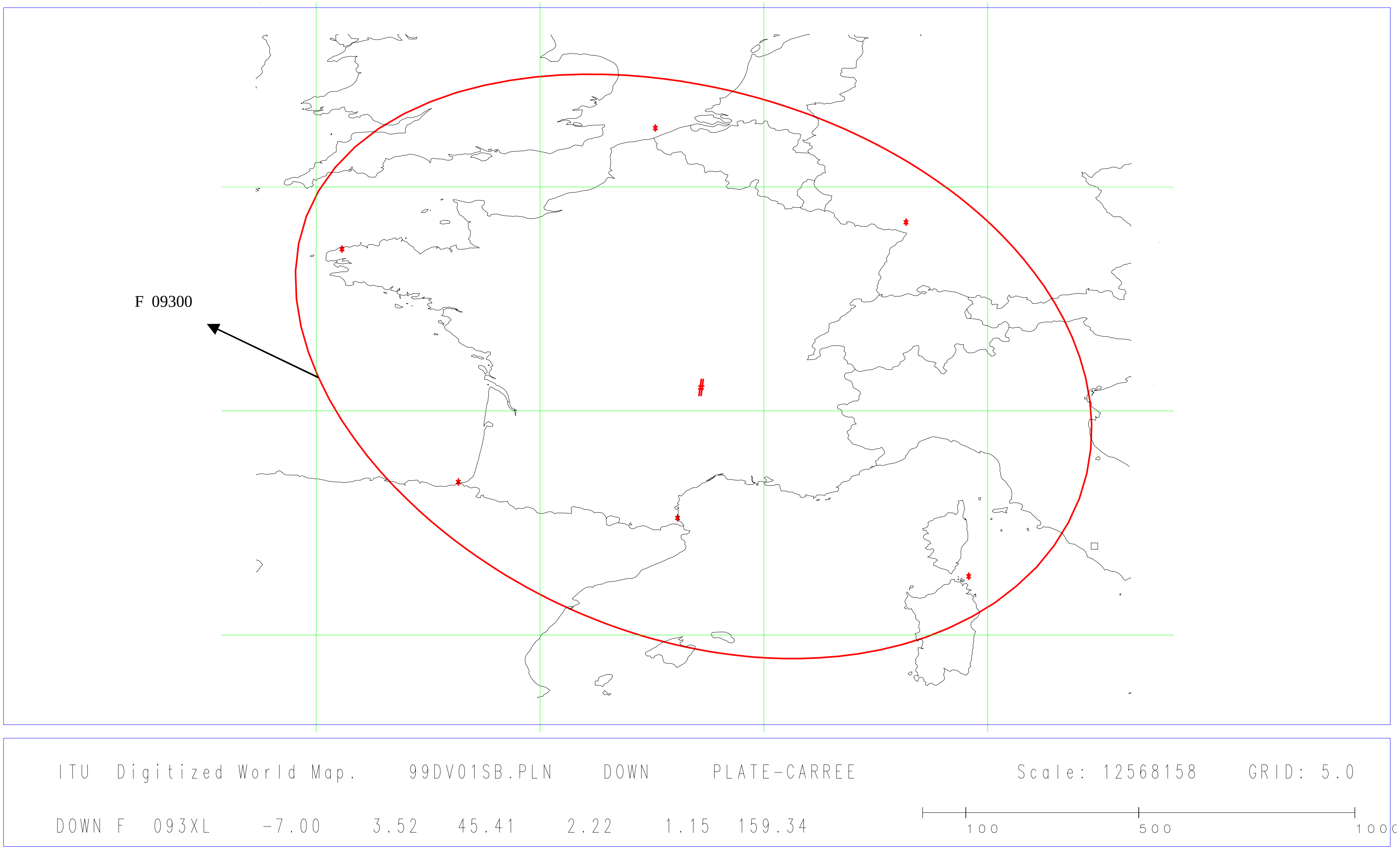


ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 12799924 GRID: 5.0

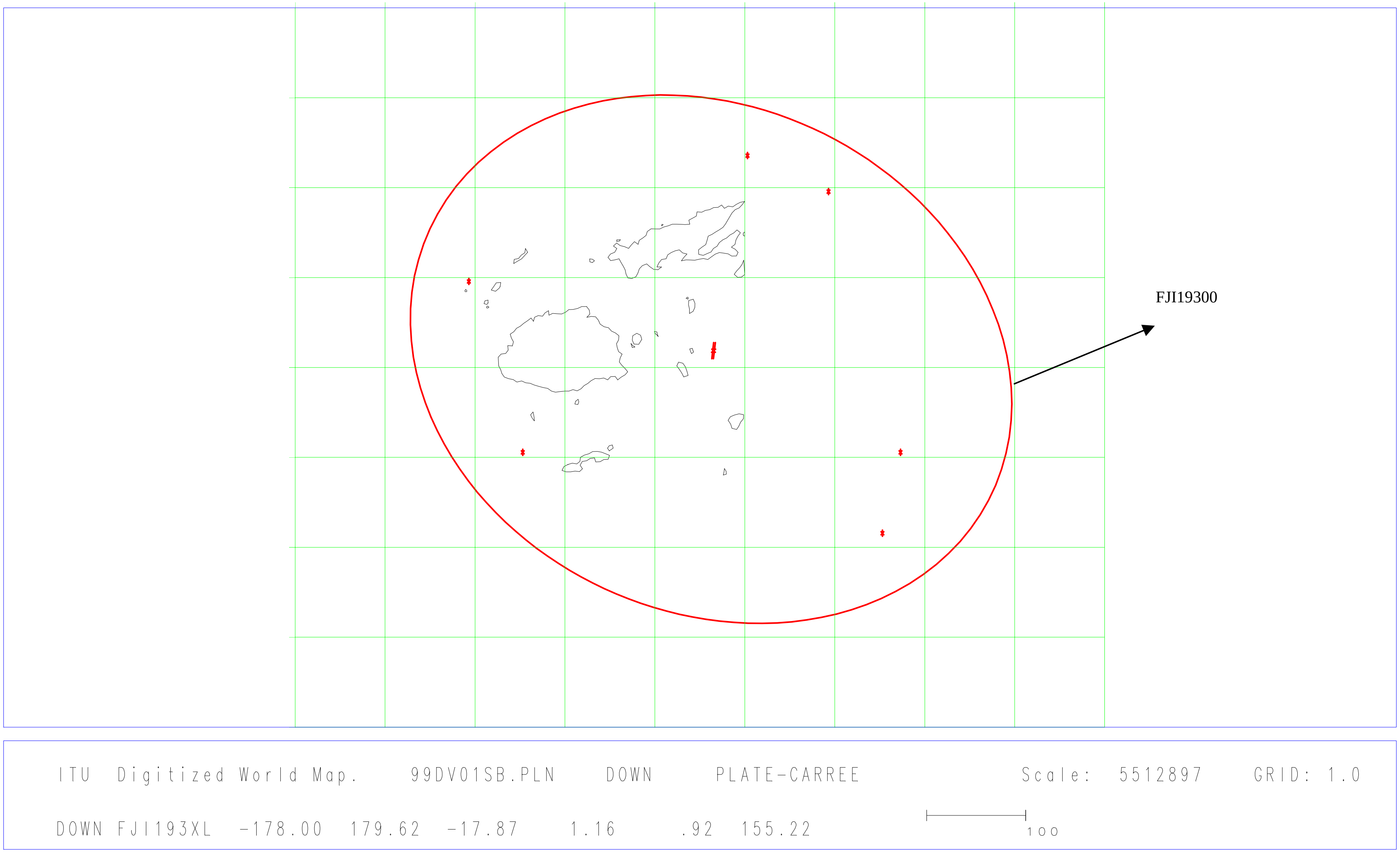
DOWN D 087YR -19.00 10.31 49.47 1.82 .92 151.78 100 500 1000

(1) Multinational beam identical for AUT, D, LIE and SUI

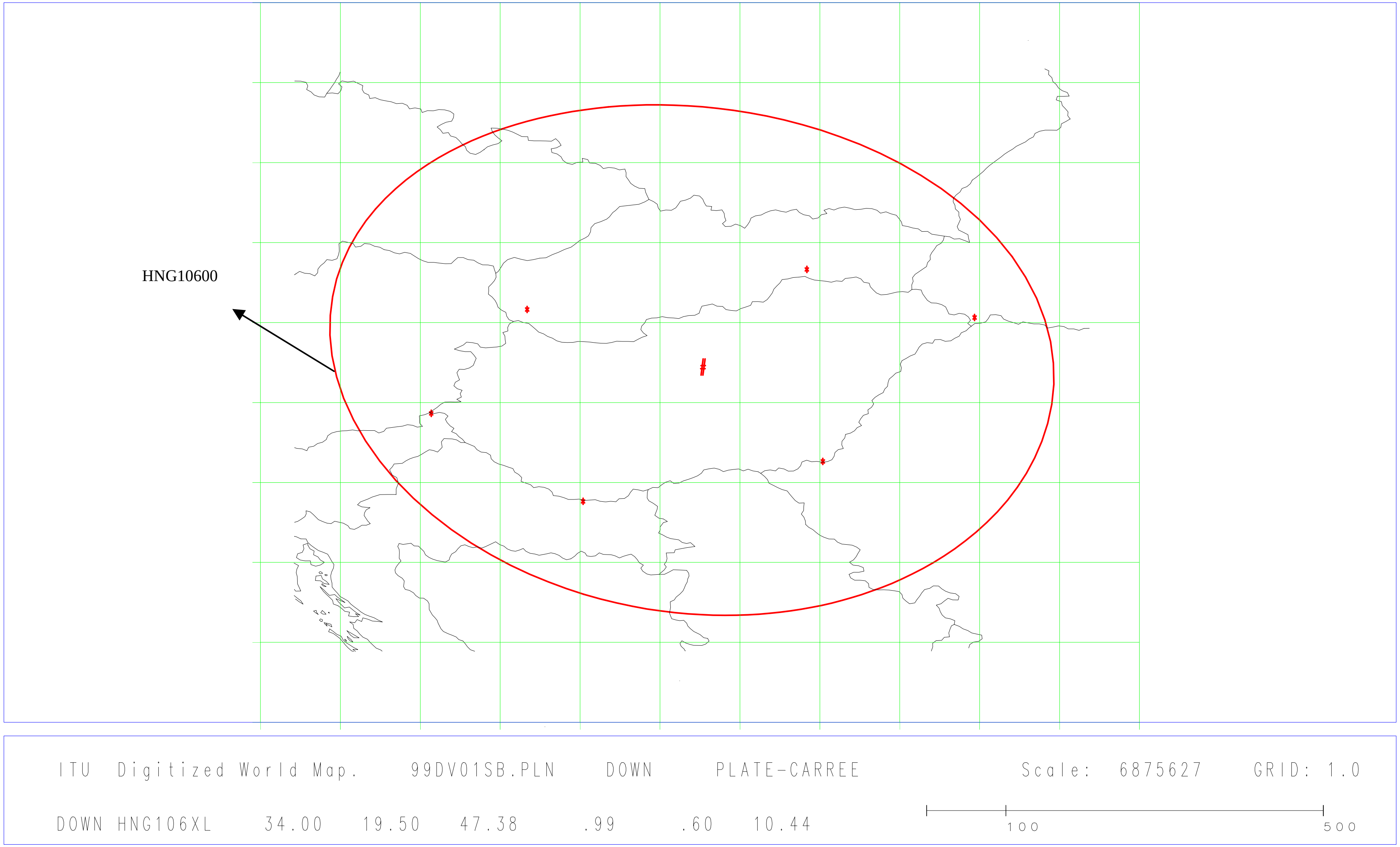
F (7° W)


F 09300
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 12568158 GRID: 5.0
DOWN F 093XL -7.00 3.52 45.41 2.22 1.15 159.34
100
500
1000

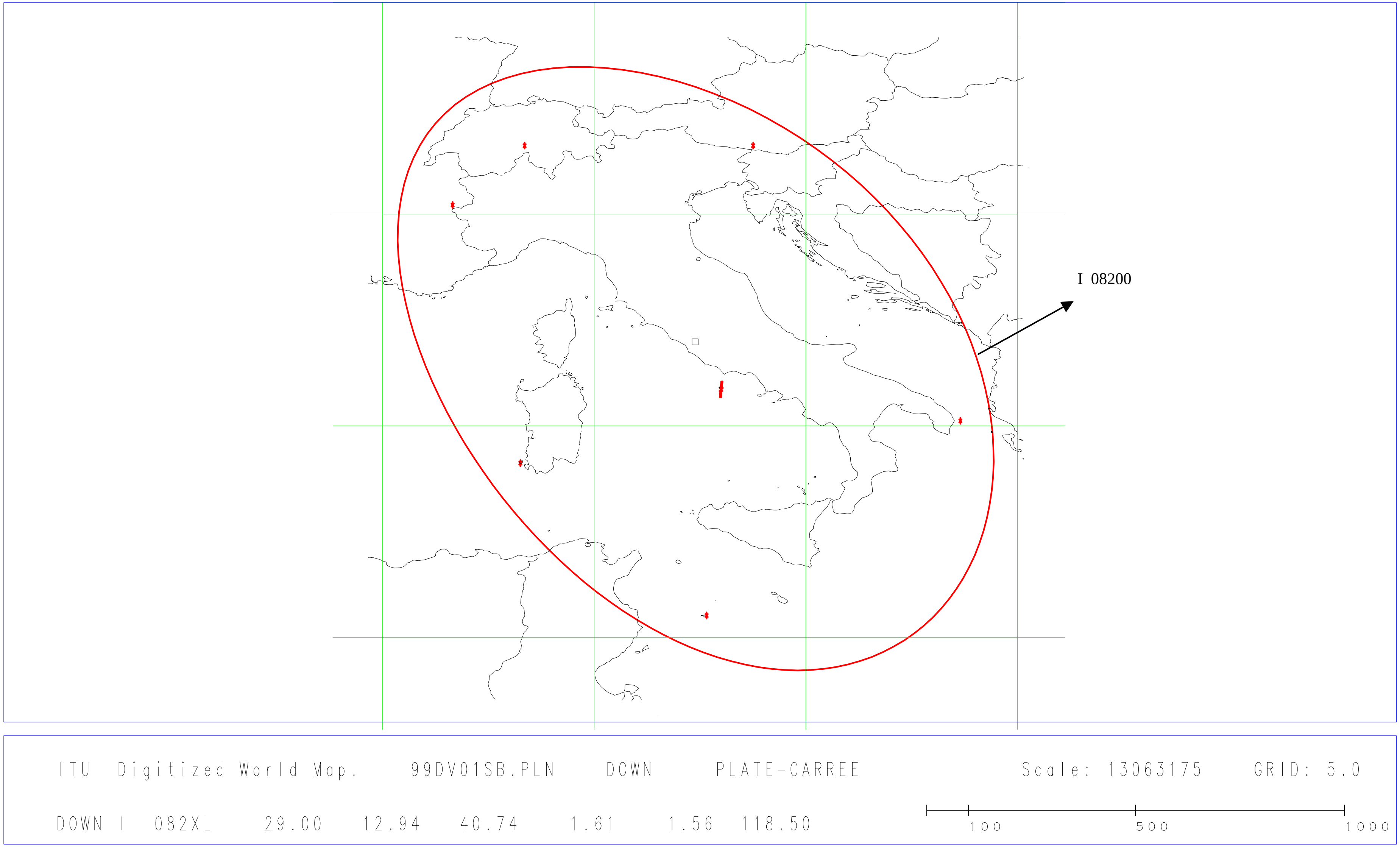
FJI (178° W)


FJI19300
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 5512897 GRID: 1.0
DOWN FJI193XL -178.00 179.62 -17.87 1.16 .92 155.22
100

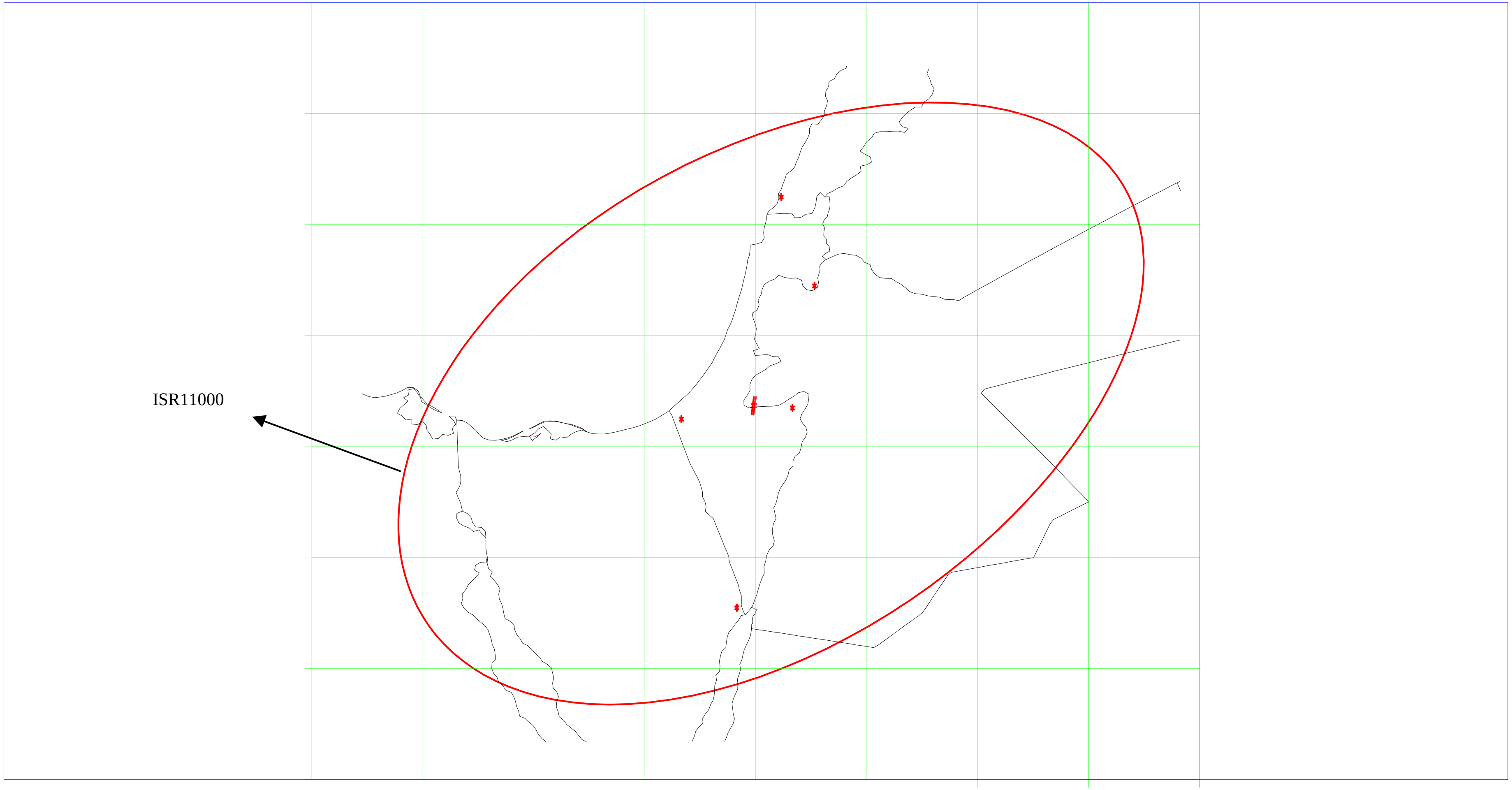
HNG (34° E)


HNG10600
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 6875627 GRID: 1.0
DOWN HNG106XL 34.00 19.50 47.38 .99 .60 10.44
100
500

I (29° E)


I 08200
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 13063175 GRID: 5.0
DOWN I 082XL 29.00 12.94 40.74 1.61 1.56 118.50
100
500
1000

ISR (4° W)

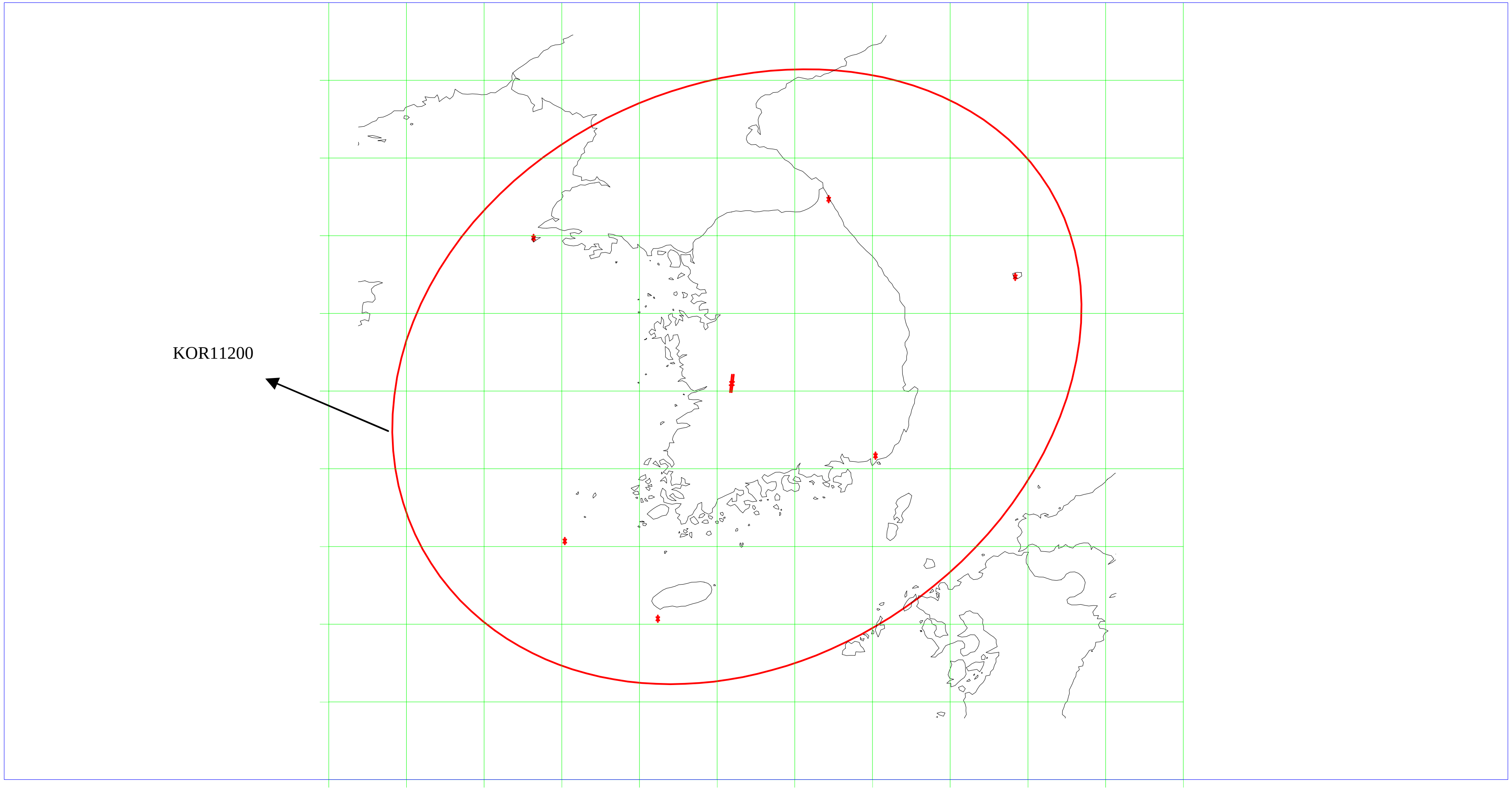


ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 5450691 GRID: 1.0

DOWN ISR110YR -4.00 34.95 31.32 .73 .60 110.02

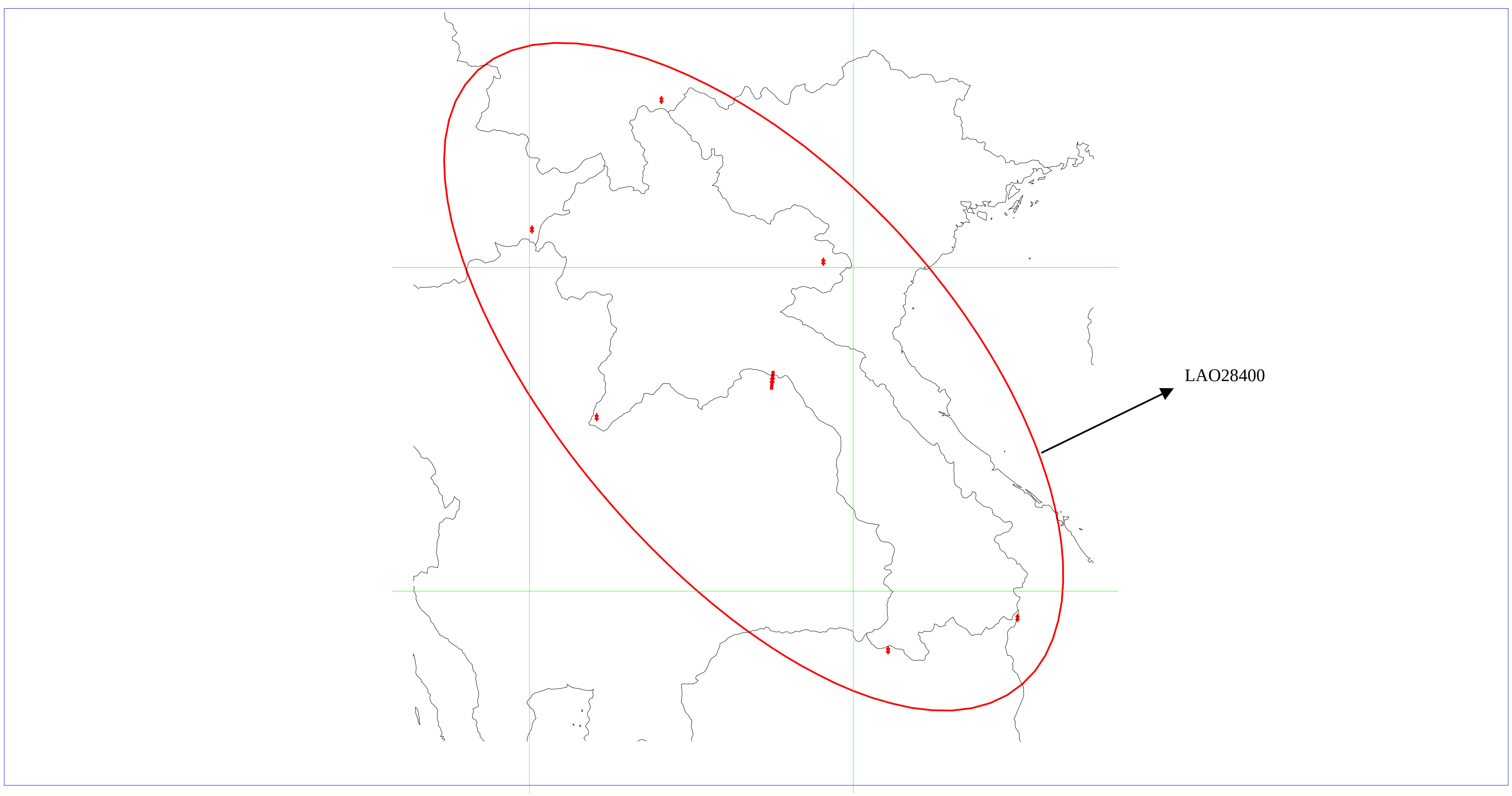
100

KOR (116° E)



ITU Digitized World Map.	99D_KOR.PLN	DOWN	PLATE-CARREE		Scale: 7482164	GRID: 1.0		
DOWN KOR11200	116.00	127.15	36.03	1.17	1.00	3.83	100	500

LAO (122° E)

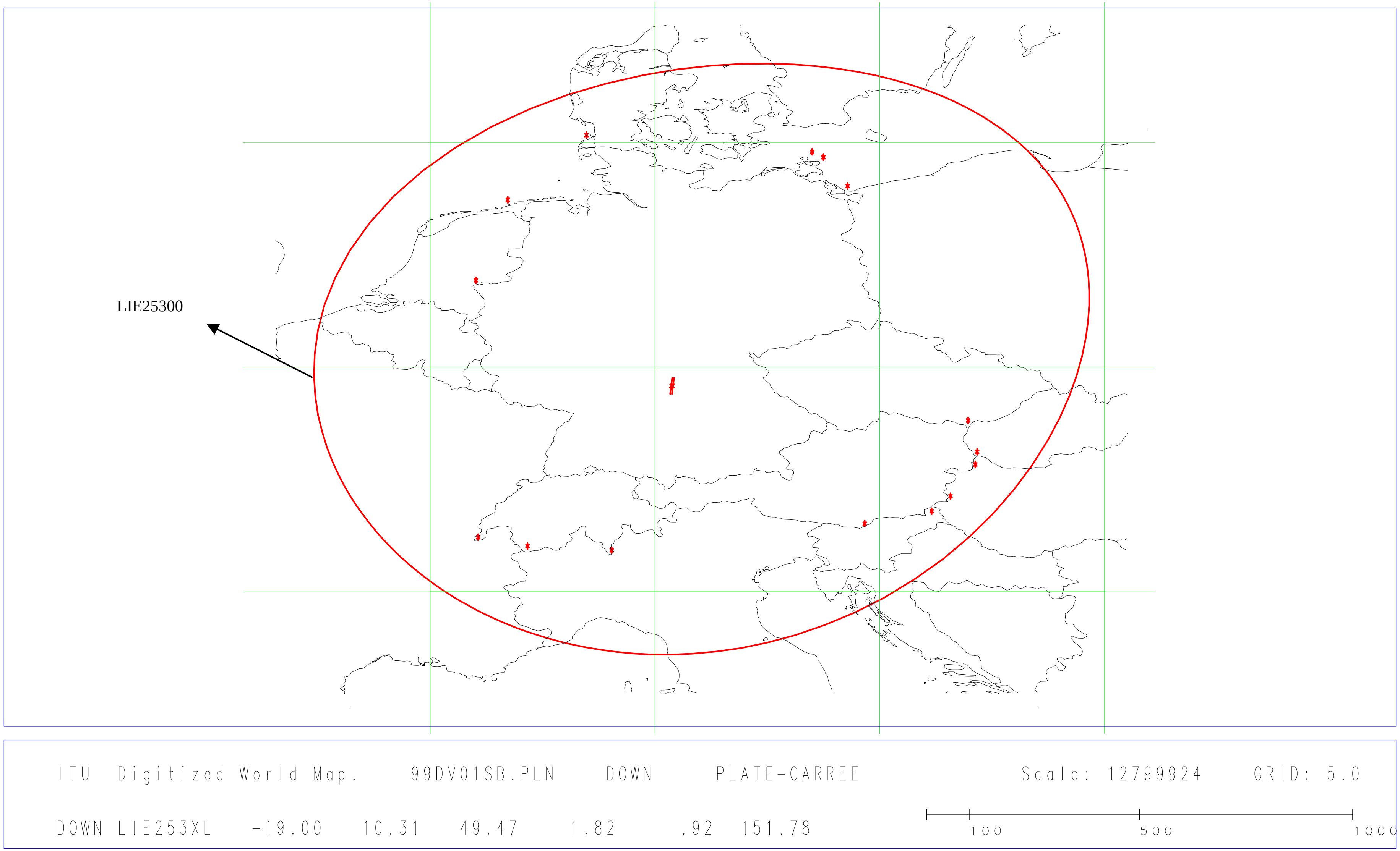


ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 9675034 GRID: 5.0

DOWN LAO284XL 122.00 103.71 18.17 1.87 1.03 123.99

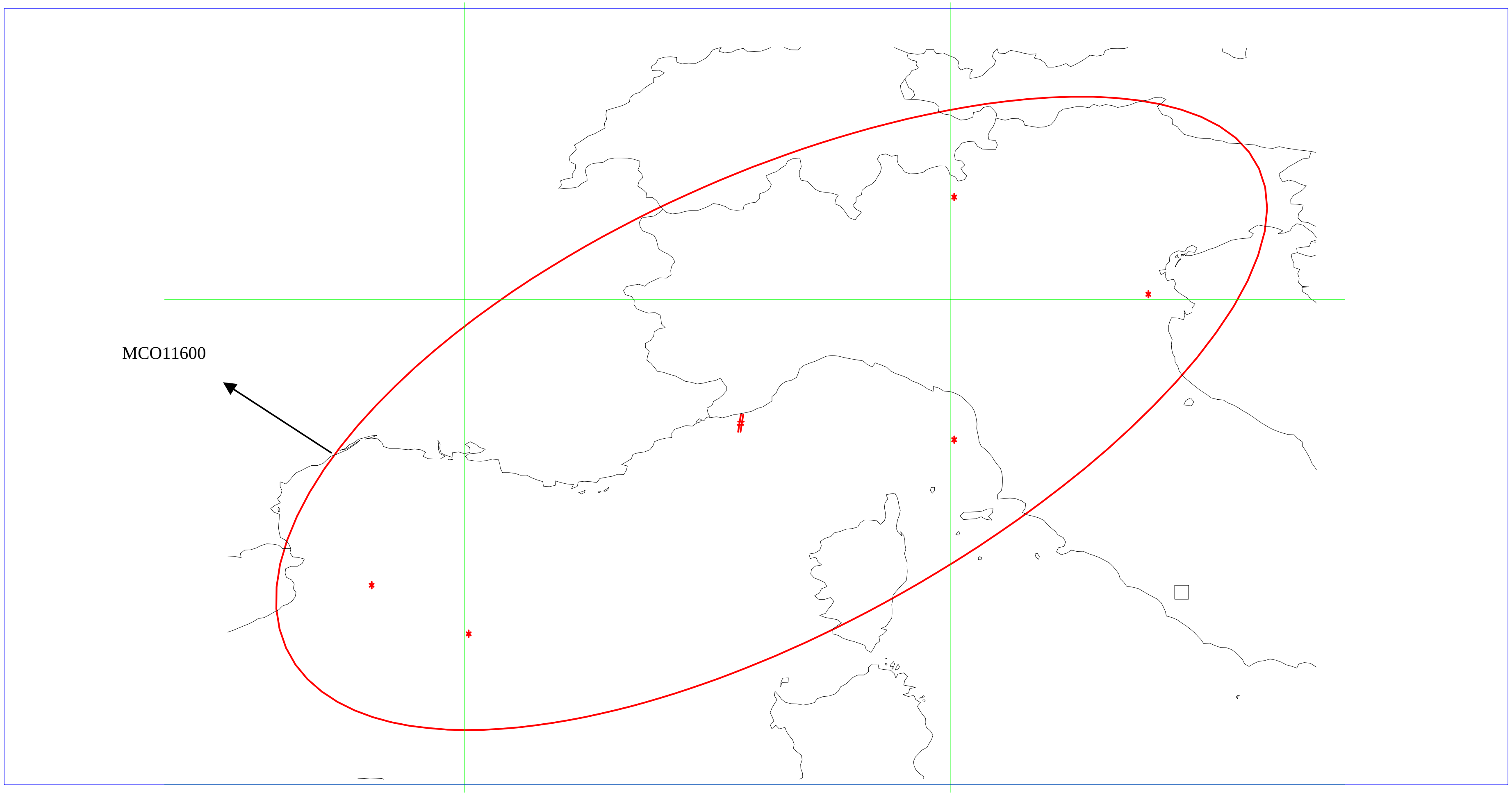
100 500

LIE (19° W) (1)



(1) Multinational beam identical for AUT, D, LIE and SUI

MCO (13° W)

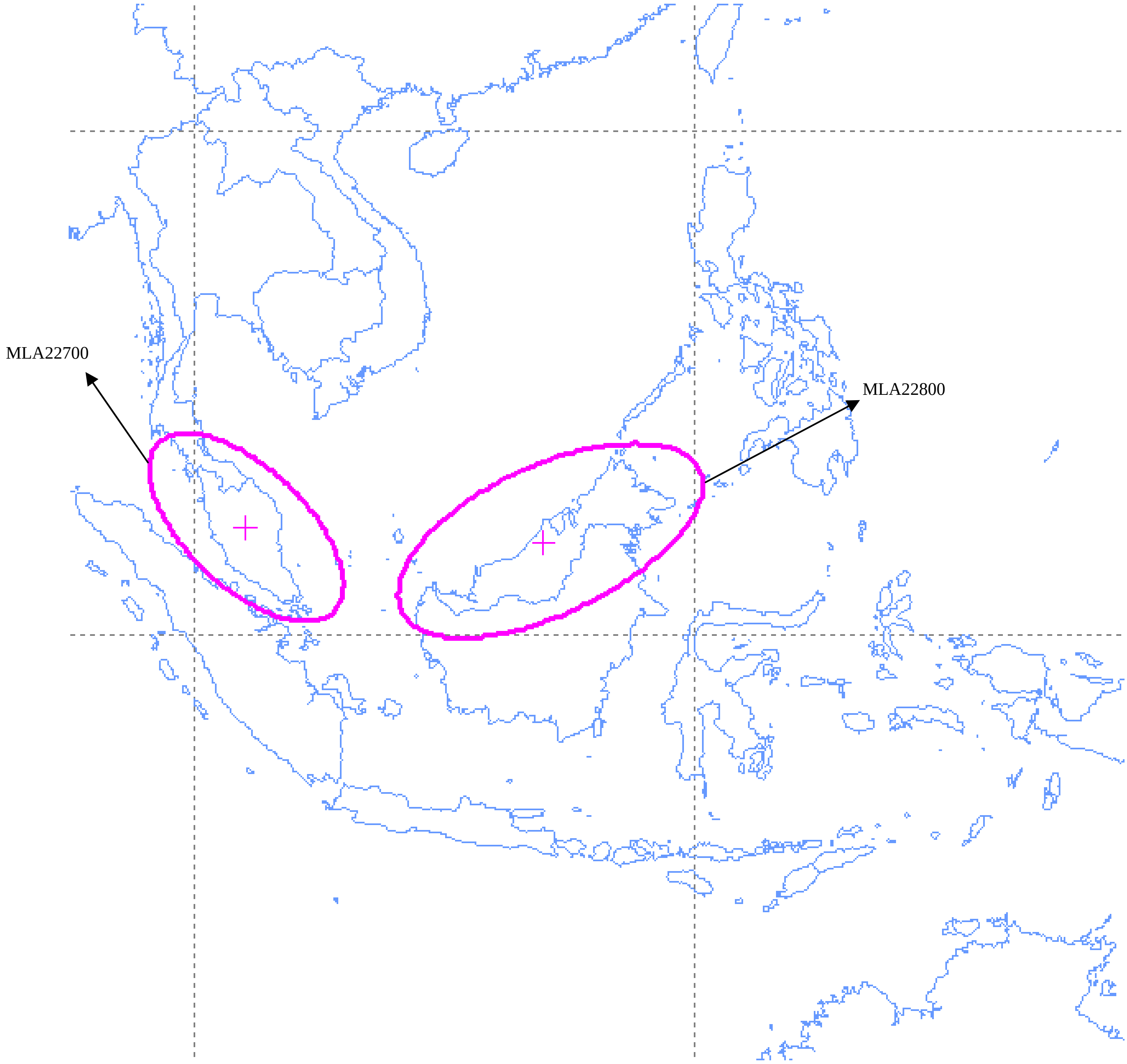


ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 6310512 GRID: 5.0

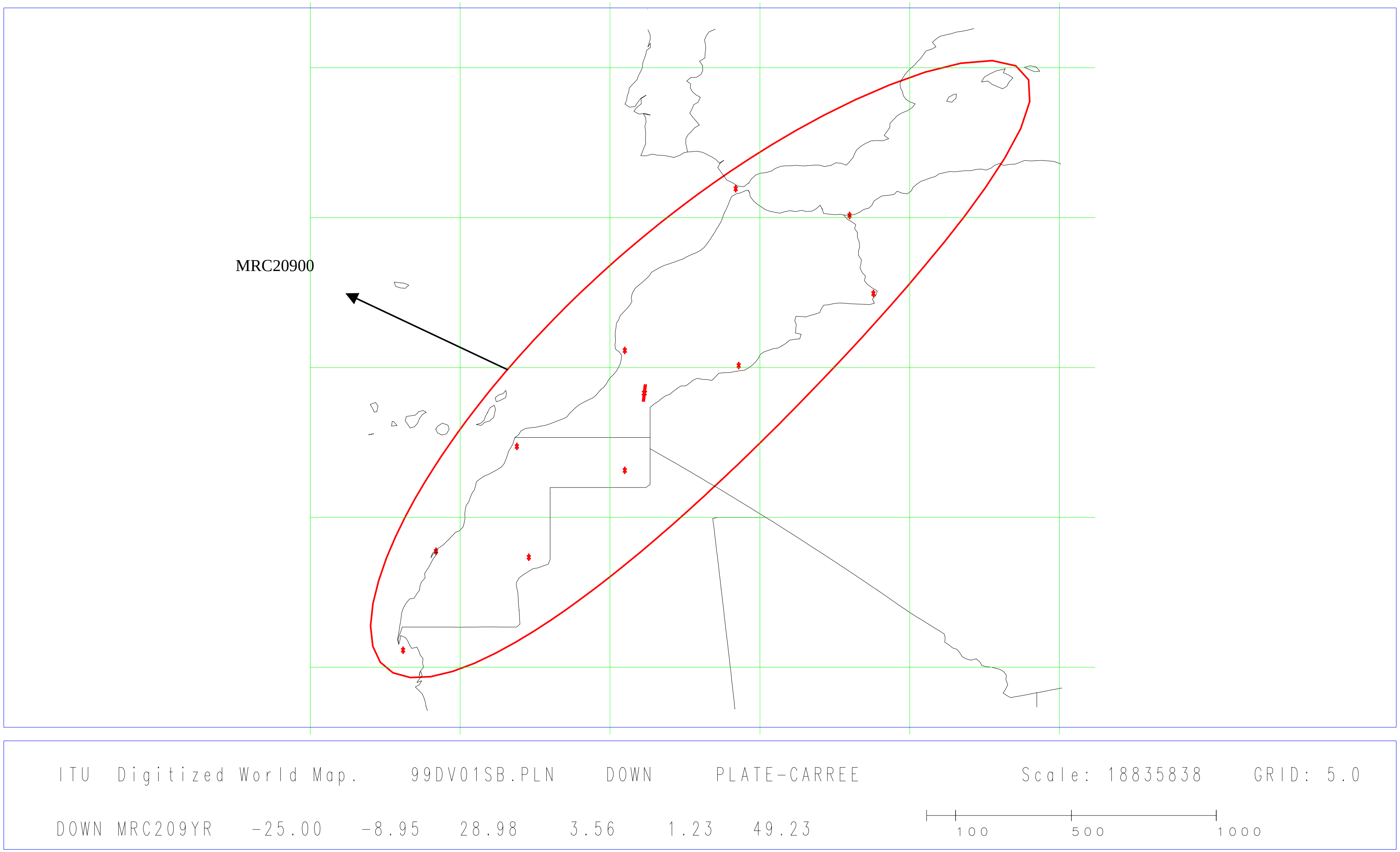
DOWN MCO116XL -13.00 7.80 43.67 1.01 .60 21.06

100 500

MLA (91.5° E)

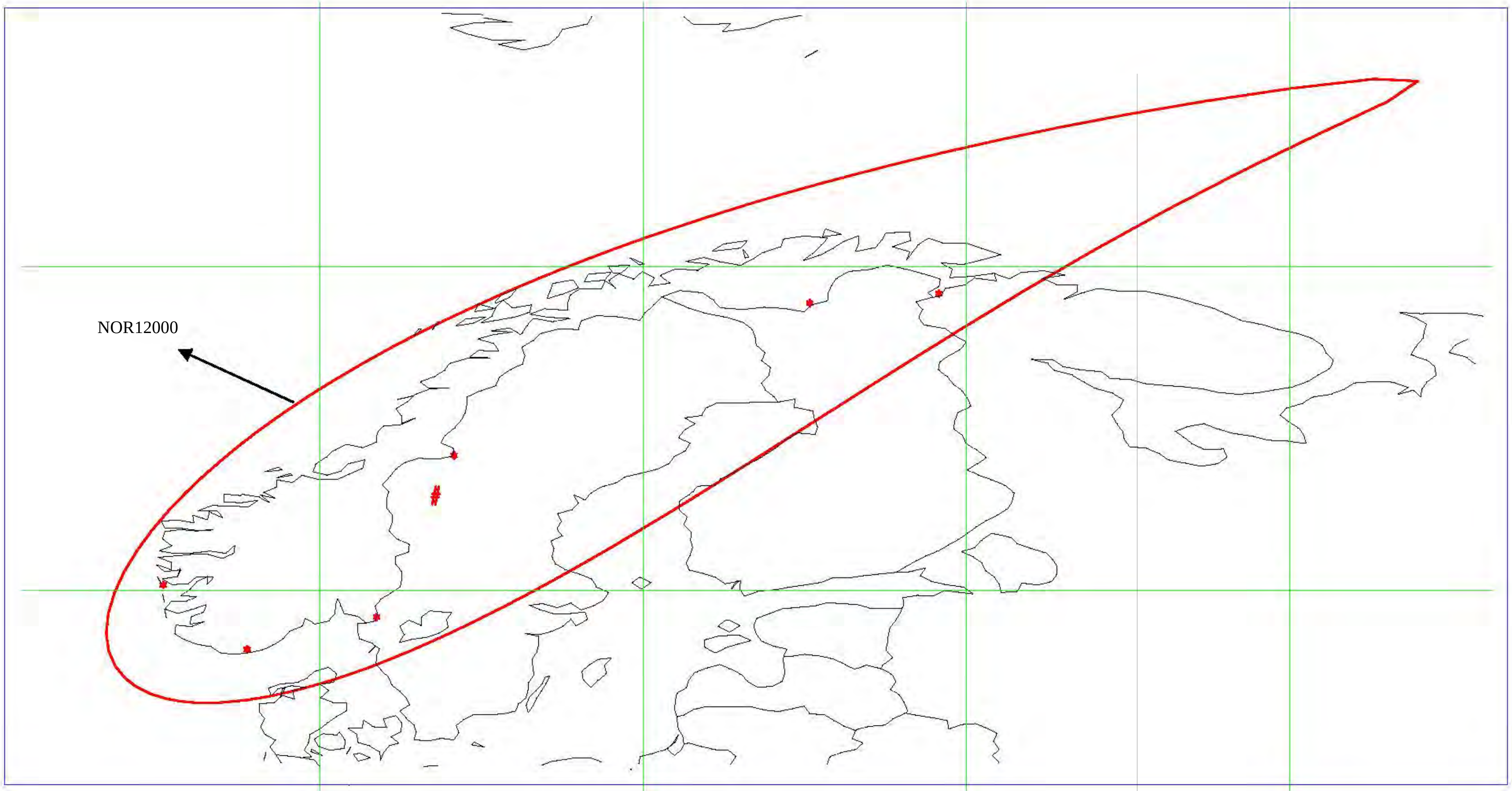


MRC (25° W) (2)



(2) Beam recalculated to provide appropriate national coverage

NOR (0.8° W)

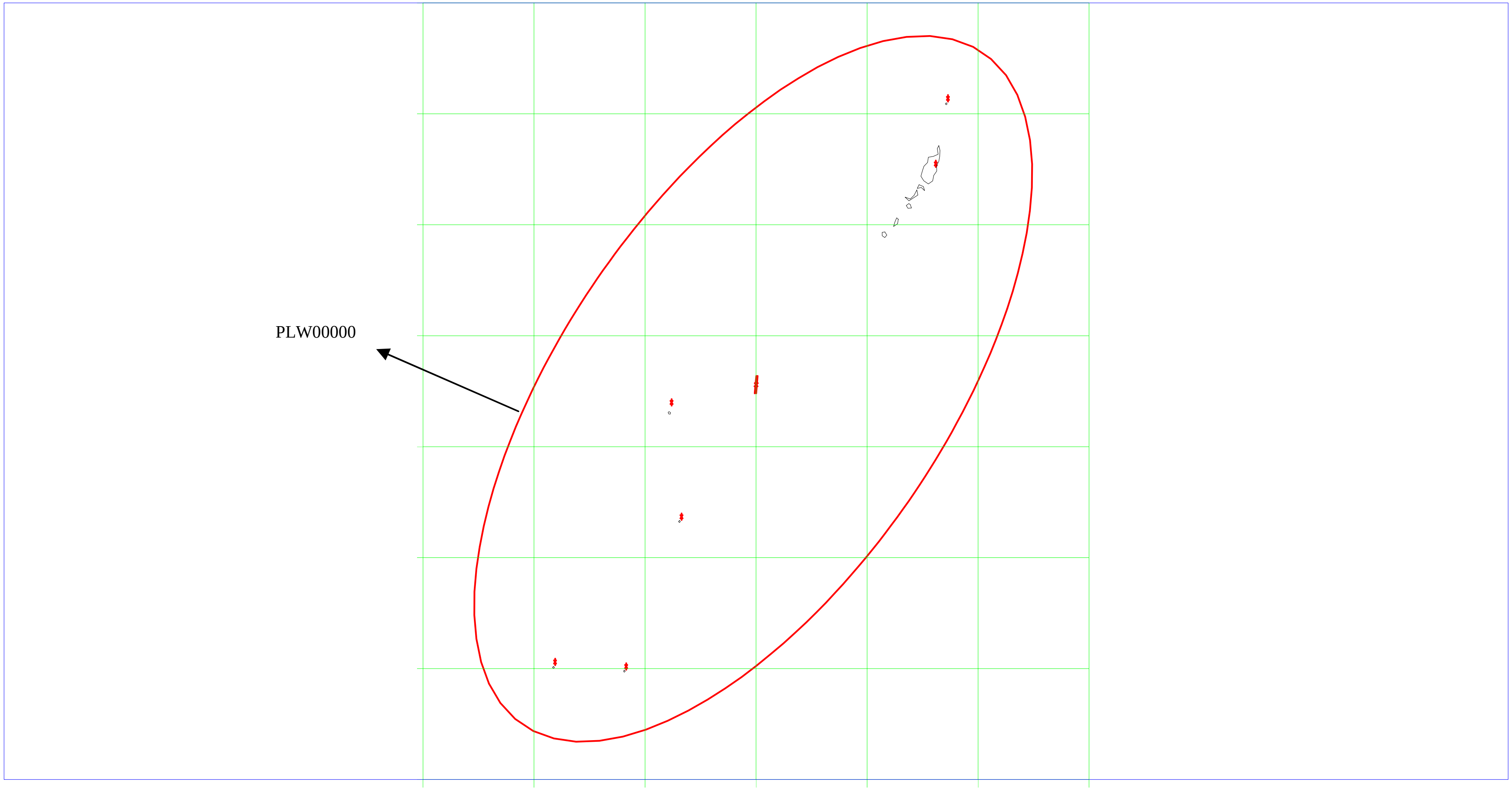


ITU Digitized World Map. 99D_NOR.PLN DOWN PLATE-CARREE Scale: 20063248 GRID:10.0

DOWN NOR120D_ -.80 13.42 62.76 1.43 .60 19.61

100 500 1000

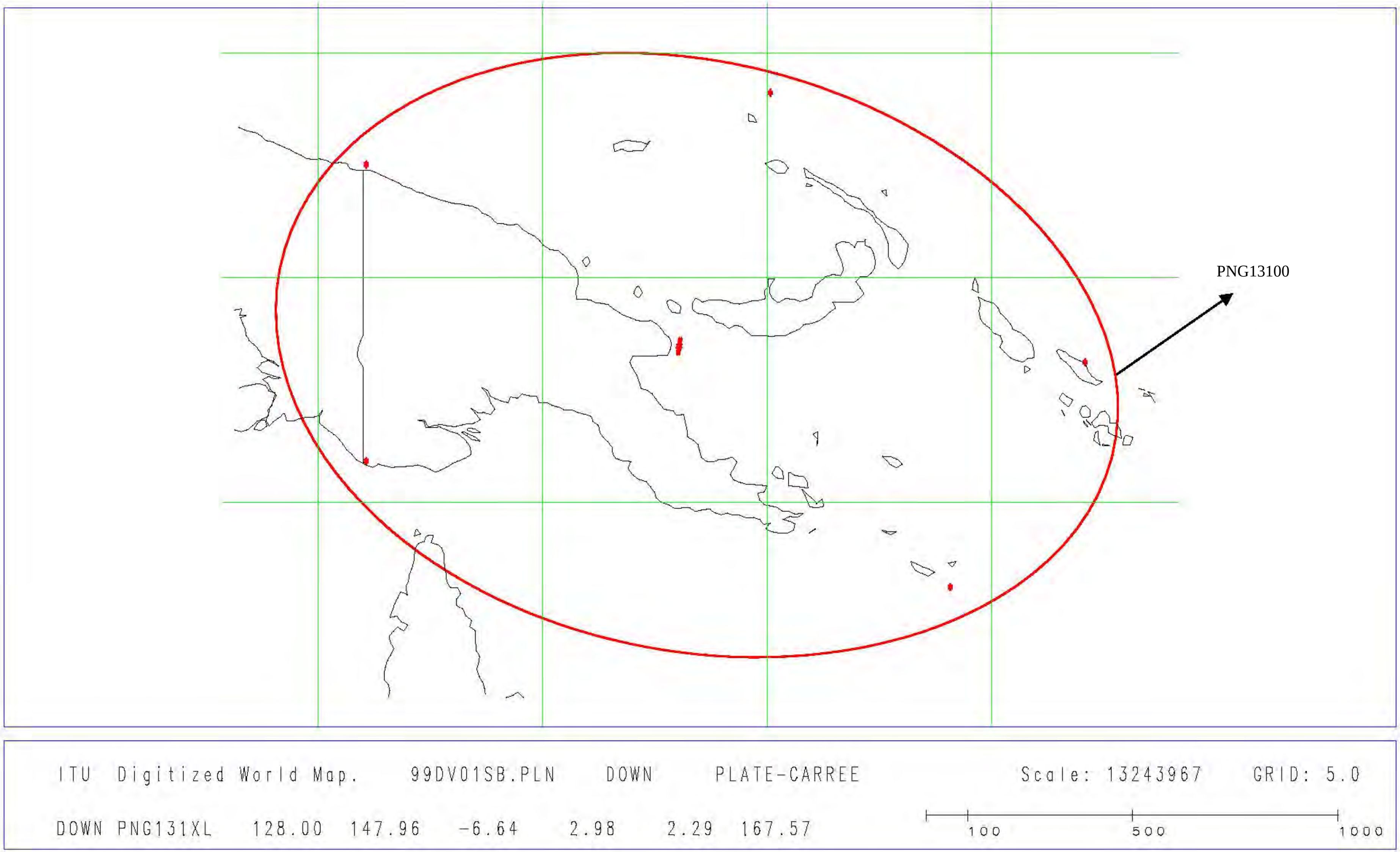
PLW (140° E)



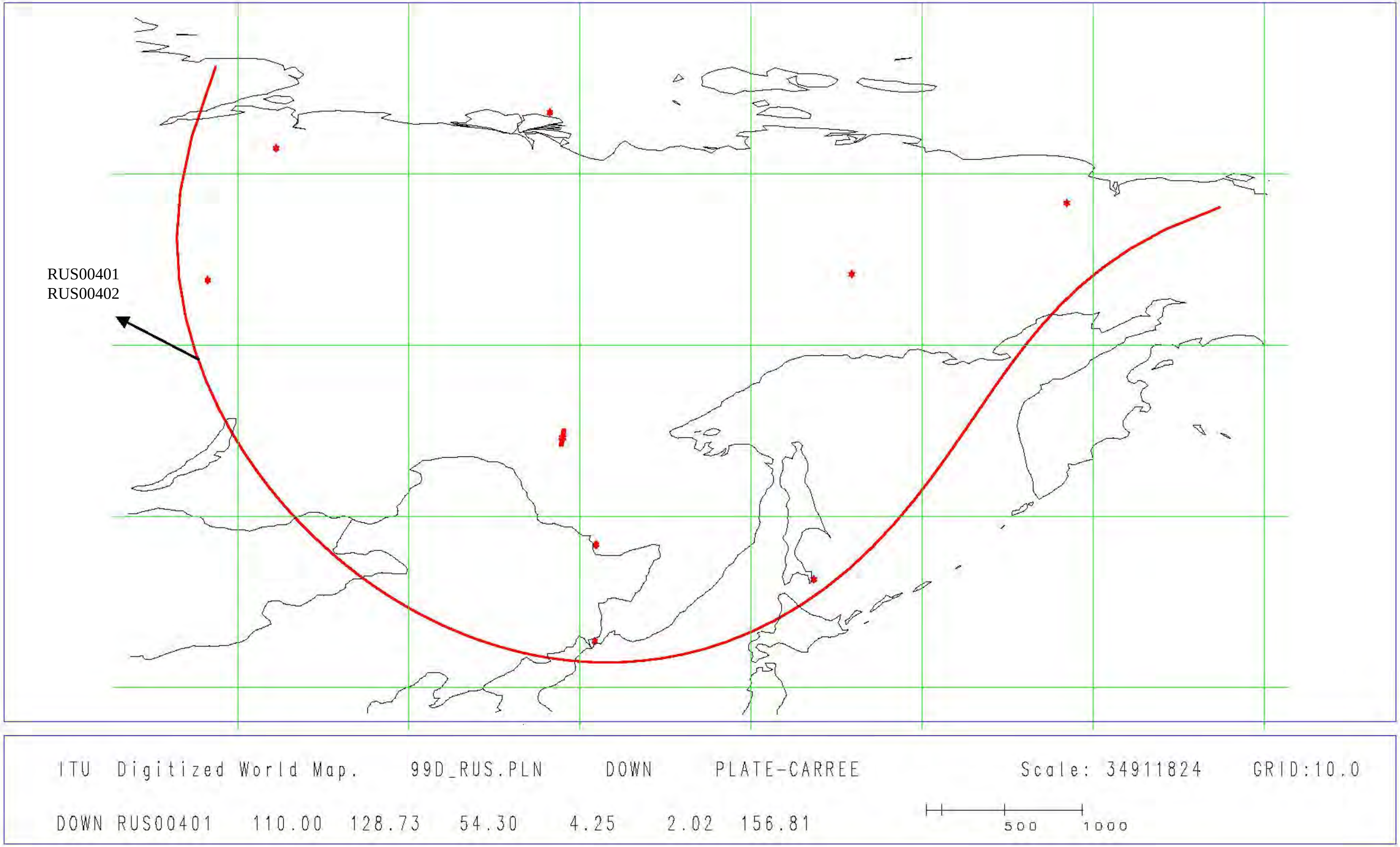
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 5438082 GRID: 1.0

DOWN PLW000XL 140.00 132.98 5.51 1.30 .60 55.41 100

PNG (128° E)

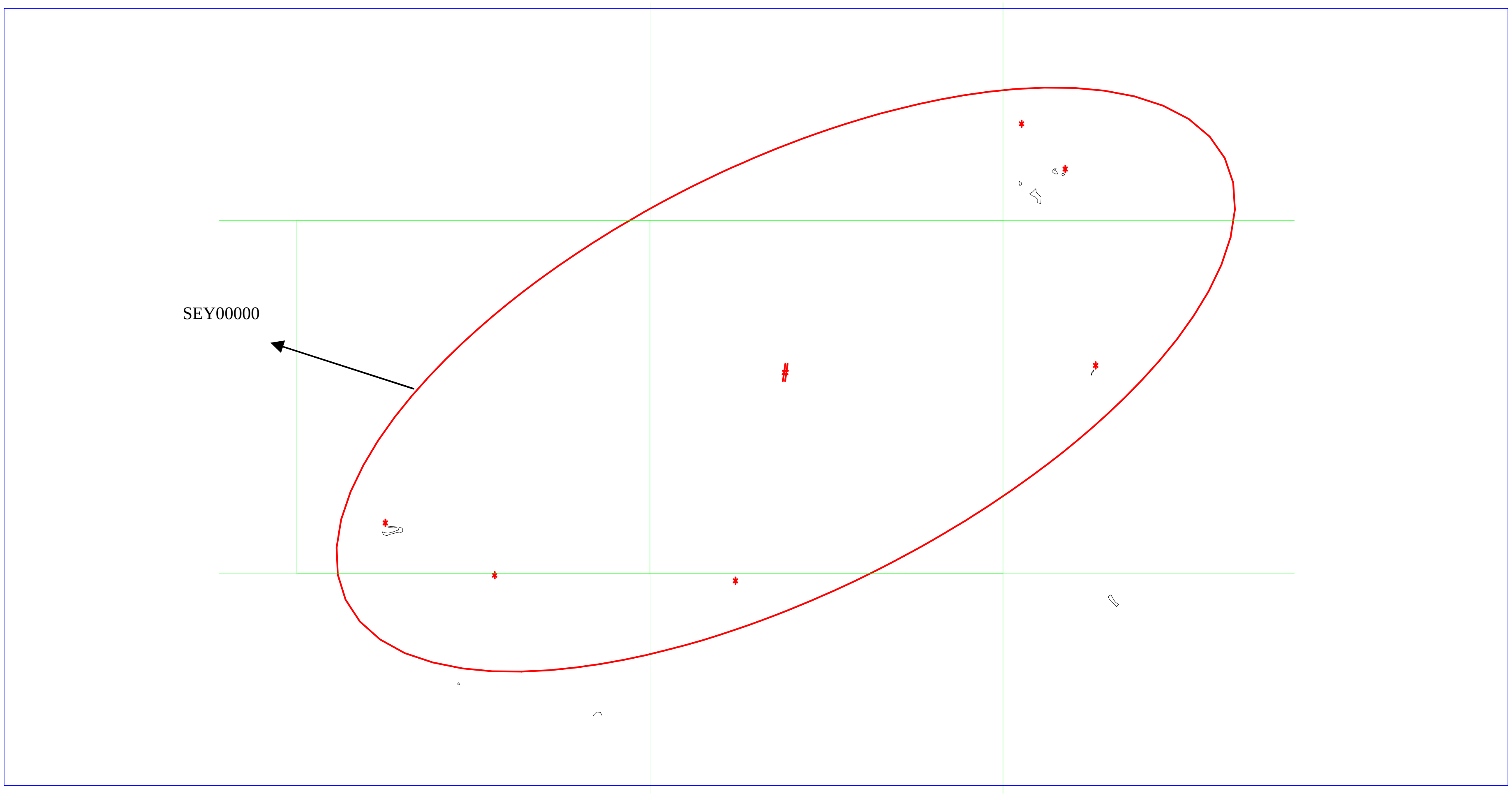

PNG13100
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 13243967 GRID: 5.0
DOWN PNG131XL 128.00 147.96 -6.64 2.98 2.29 167.57
100
500
1000

RUS (110° E) (2)



(2) Beam recalculated to provide appropriate national coverage

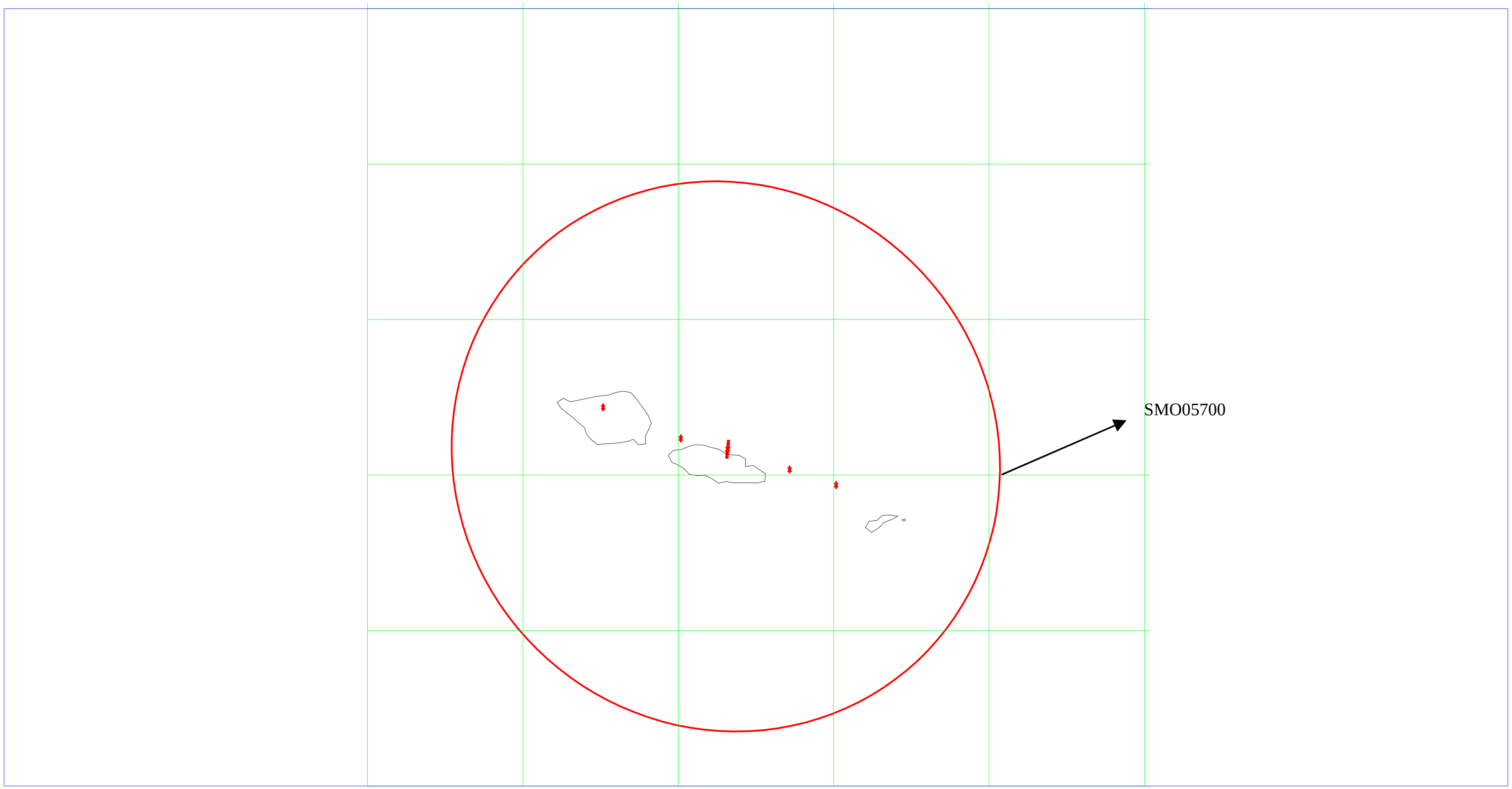
SEY (42.5° E)



ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 8654665 GRID: 5.0

DOWN SEY000XL 42.50 51.86 -7.23 2.43 1.04 27.51

SMO (178° W)

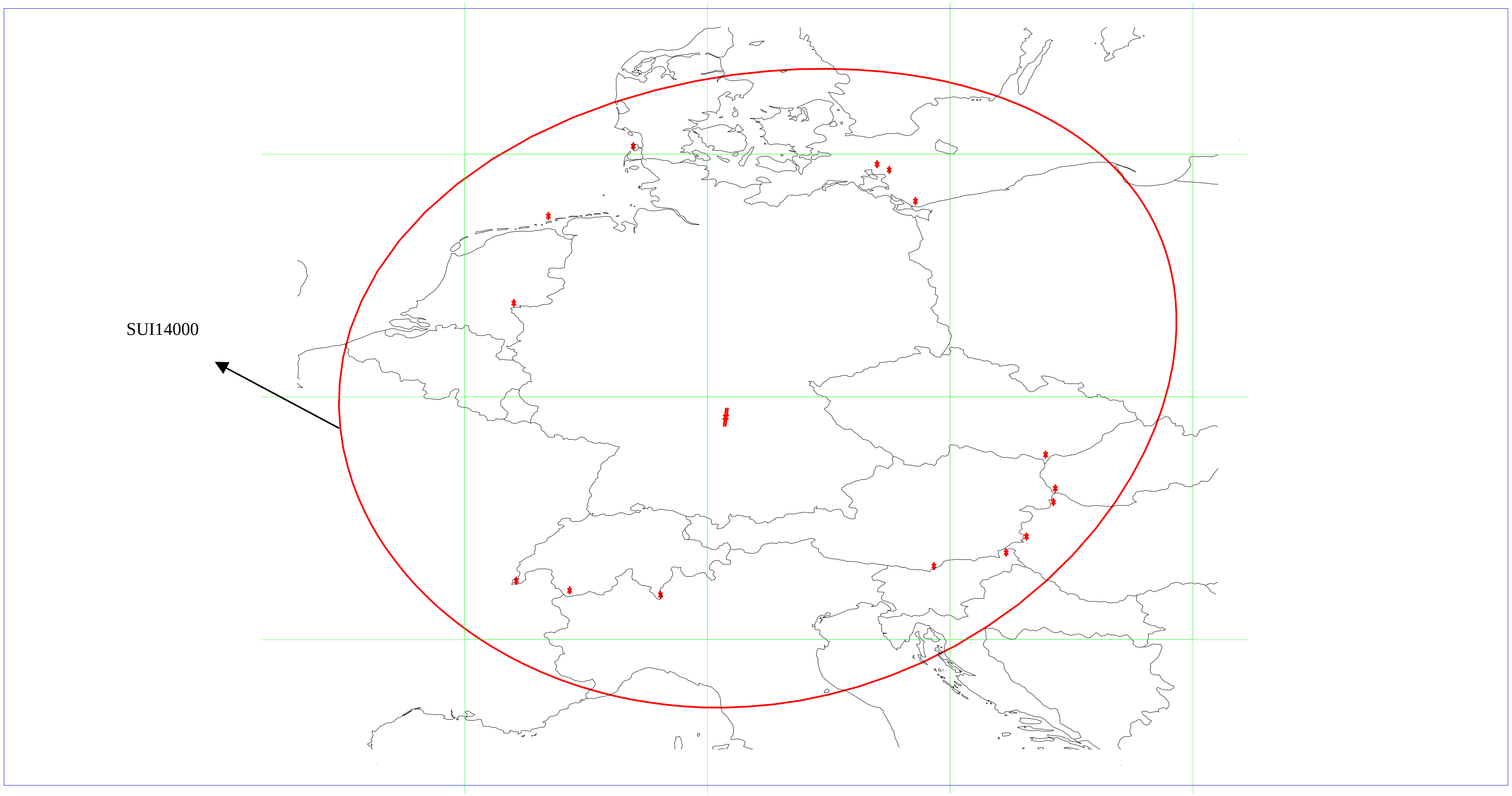


ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 3273598 GRID: 1.0

DOWN SMO057XL -178.00 -171.70 -13.87 .60 .60 90.00

100

SUI (19° W) (1)



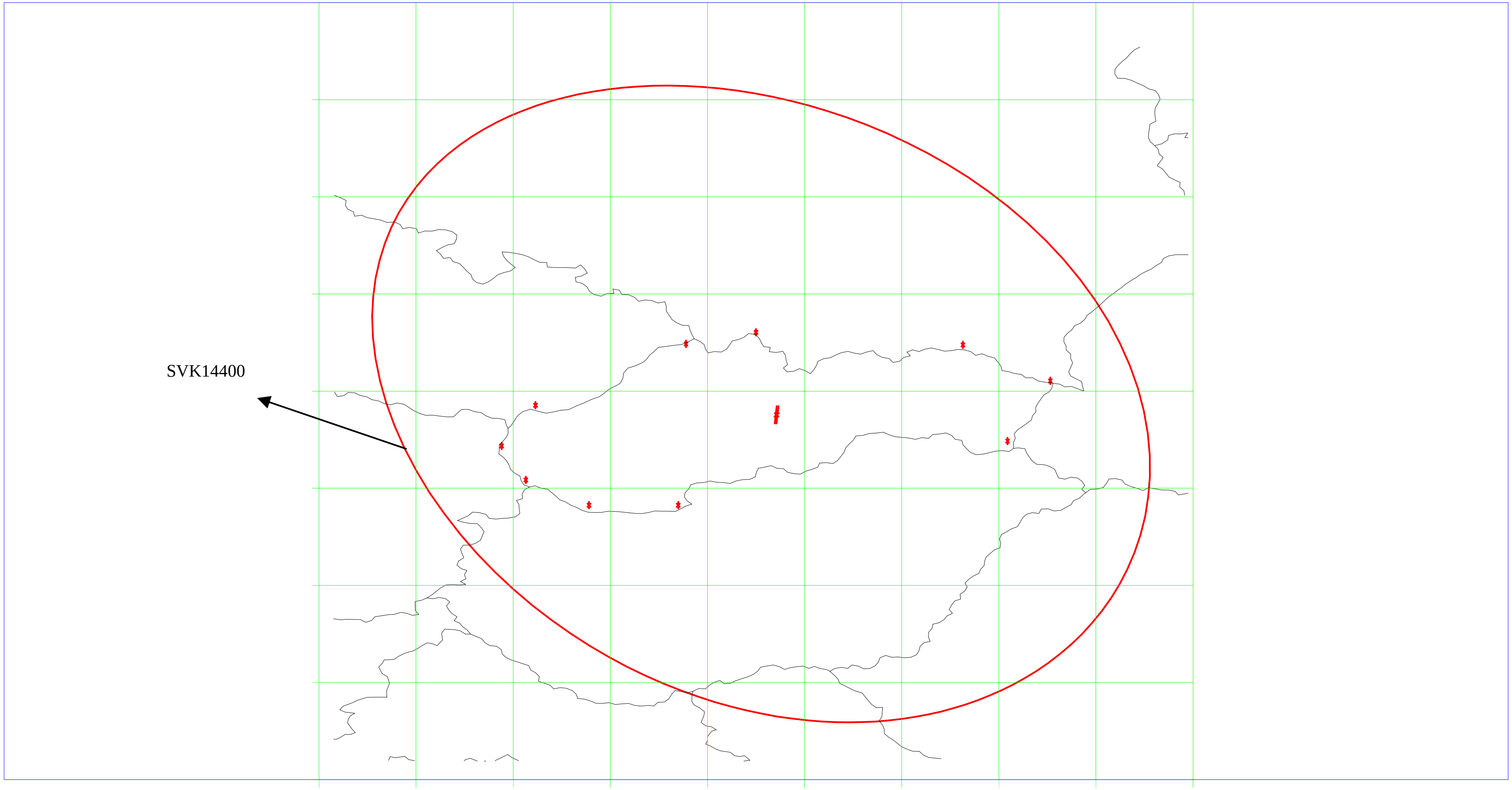
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 12799924 GRID: 5.0

DOWN SUI140XL -19.00 10.31 49.47 1.82 .92 151.78

100 500 1000

(1) Multinational beam identical for AUT, D, LIE and SUI

SVK (34° E)

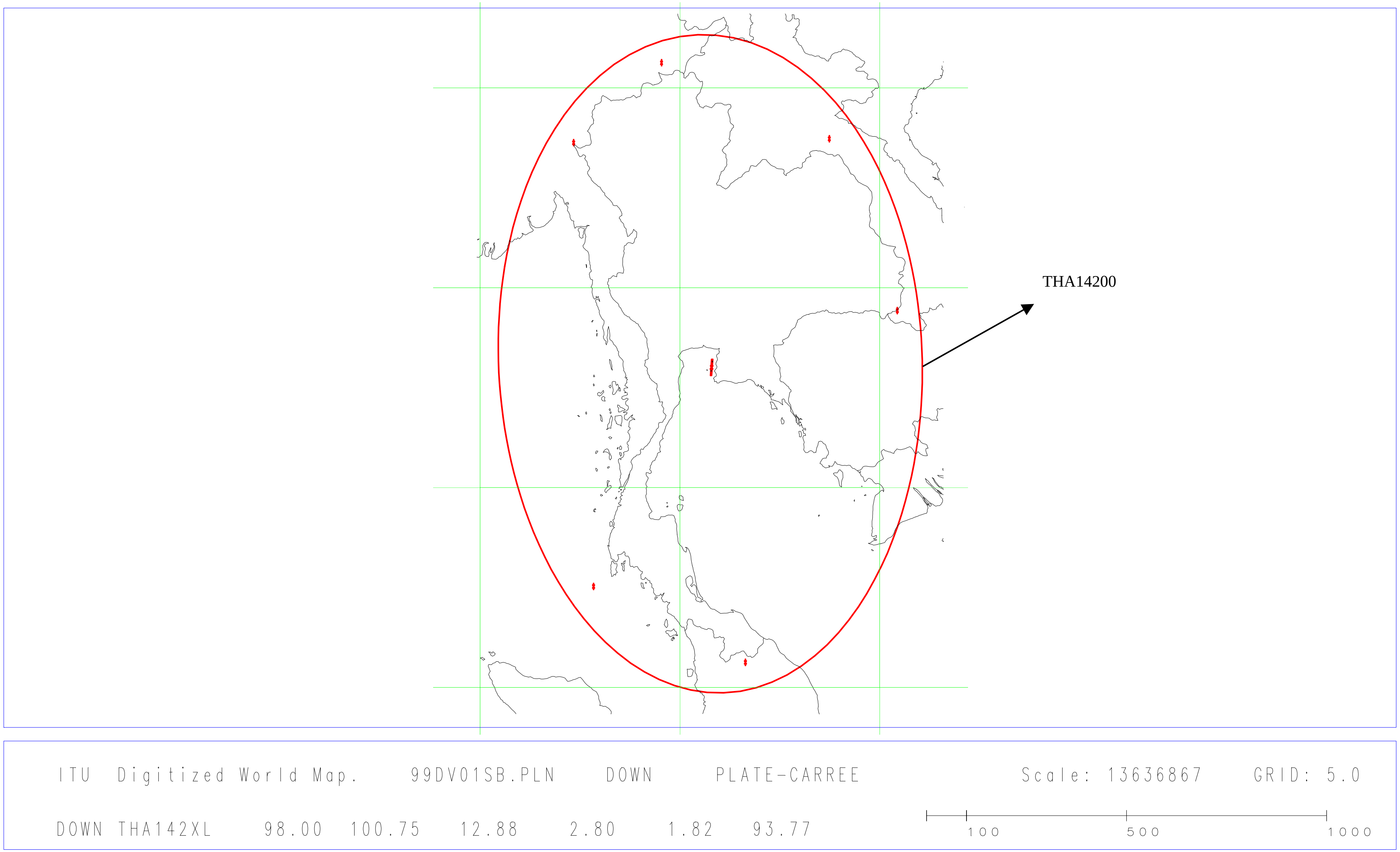


ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 6601555 GRID: 1.0

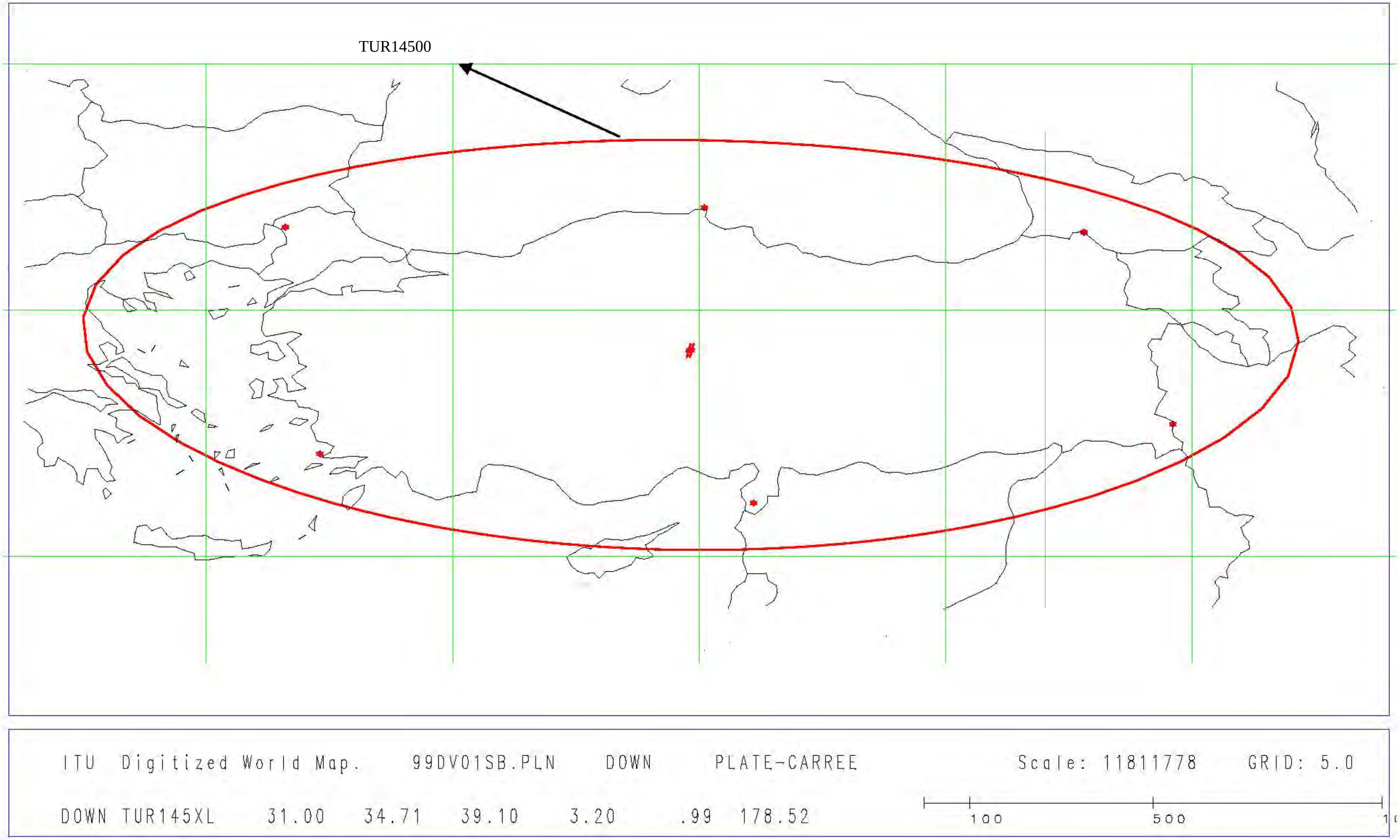
DOWN SVK144XL 34.00 19.68 48.70 .82 .60 7.75

100 500

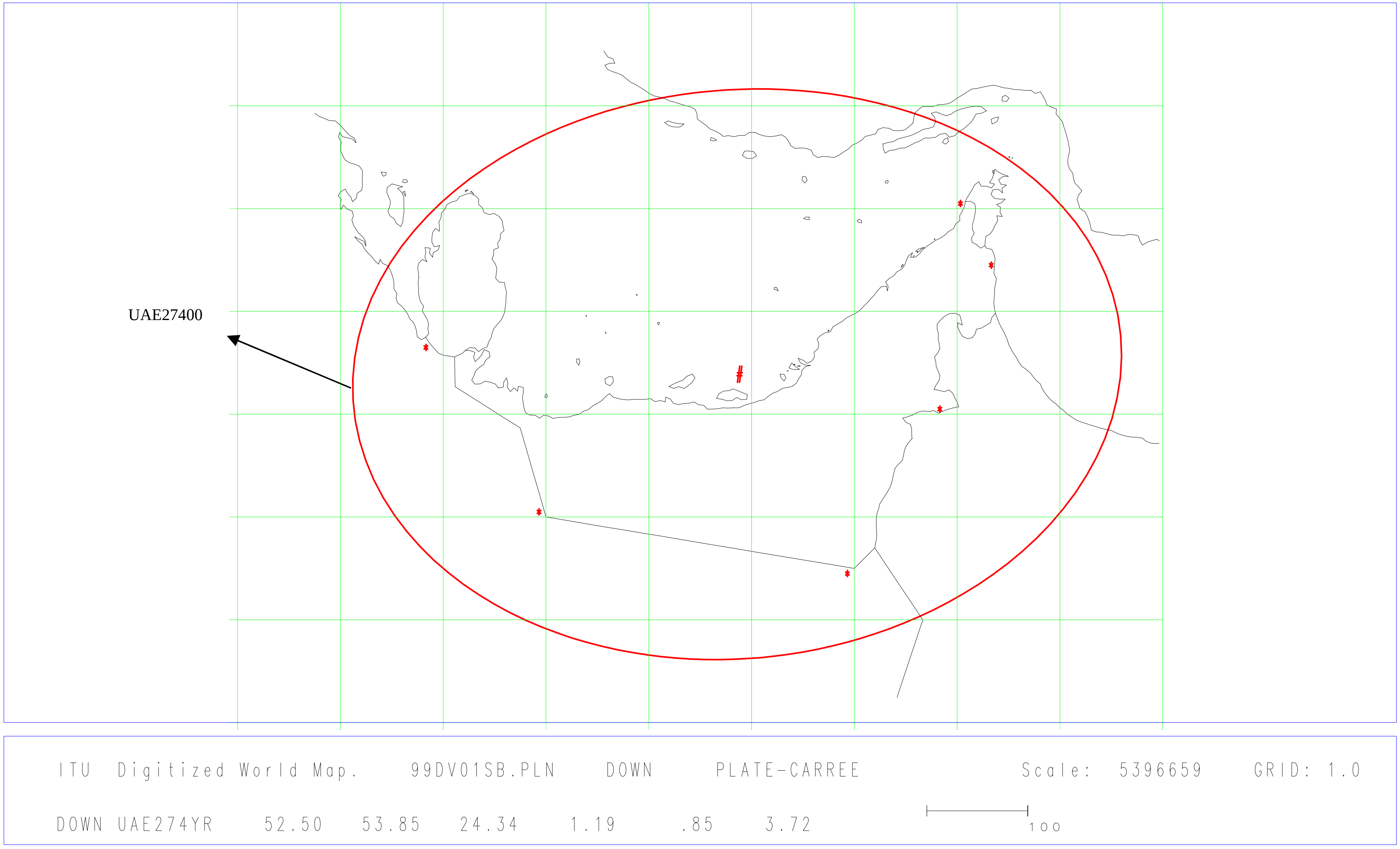
THA (98° E)


THA14200
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 13636867 GRID: 5.0
DOWN THA142XL 98.00 100.75 12.88 2.80 1.82 93.77
100
500
1000

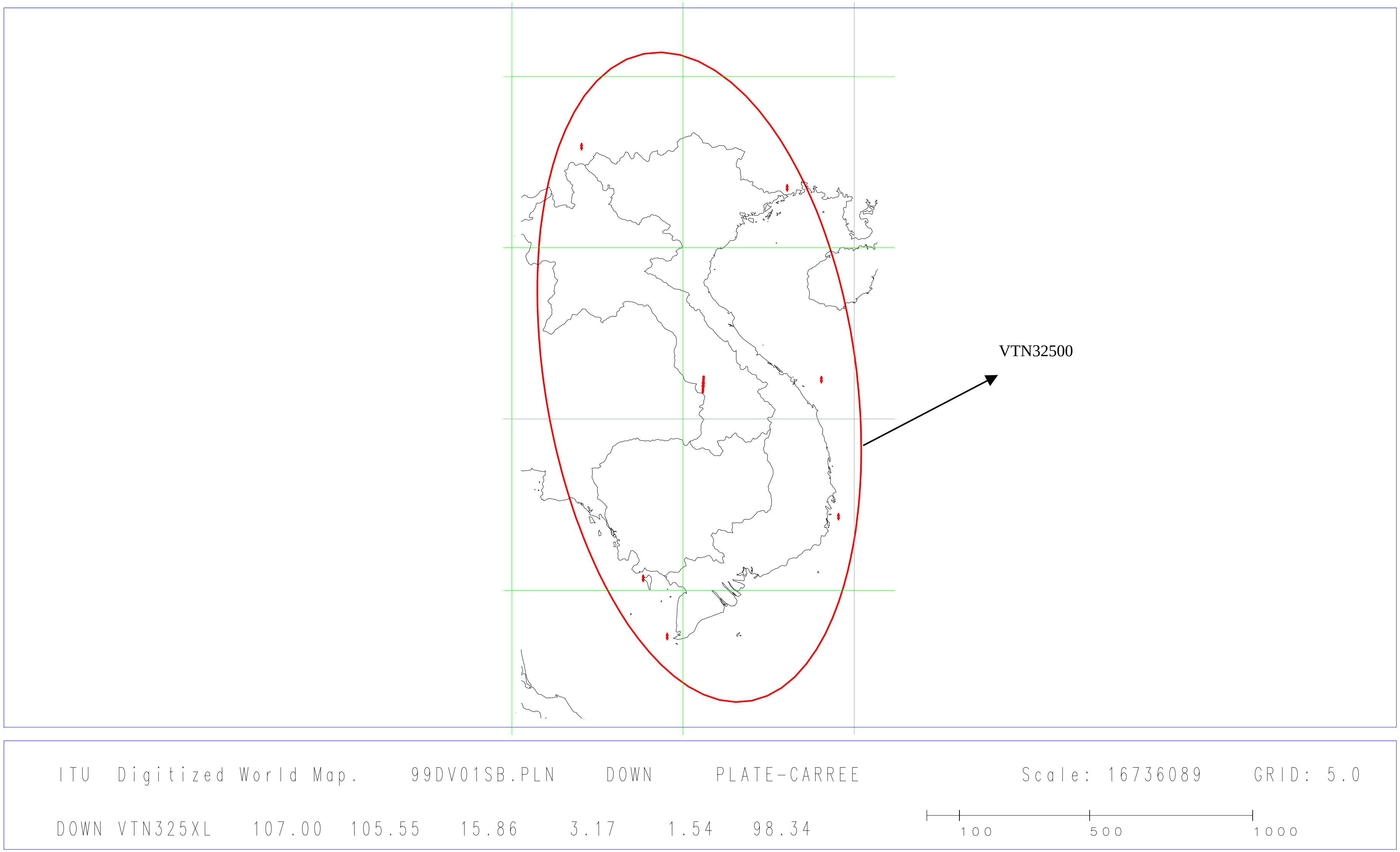
TUR (31° E)


TUR14500
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 11811778 GRID: 5.0
DOWN TUR145XL 31.00 34.71 39.10 3.20 .99 178.52
100
500

UAE (52.5° E)


UAE27400
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 5396659 GRID: 1.0
DOWN UAE274YR 52.50 53.85 24.34 1.19 .85 3.72
100

VTN (107° E)

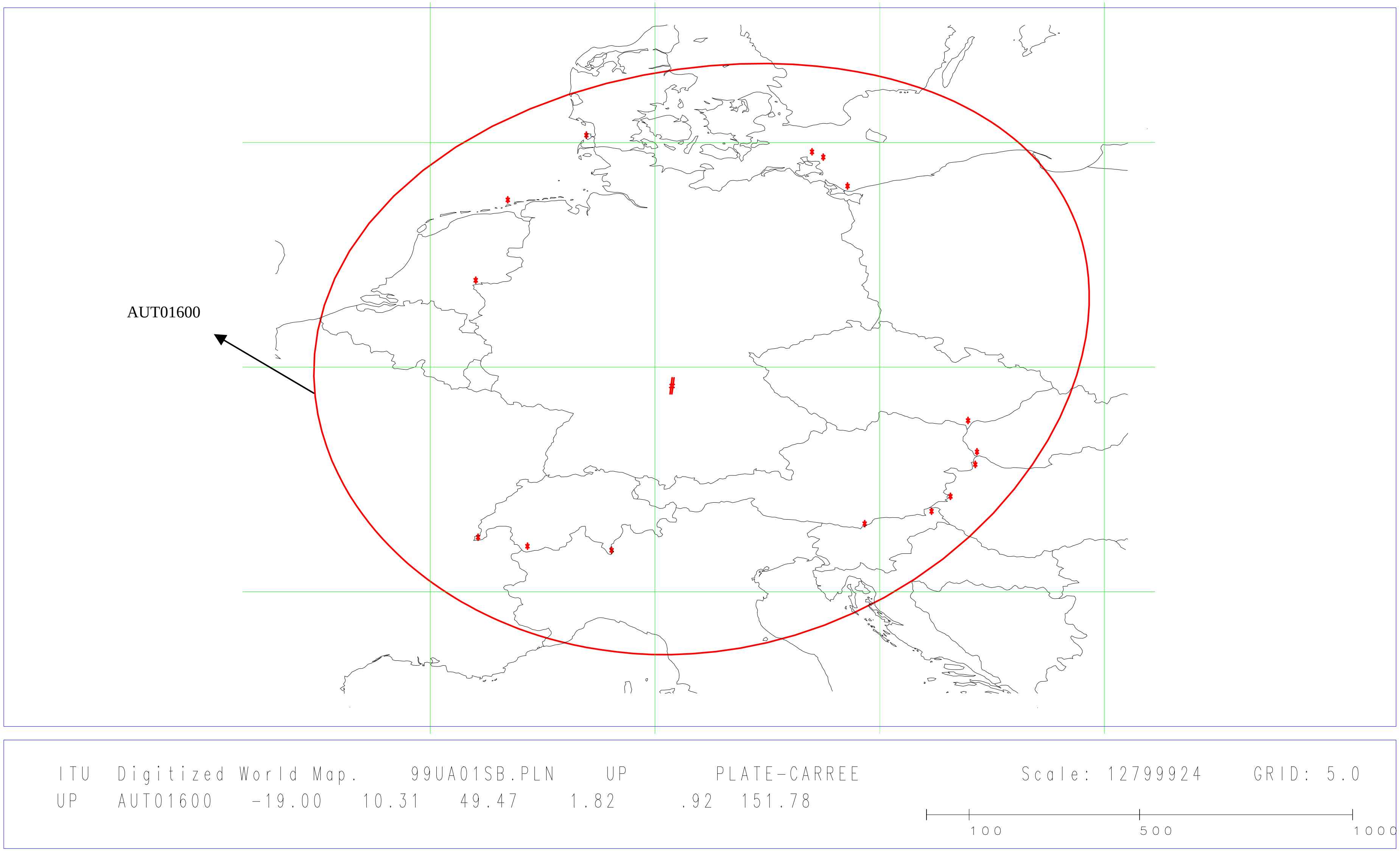

VTN32500
ITU Digitized World Map. 99DV01SB.PLN DOWN PLATE-CARREE Scale: 16736089 GRID: 5.0
DOWN VTN325XL 107.00 105.55 15.86 3.17 1.54 98.34
100 500 1000

ANNEX D

Complementary/updated information to that contained in
Annex D of Attachment 2 to Document WRC2000/34

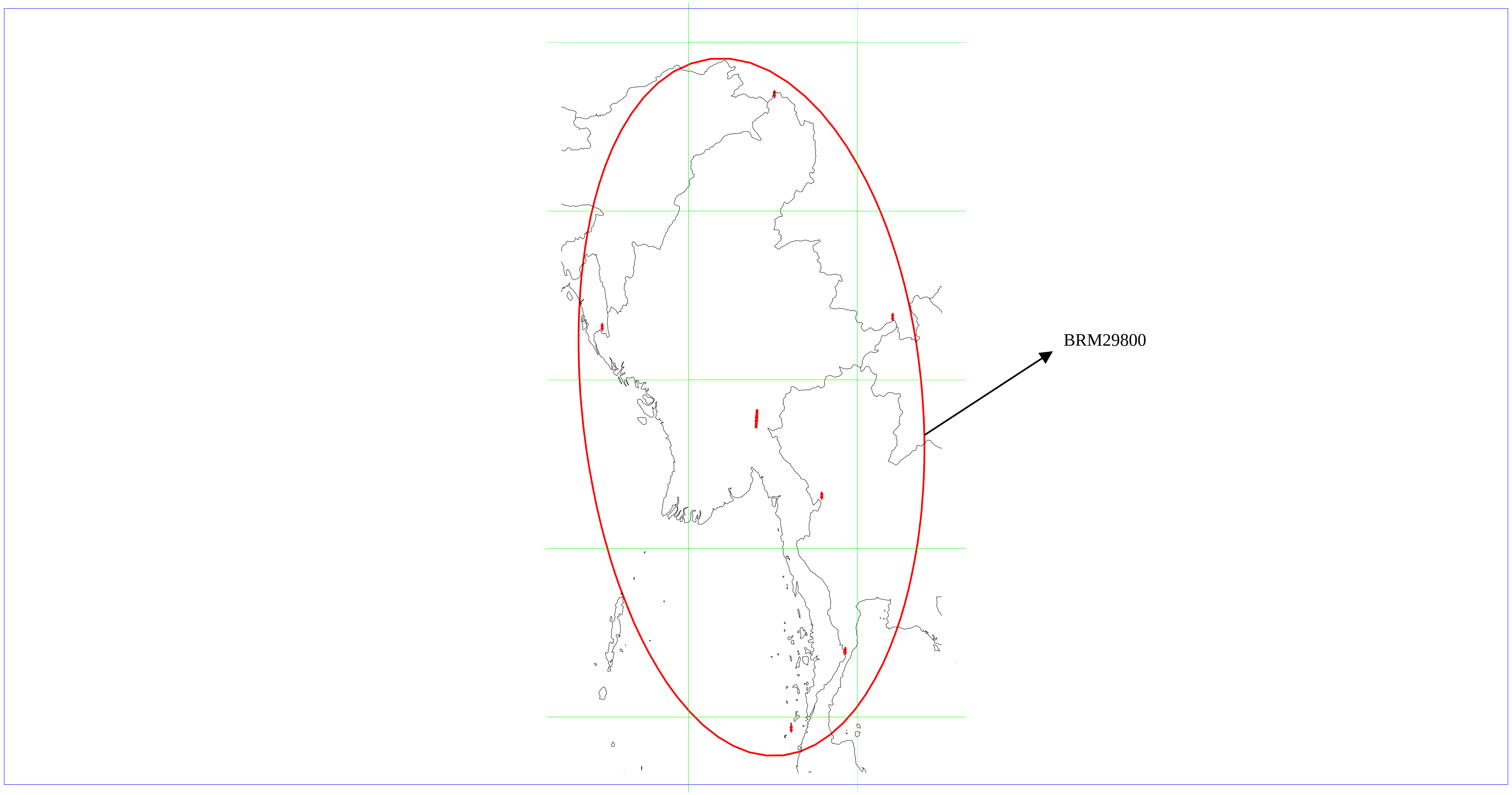
Recalculated elliptical beams and composite beams at their starting point orbital position for the feeder-link feasibility study

AUT (19° W) (1)



(1) Multinational beam identical for AUT, D, LIE and SUI

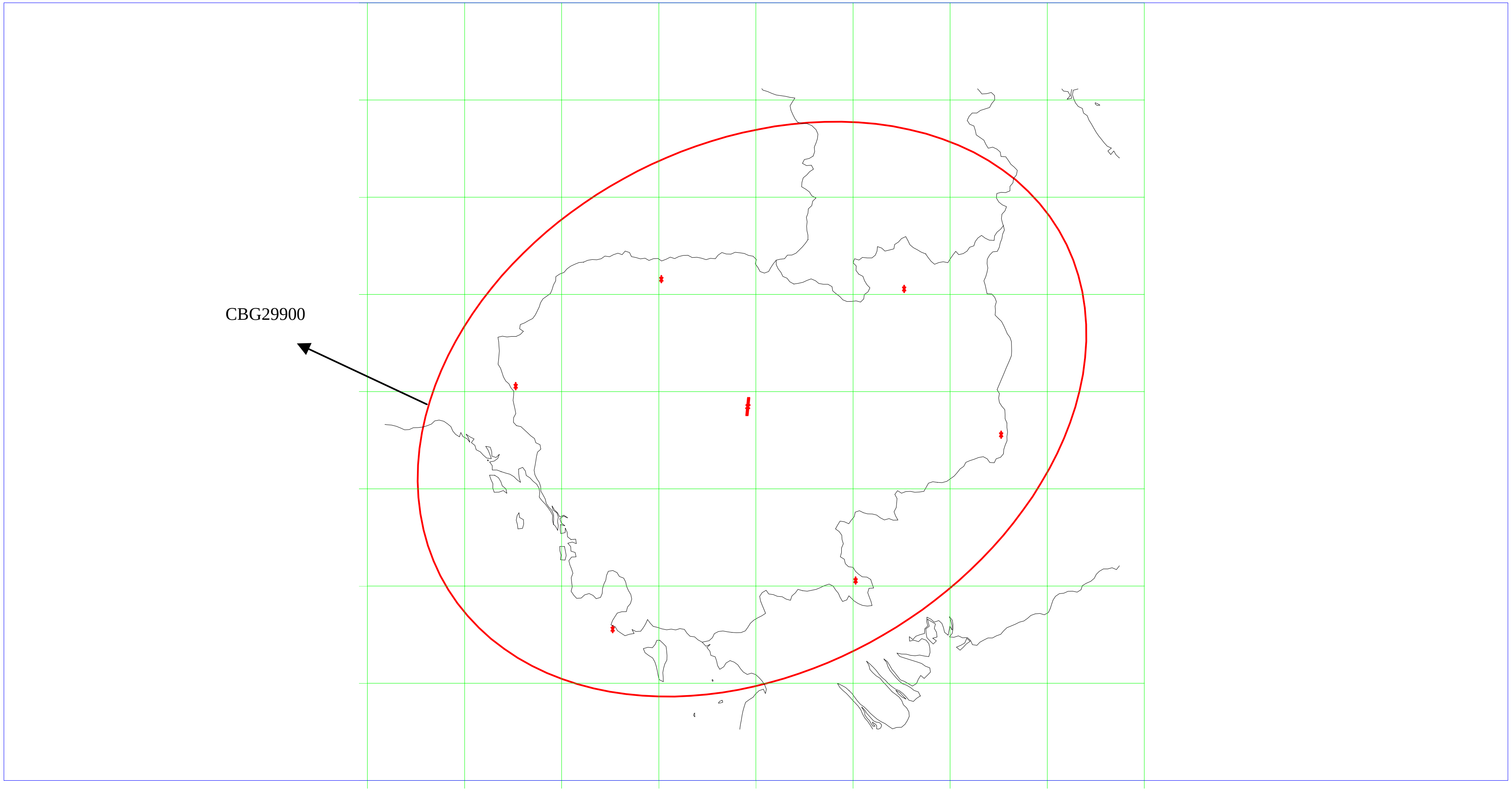
BRM (104° E)



ITU Digitized World Map. 99UA01SB.PLN UP PLATE-CARREE Scale: 18209460 GRID: 5.0
UP BRM29800 104.00 96.97 18.68 3.33 1.66 91.63

100 500 1000

CBG (86° E)

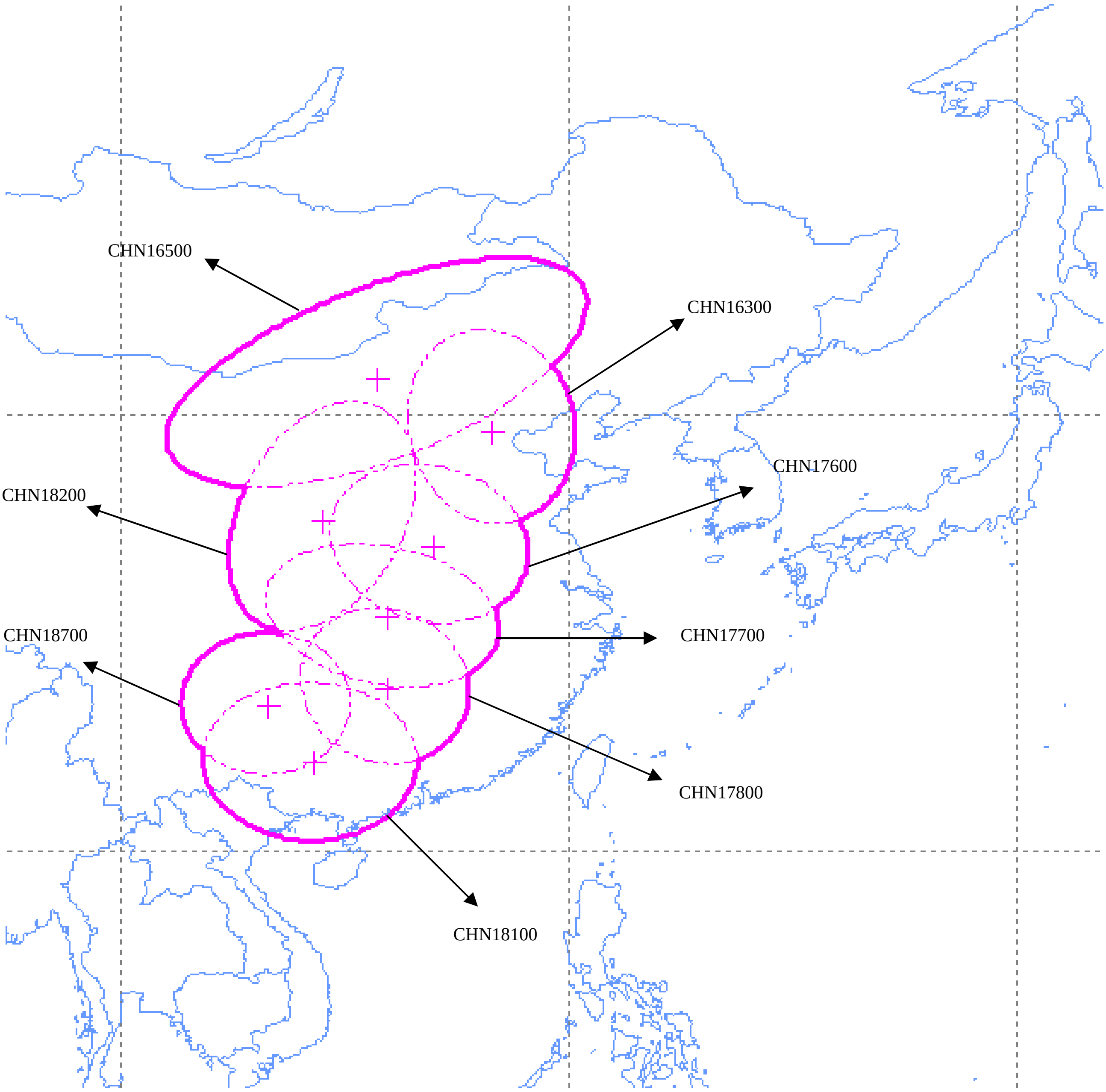


ITU Digitized World Map. UP17_FIN.UD3 UP PLATE-CARREE Scale: 6386452 GRID: 1.0

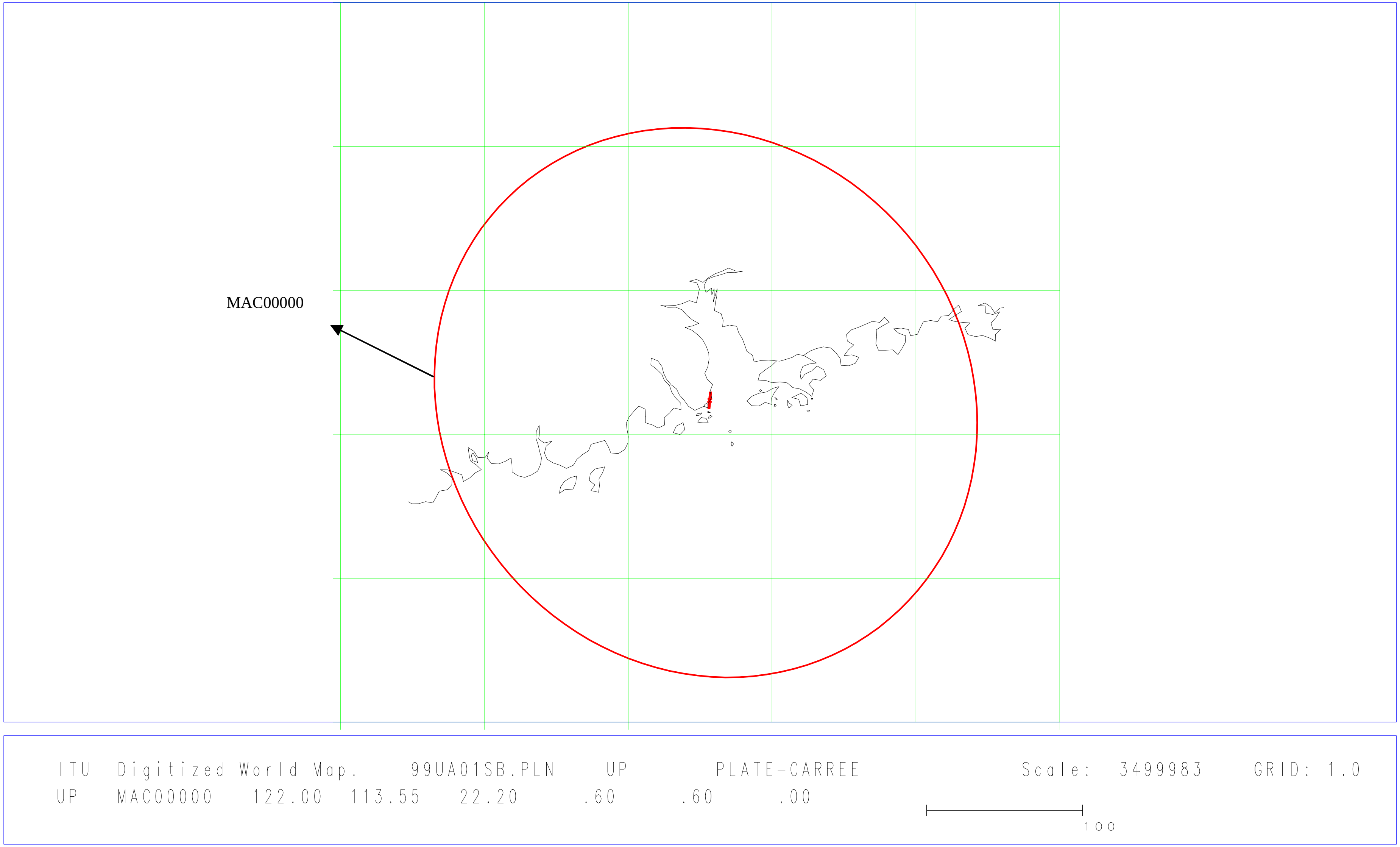
UP CBG29900 86.00 104.89 12.79 1.12 .94 32.89

100 500

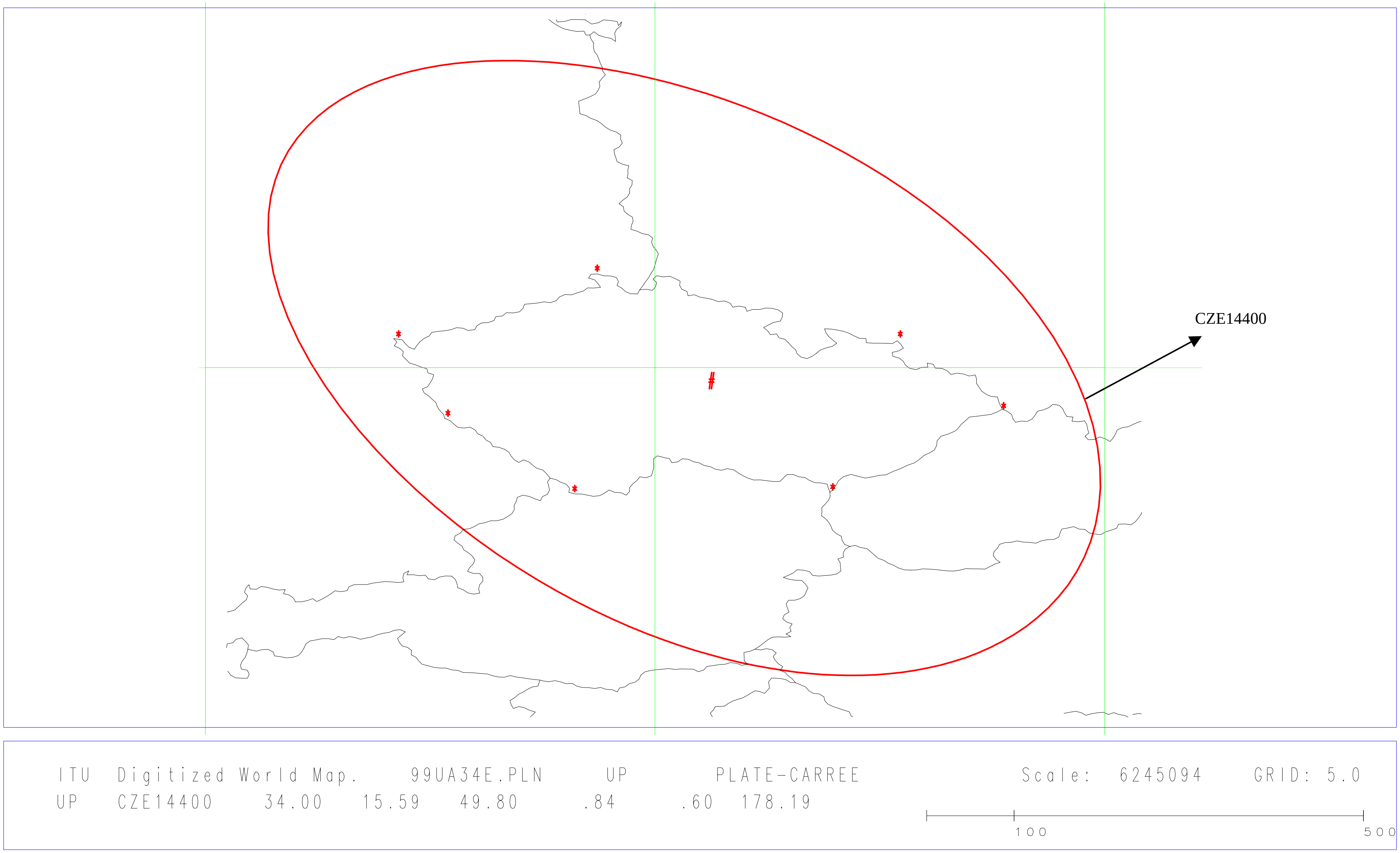
CHN (134° E)


CHN16500
CHN16300
CHN17600
CHN18200
CHN17700
CHN18700
CHN17800
CHN18100

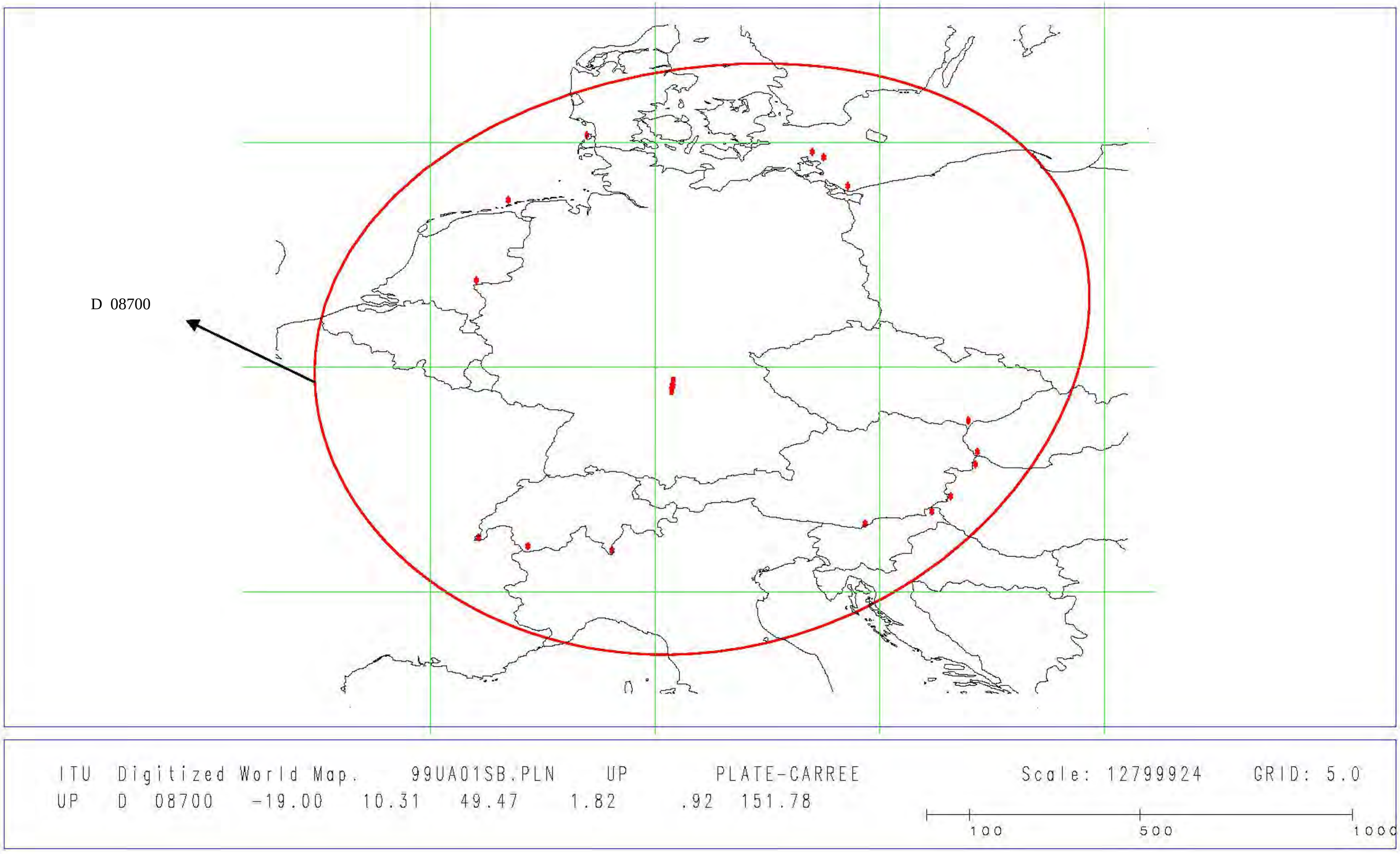
CHN / MAC (122° E)


MAC00000
ITU Digitized World Map. 99UA01SB.PLN UP PLATE-CARREE Scale: 3499983 GRID: 1.0
UP MAC00000 122.00 113.55 22.20 .60 .60 .00
100

CZE (34° E)

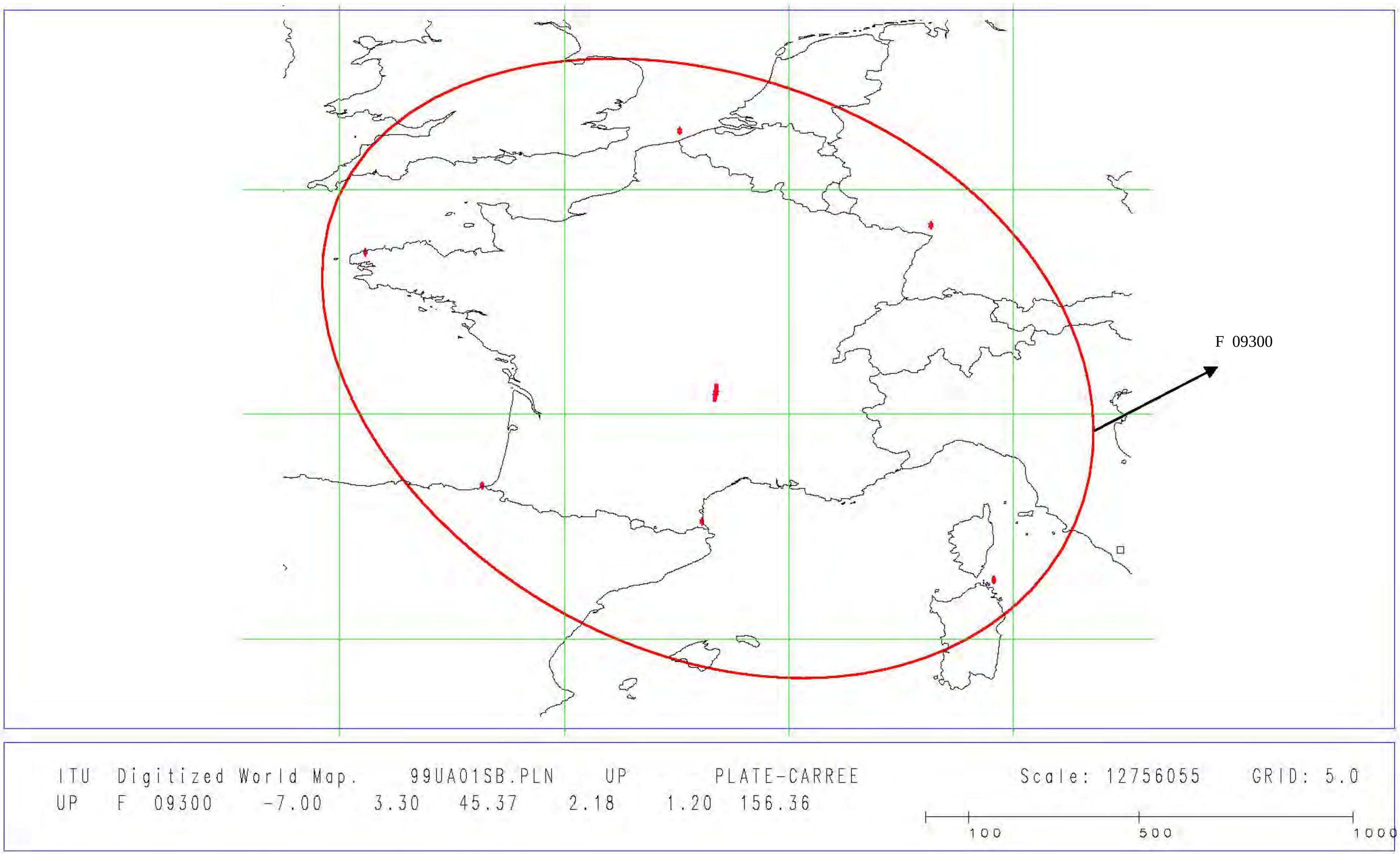

CZE14400
ITU Digitized World Map. 99UA34E.PLN UP PLATE-CARREE Scale: 6245094 GRID: 5.0
UP CZE14400 34.00 15.59 49.80 .84 .60 178.19
100
500

D (19° W) (1)

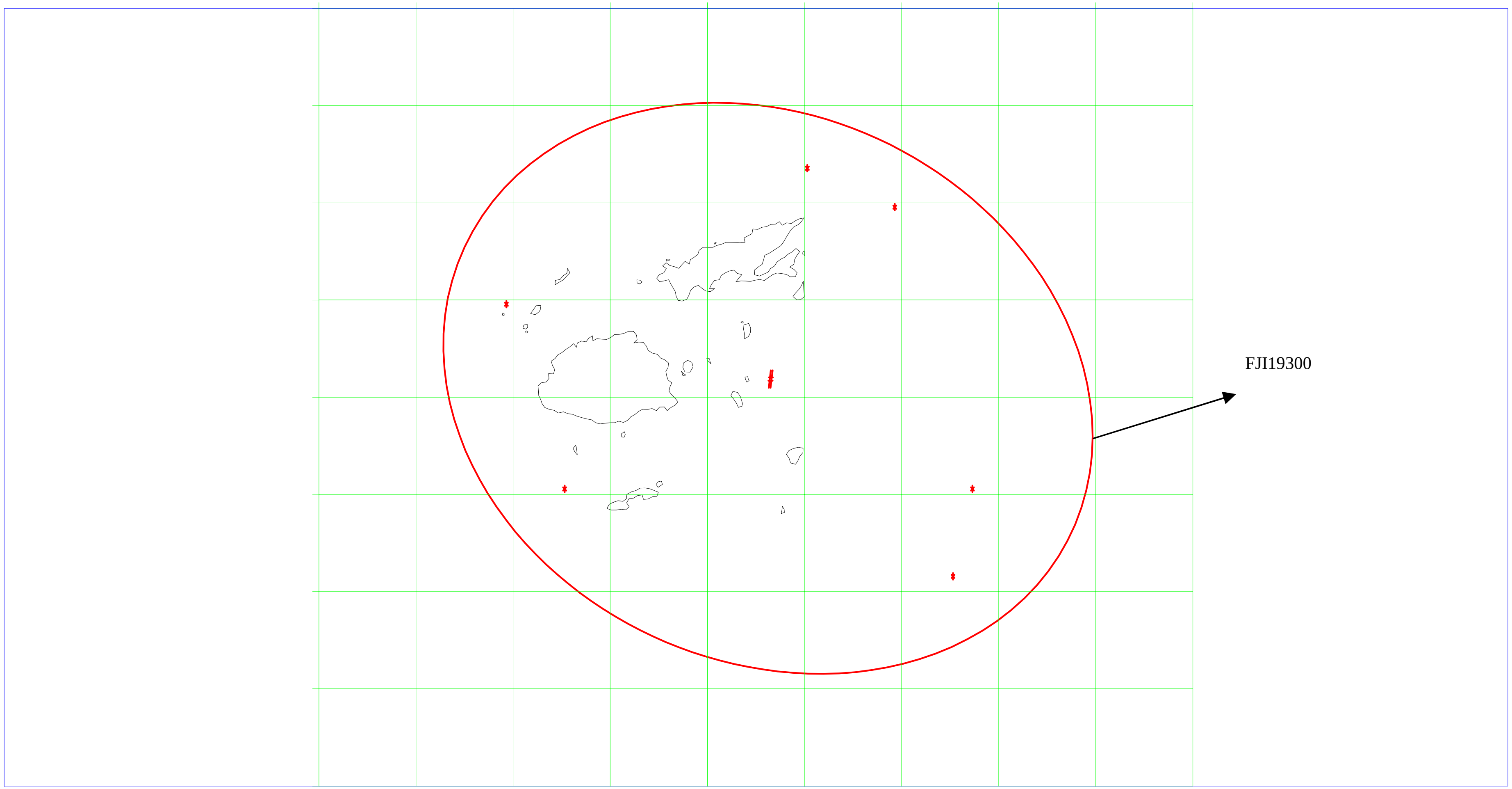


(1) Multinational beam identical for AUT, D, LIE and SUI

F (7° W)

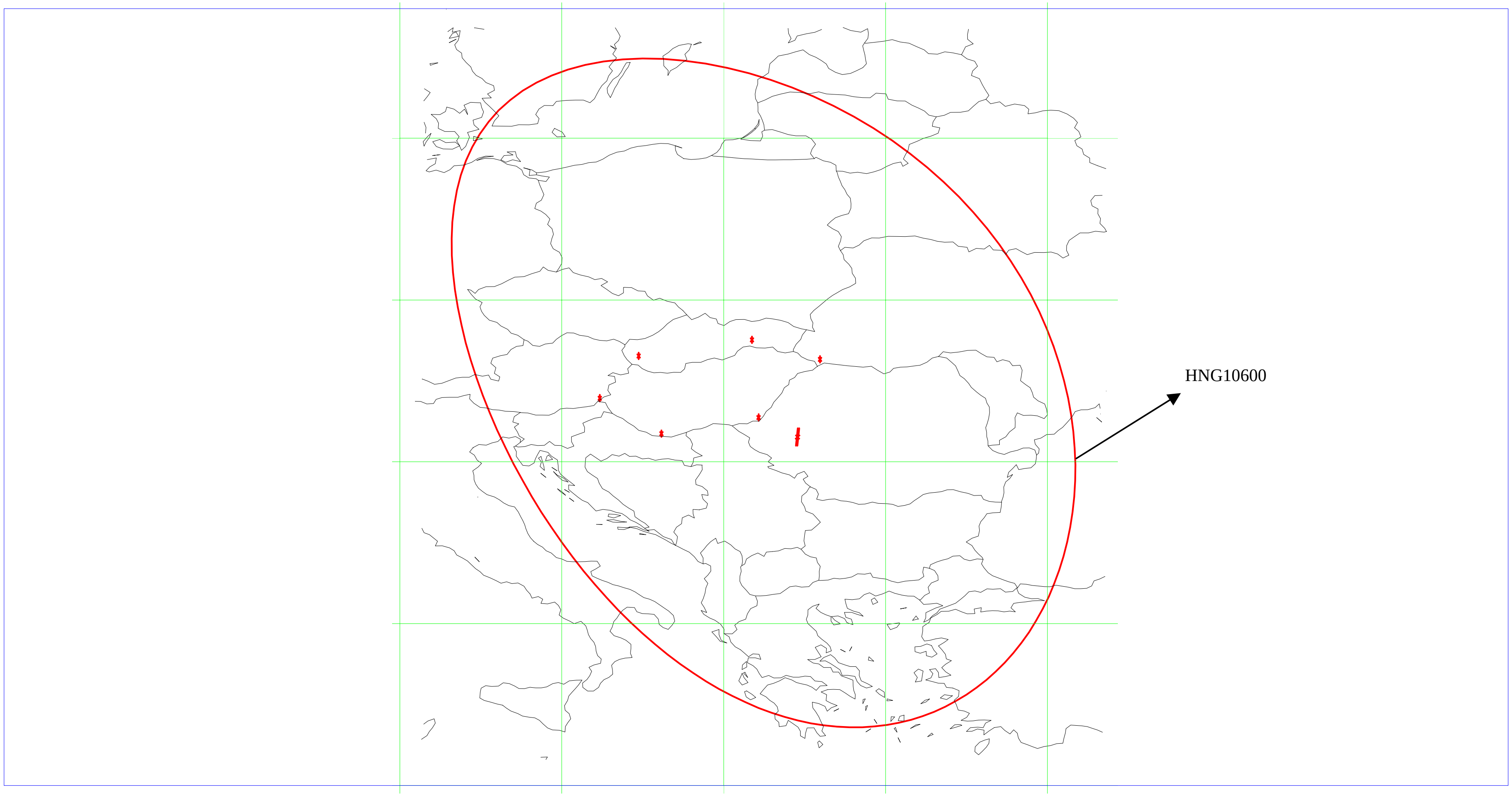

F 09300
ITU Digitized World Map. 99UA01SB.PLN UP PLATE-CARREE Scale: 12756055 GRID: 5.0
UP F 09300 -7.00 3.30 45.37 2.18 1.20 156.36
100 500 1000

FJI (178° W)



ITU Digitized World Map. UP17_FIN.UD3 UP PLATE-CARREE Scale: 5512897 GRID: 1.0
UP FJI19300 -178.00 179.62 -17.87 1.16 .92 155.22
100

HNG (34° E)

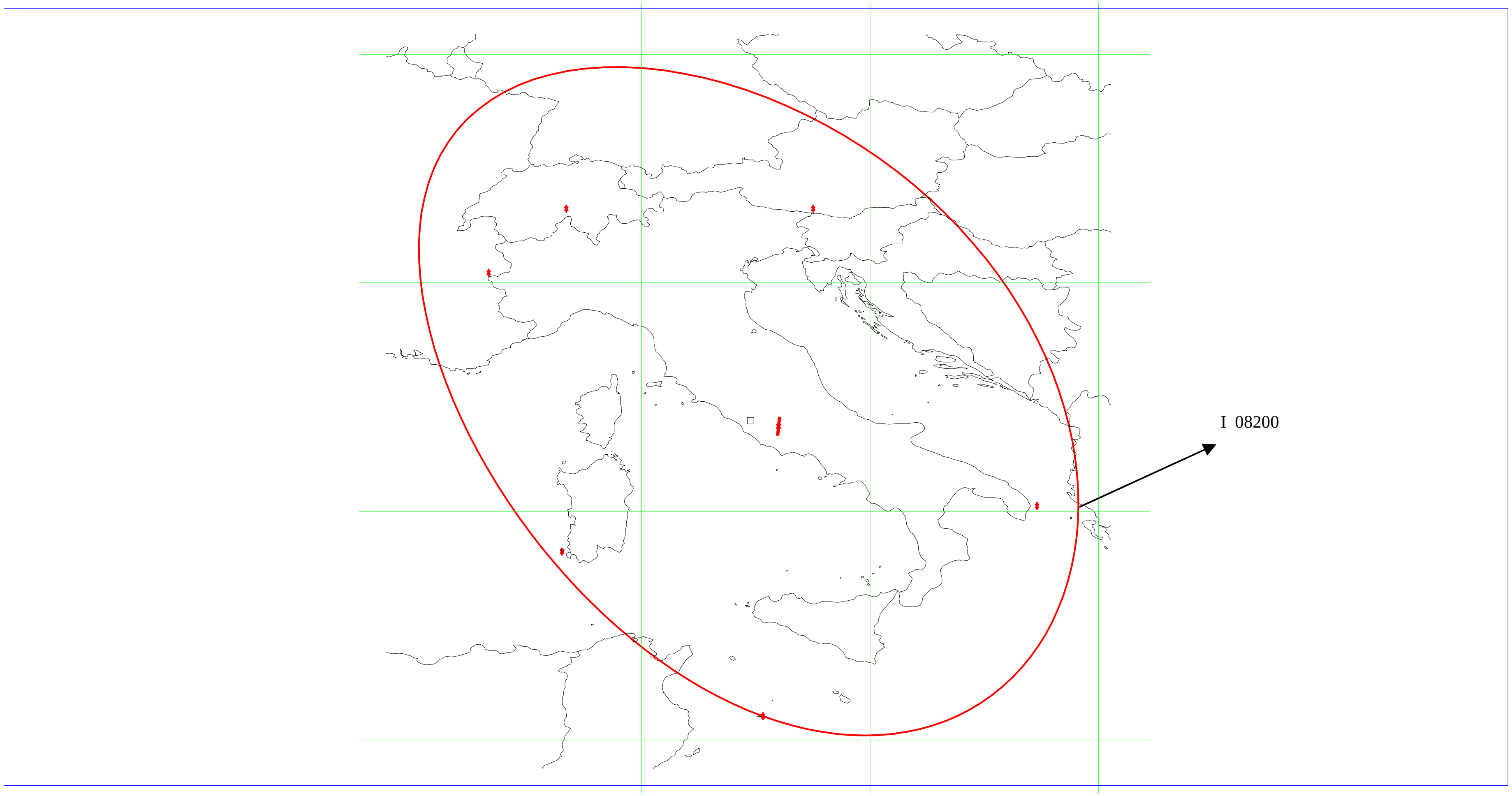


ITU Digitized World Map. 99UA34E.PLN UP PLATE-CARREE Scale: 19493298 GRID: 5.0

UP HNG10600 34.00 22.20 45.60 2.00 2.00 .00

100 500 1000

I (29° E)

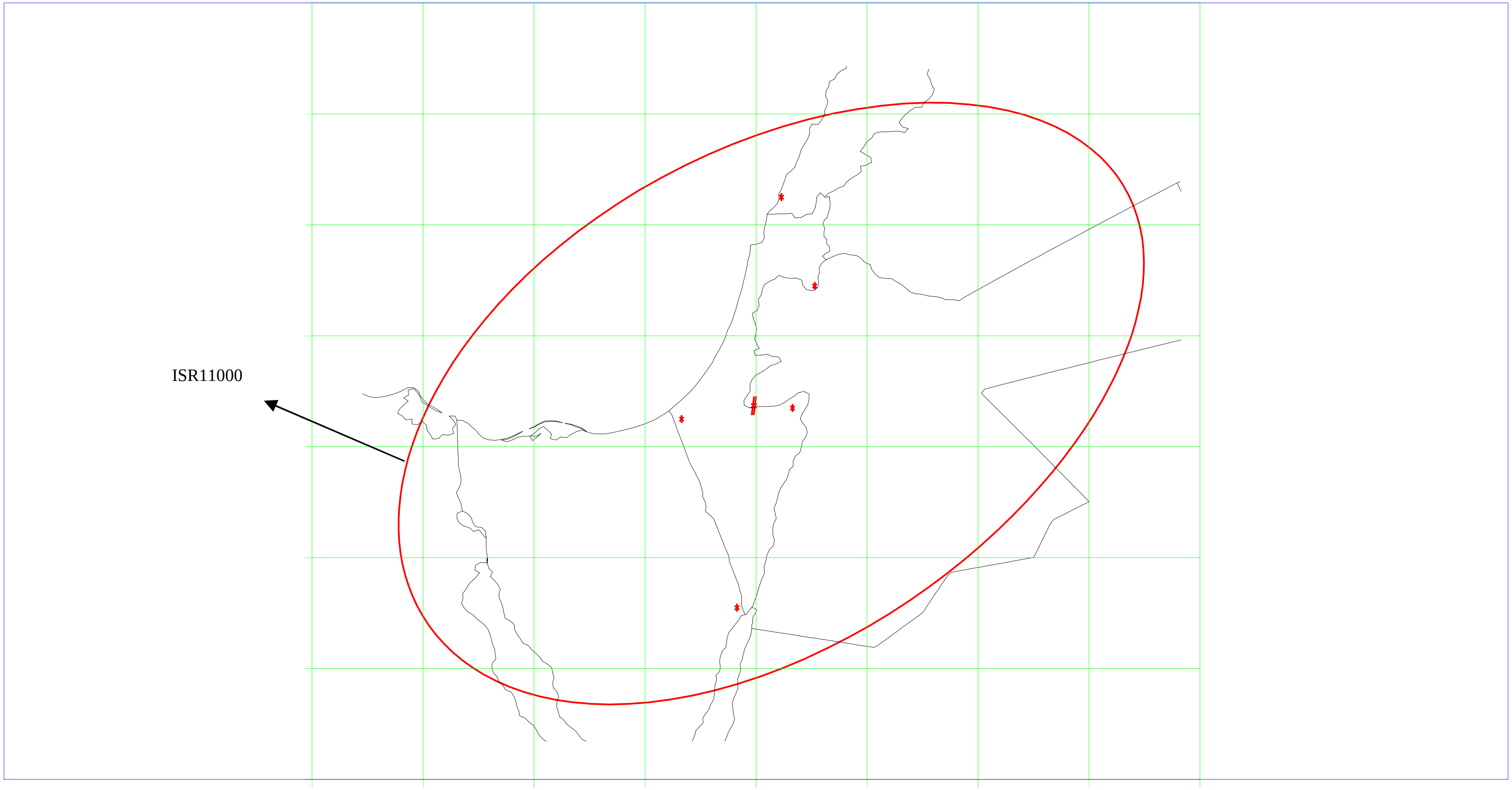


ITU Digitized World Map. 99UA01SB.PLN UP PLATE-CARREE Scale: 13385617 GRID: 5.0

UP I 08200 29.00 12.94 41.74 1.61 1.56 118.50

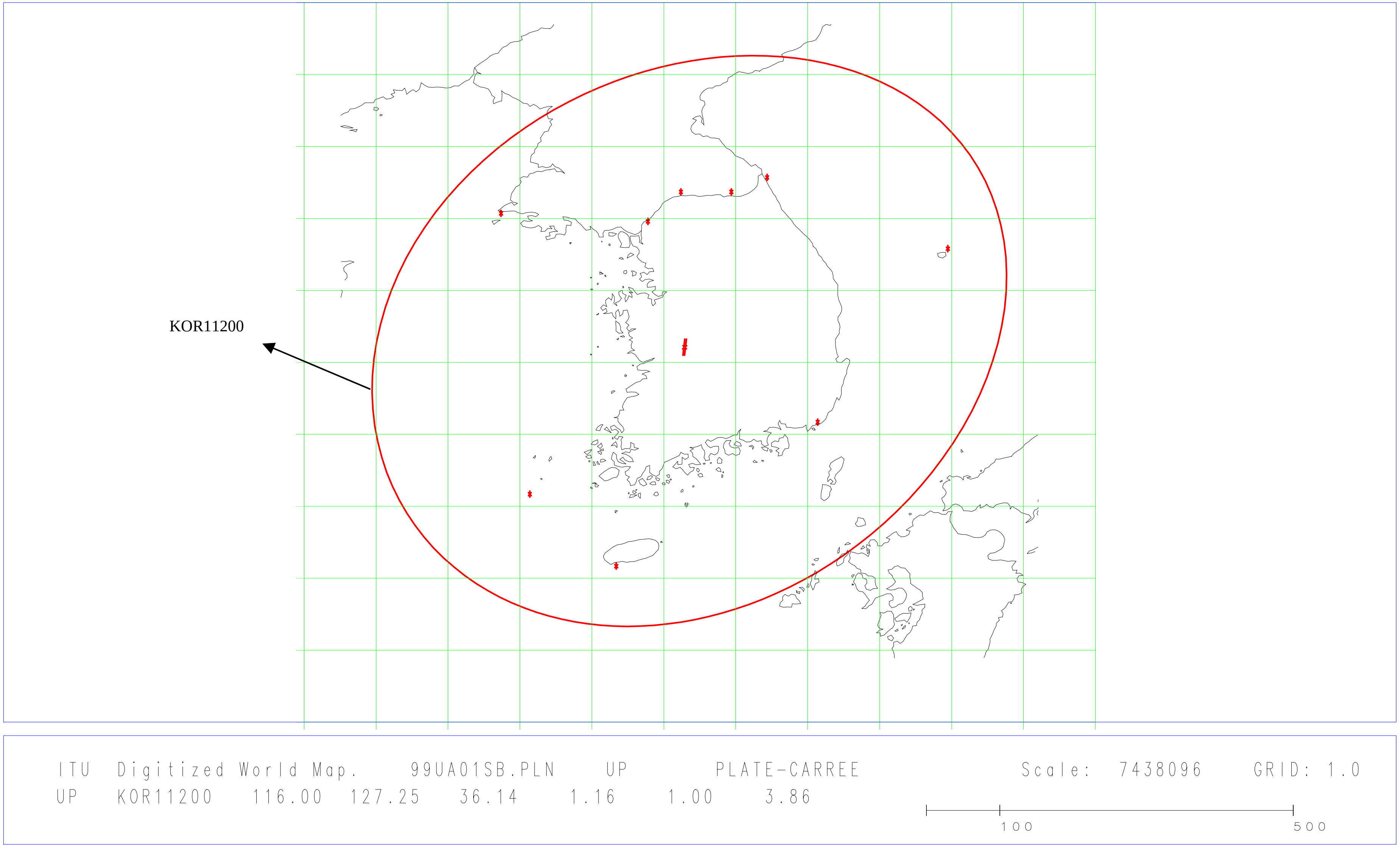
100 500 1000

ISR (4° W)

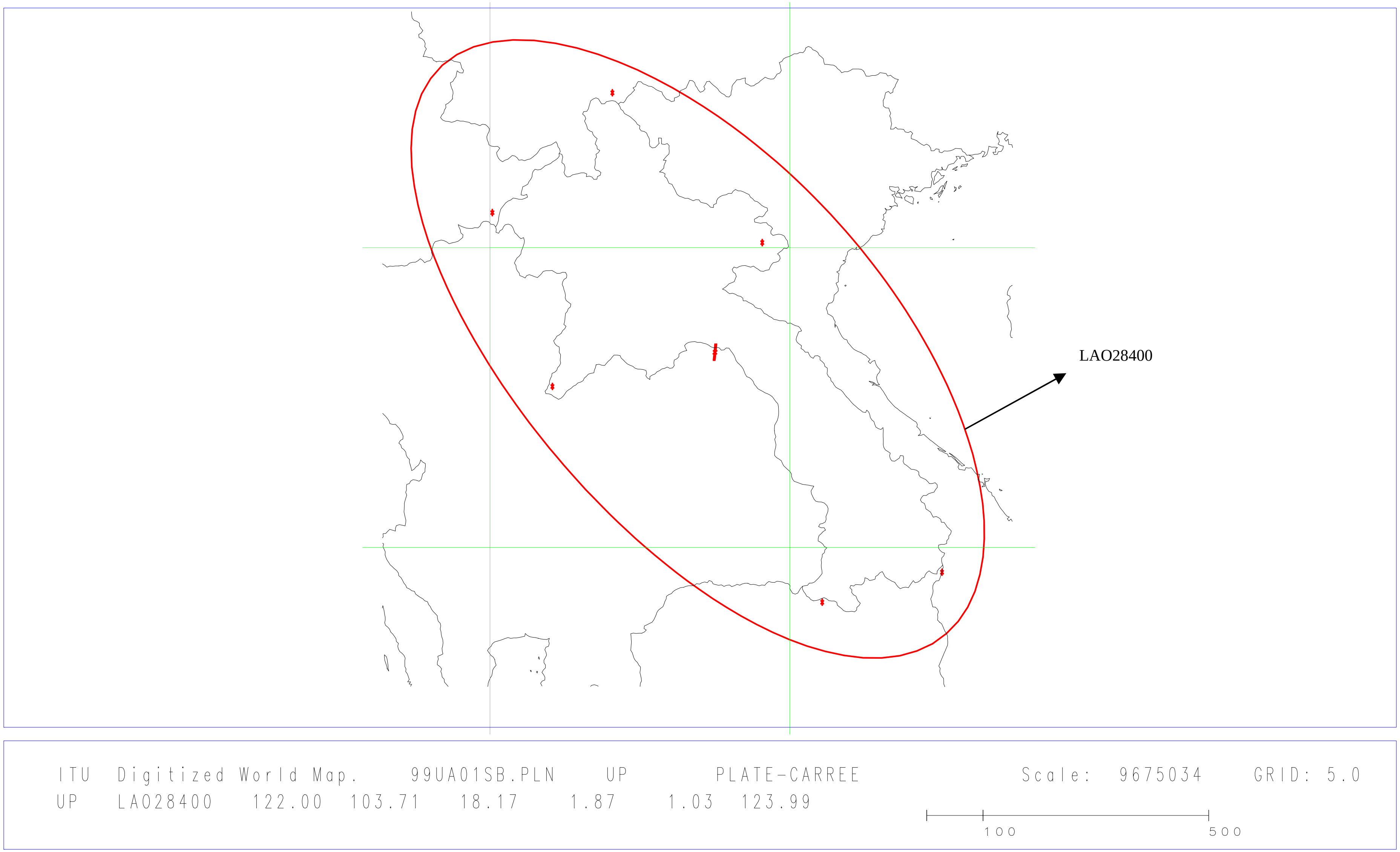


ITU Digitized World Map. 99UA01SB.PLN UP PLATE-CARREE Scale: 5450691 GRID: 1.0
UP ISR11000 -4.00 34.95 31.32 .73 .60 110.02
100

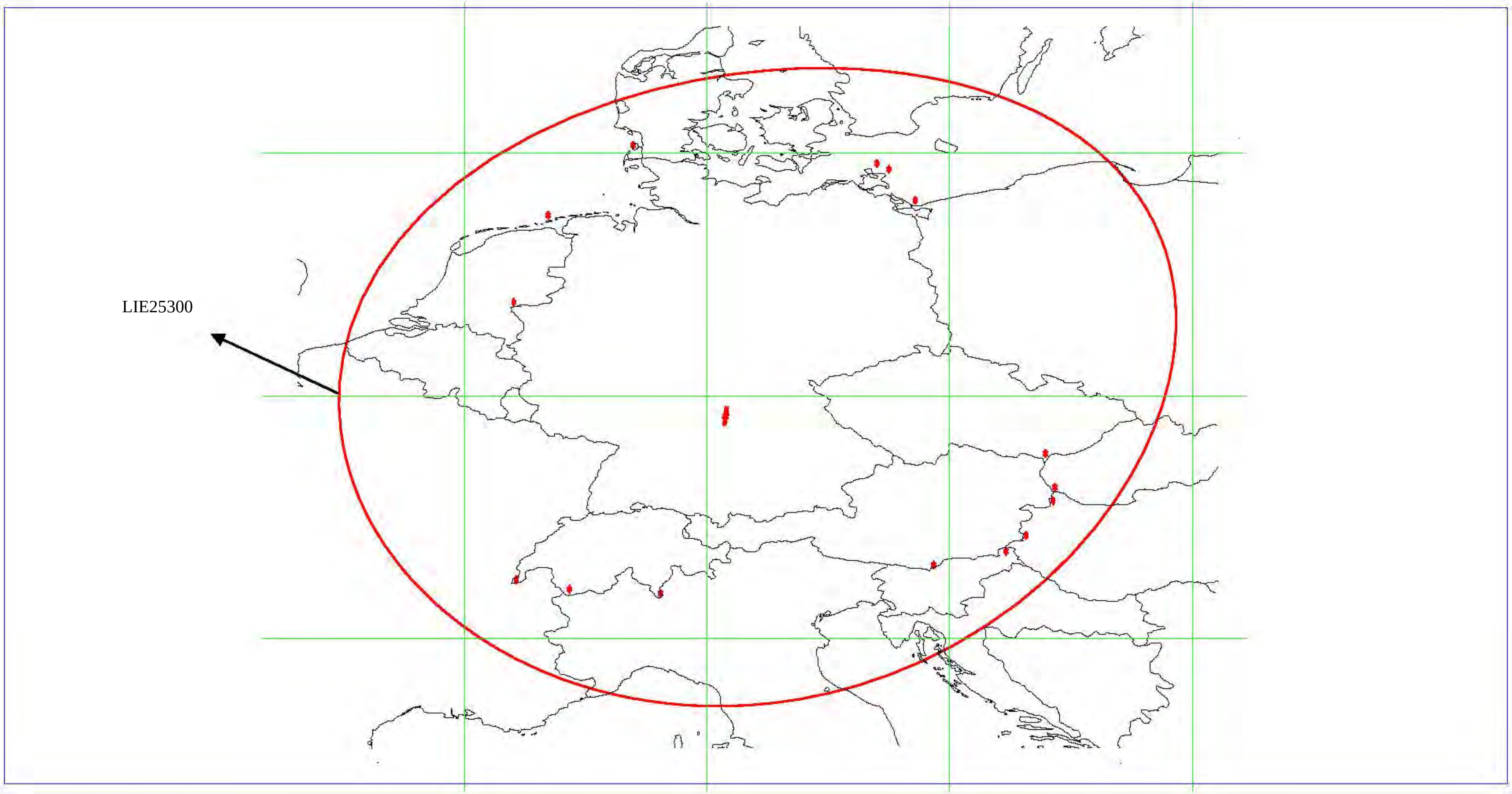
KOR (116° E)


KOR11200
ITU Digitized World Map. 99UA01SB.PLN UP PLATE-CARREE Scale: 7438096 GRID: 1.0
UP KOR11200 116.00 127.25 36.14 1.16 1.00 3.86
100
500

LAO (122° E)


LAO28400
ITU Digitized World Map. 99UA01SB.PLN UP PLATE-CARREE Scale: 9675034 GRID: 5.0
UP LAO28400 122.00 103.71 18.17 1.87 1.03 123.99
100
500

LIE (19° W) (1)

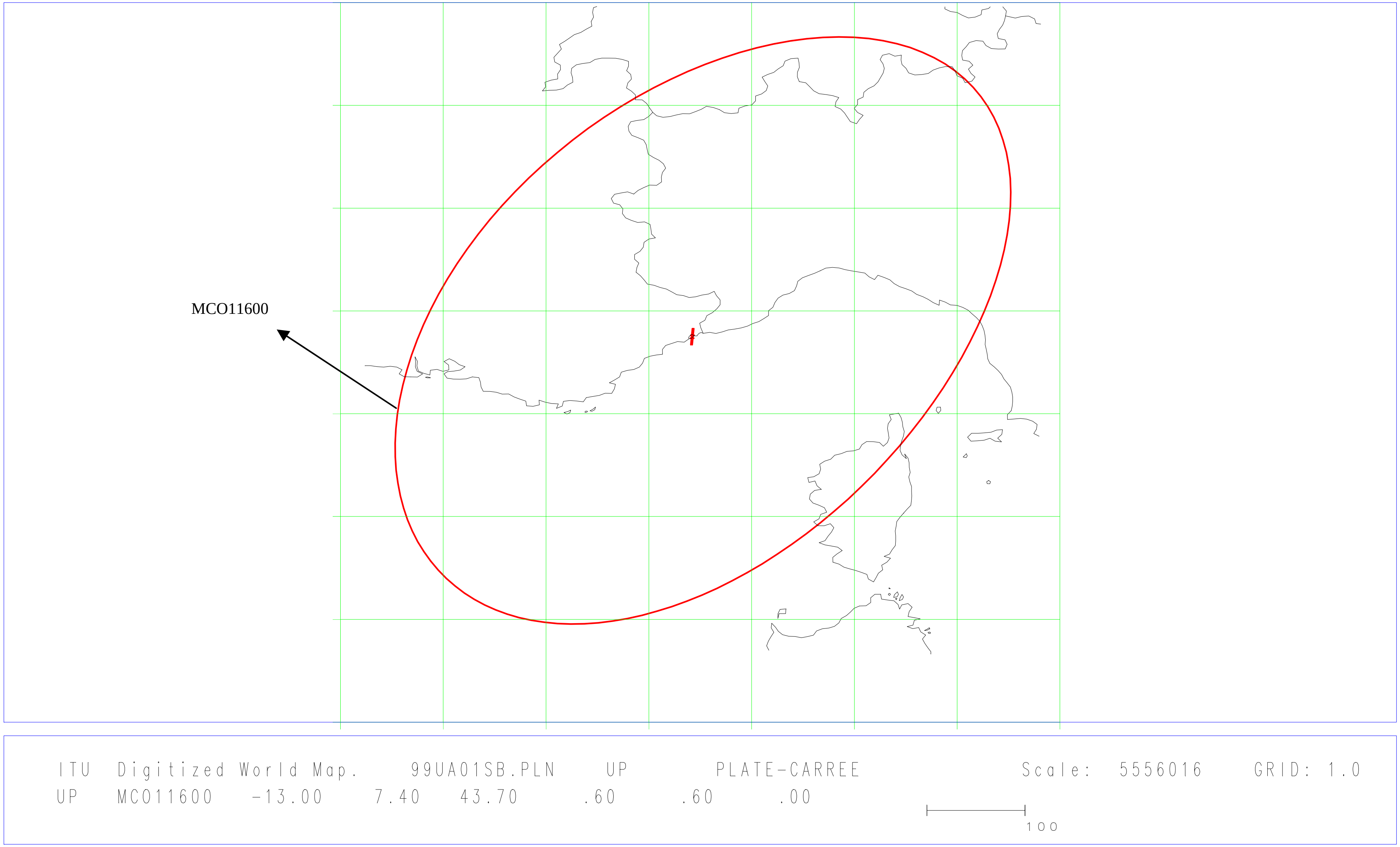


ITU	Digitized World Map.	99UA01SB.PLN	UP	PLATE-CARREE			Scale: 12799924	GRID: 5.0
UP	LIE25300	-19.00	10.31	49.47	1.82	.92	151.78	

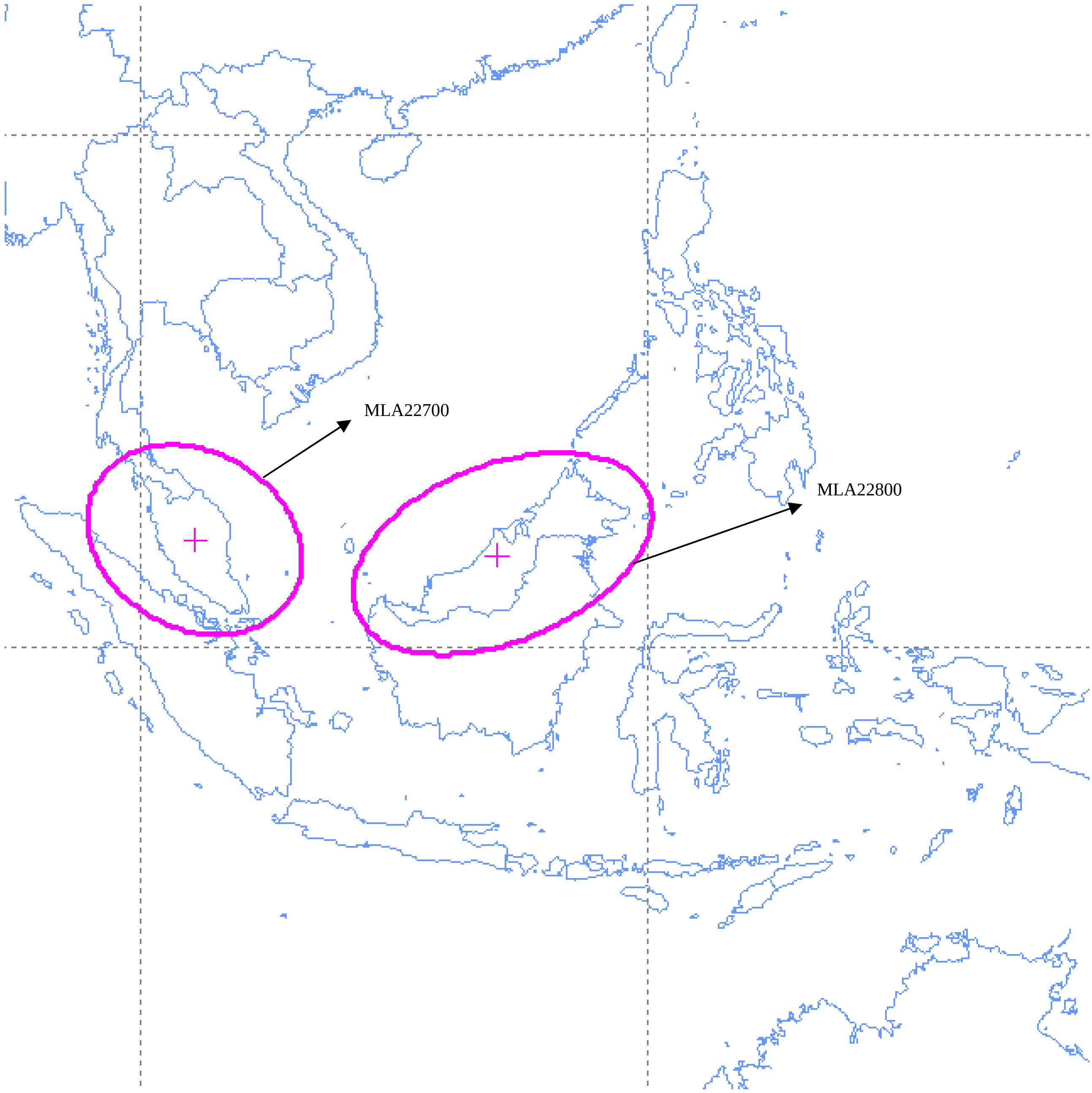
100 500 1000

(1) Multinational beam identical for AUT, D, LIE and SUI

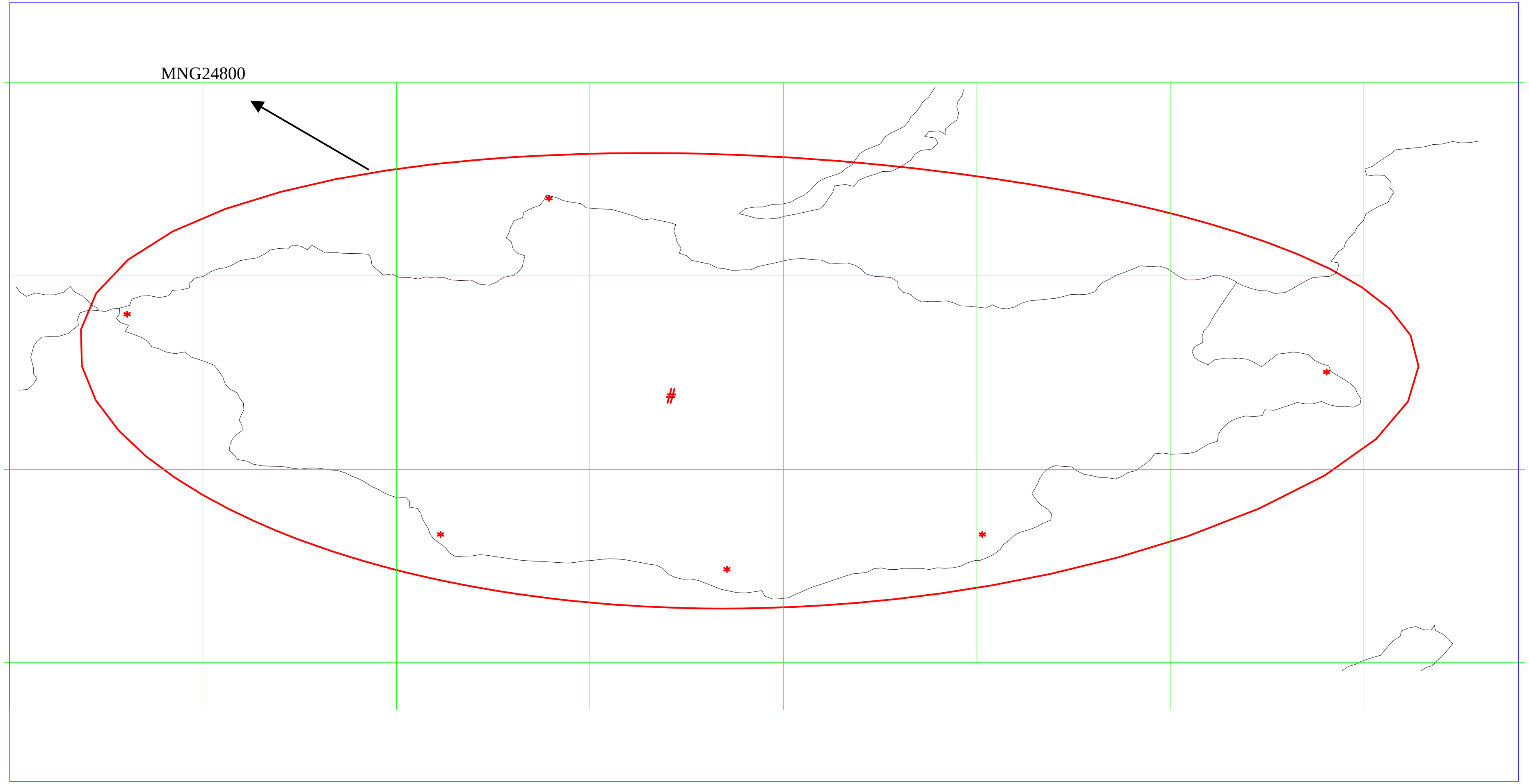
MCO (13° W)


MCO11600
ITU Digitized World Map. 99UA01SB.PLN UP PLATE-CARREE Scale: 5556016 GRID: 1.0
UP MCO11600 -13.00 7.40 43.70 .60 .60 .00
100

MLA (91.5° E)

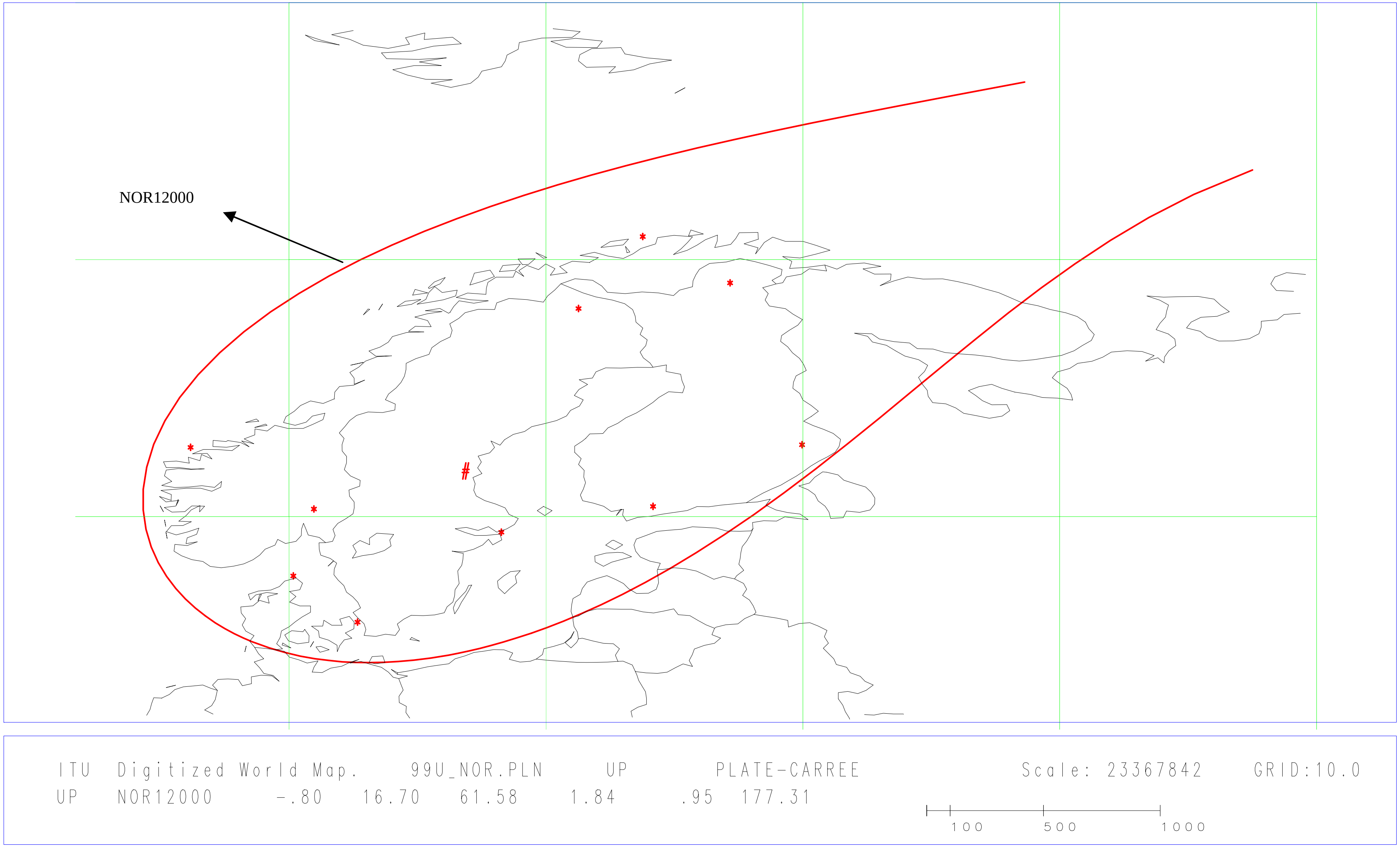


MNG (74° E) (2)

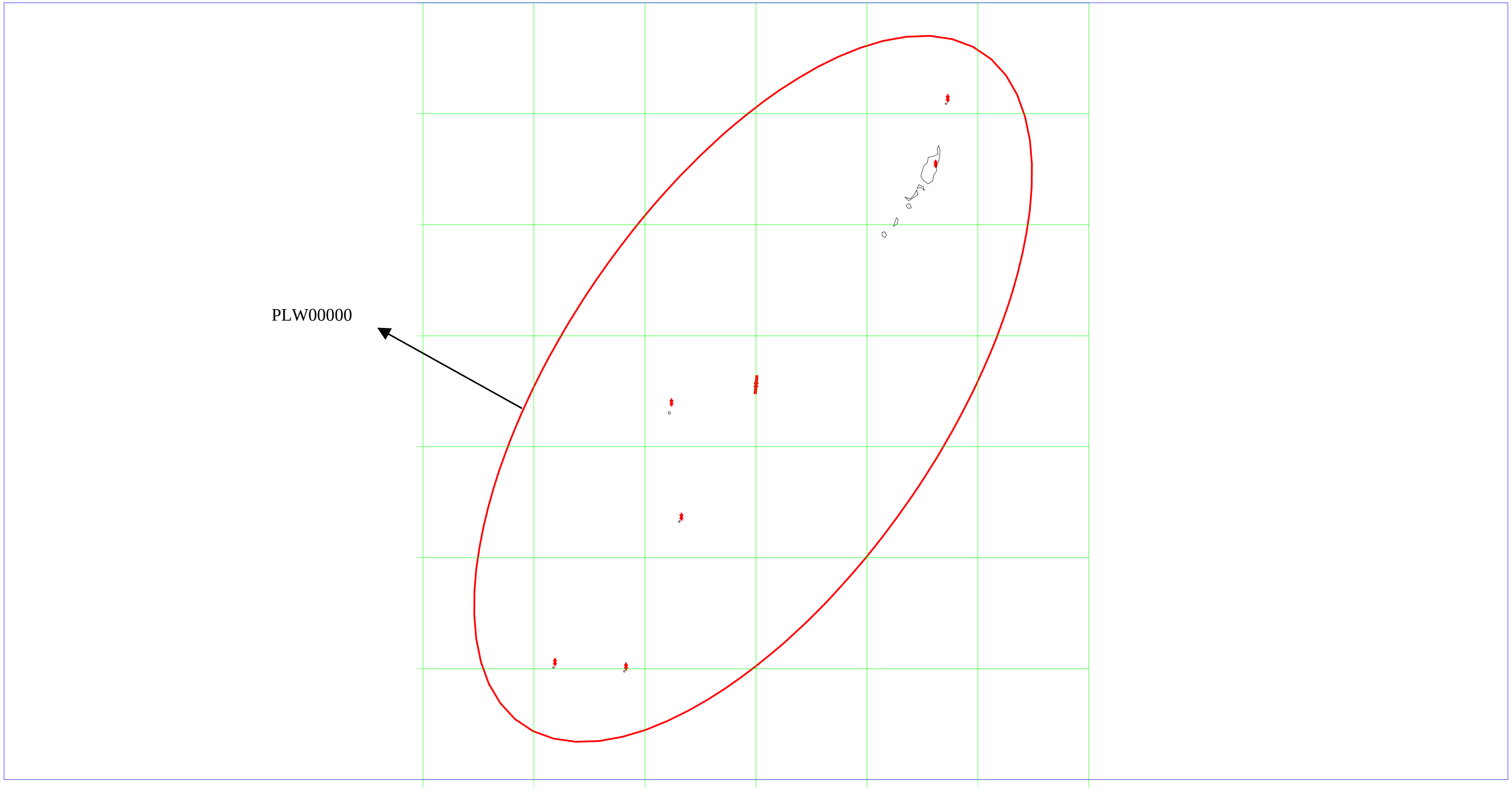


(2) Beam recalculated to provide appropriate national coverage

NOR (0.8° W)

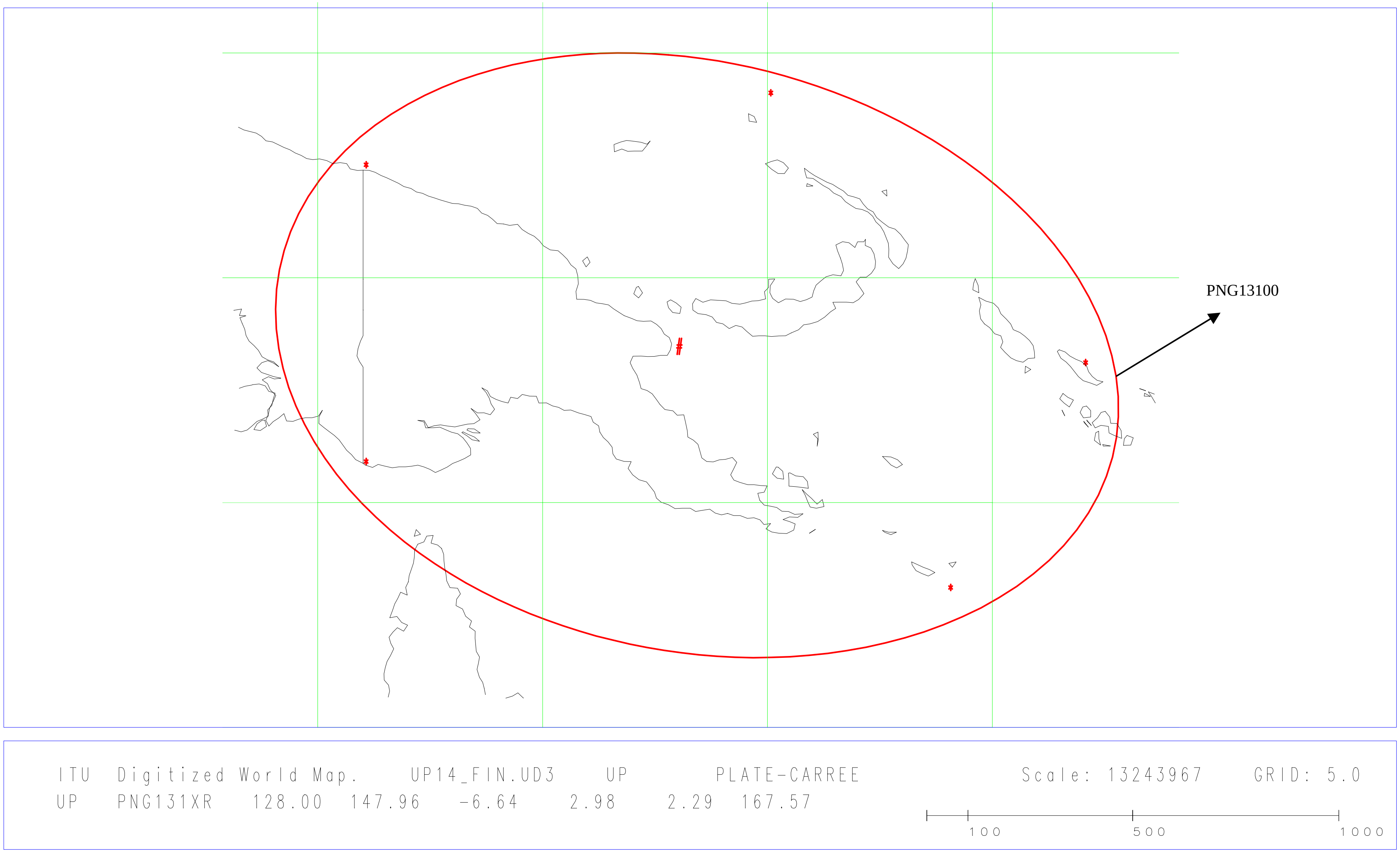

NOR12000
ITU Digitized World Map. 99U_NOR.PLN UP PLATE-CARREE Scale: 23367842 GRID:10.0
UP NOR12000 -.80 16.70 61.58 1.84 .95 177.31
100 500 1000

PLW (140° E)

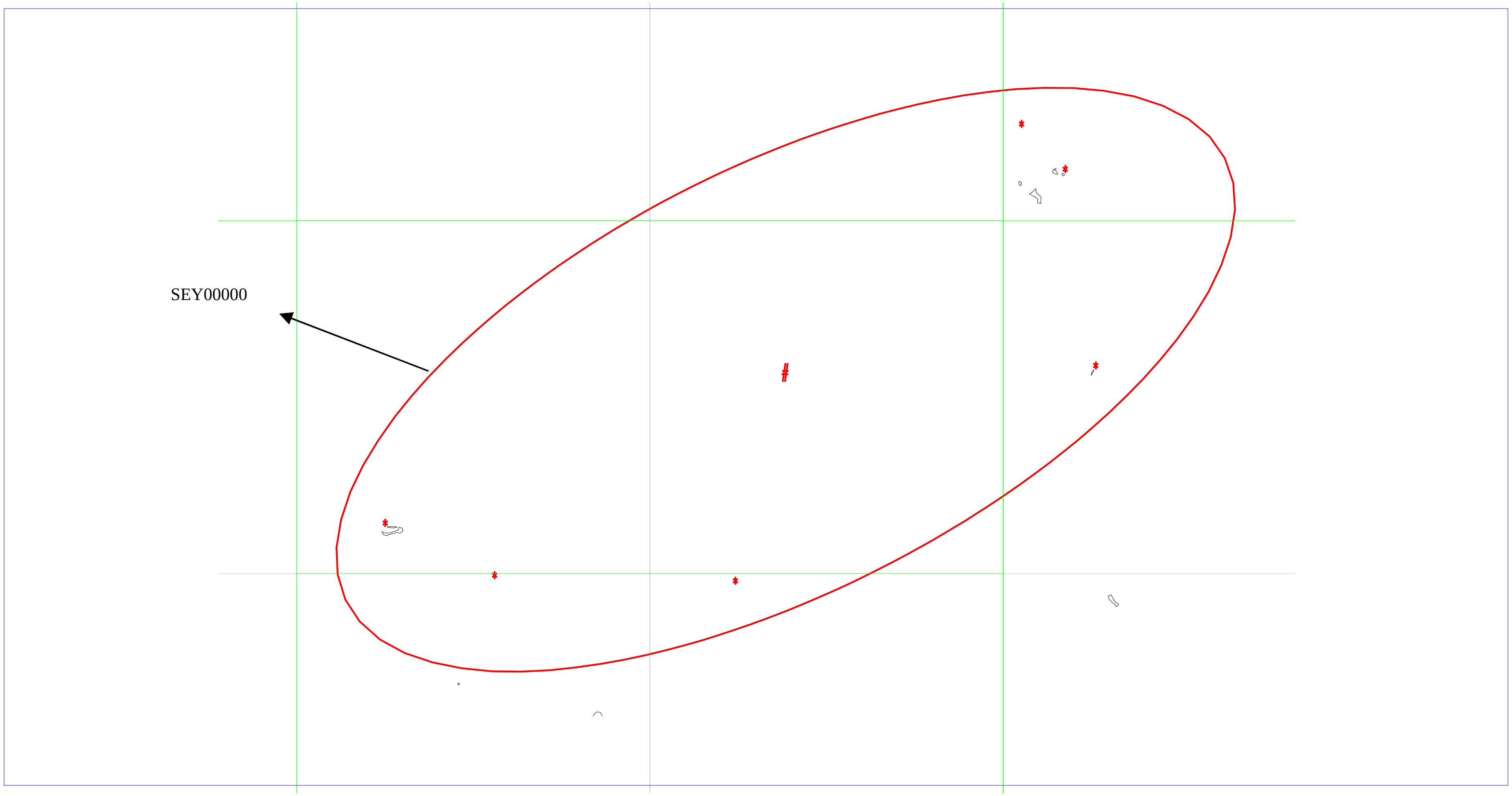


ITU Digitized World Map. UP17_FIN.UD3 UP PLATE-CARREE Scale: 5438082 GRID: 1.0
UP PLW00000 140.00 132.98 5.51 1.30 .60 55.41
100

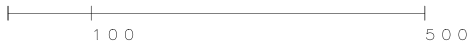
PNG (128° E)


PNG13100
ITU Digitized World Map. UP14_FIN.UD3 UP PLATE-CARREE Scale: 13243967 GRID: 5.0
UP PNG131XR 128.00 147.96 -6.64 2.98 2.29 167.57
100
500
1000

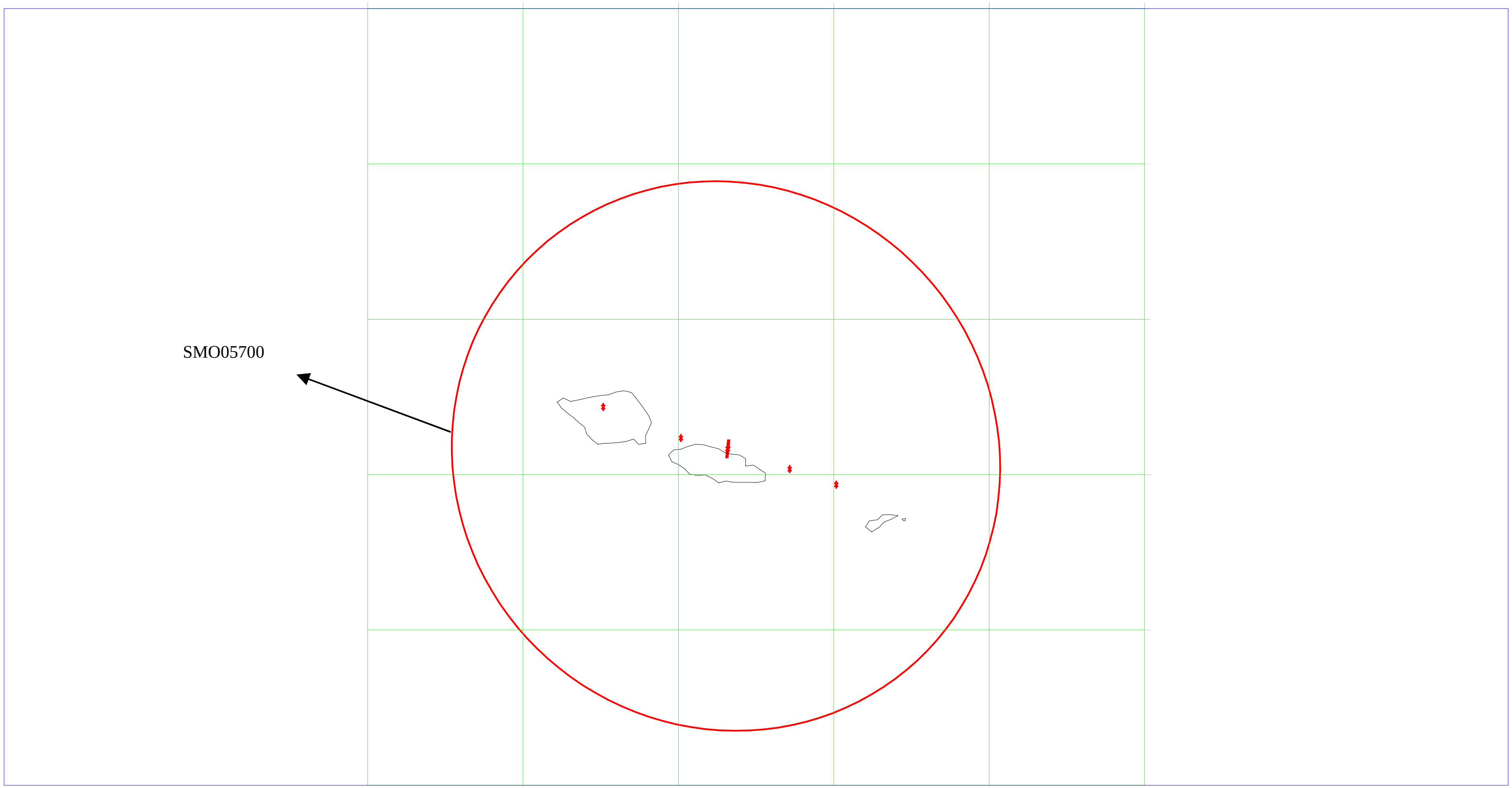
SEY (42.5° E)



ITU	Digitized World Map.	99UA01SB.PLN	UP	PLATE-CARREE		Scale: 8654665	GRID: 5.0
UP	SEY00000	42.50	51.86	-7.23	2.43	1.04	27.51

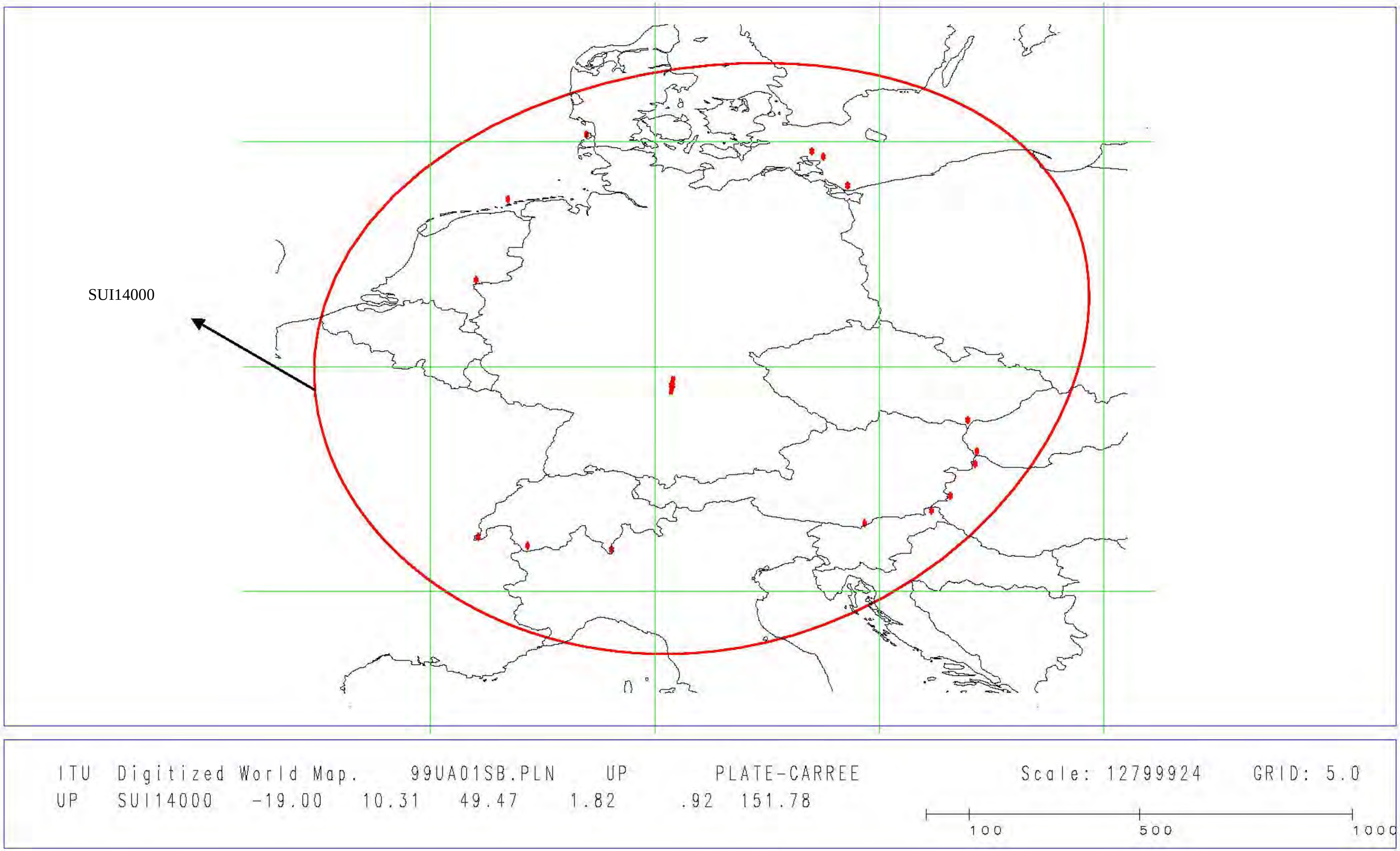


SMO (178° W)



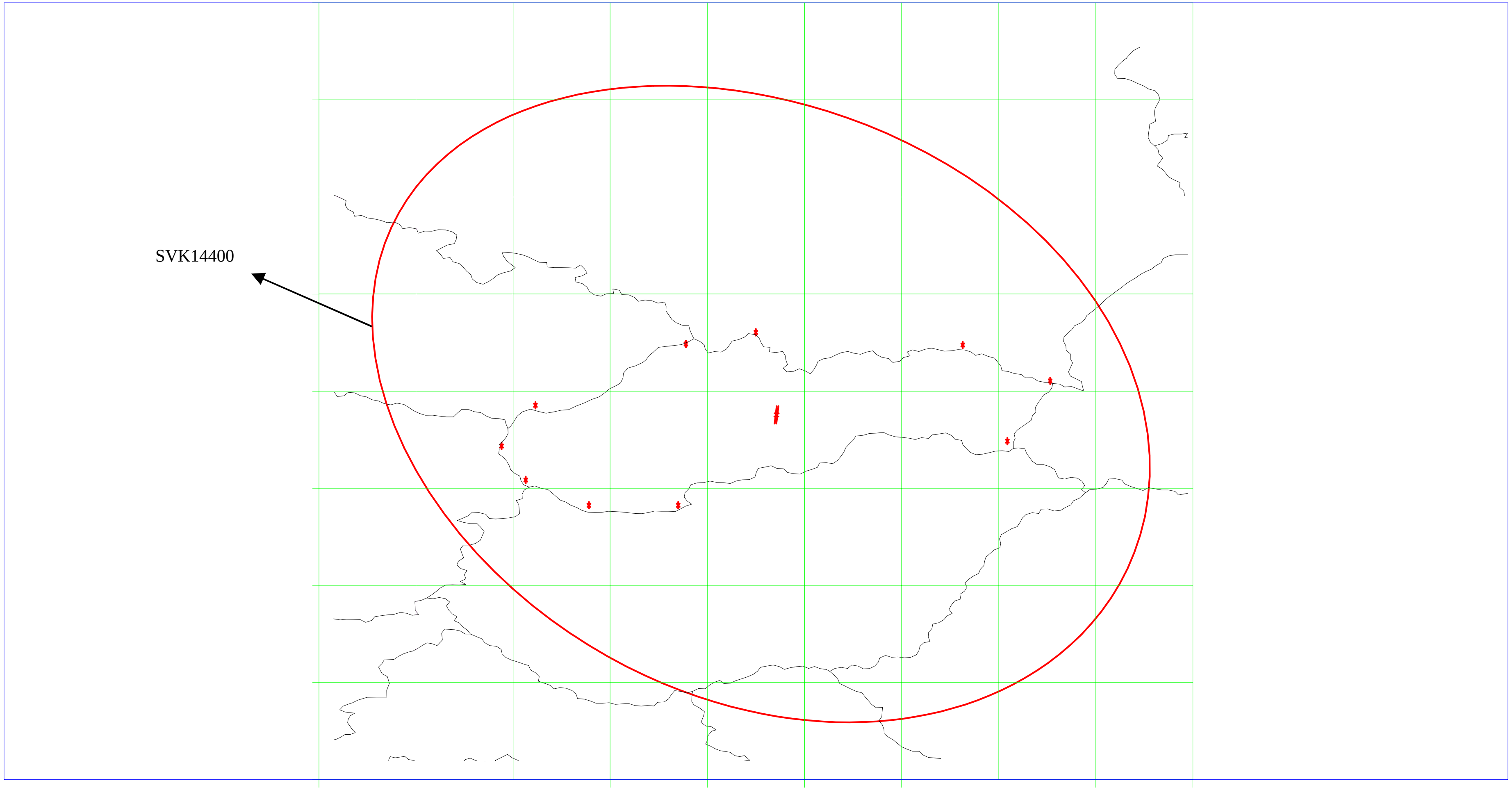
ITU Digitized World Map. UP17_FIN.UD3 UP PLATE-CARREE Scale: 3273598 GRID: 1.0
UP SMO05700 -178.00 -171.70 -13.87 .60 .60 90.00
100

SUI (19° W) (1)



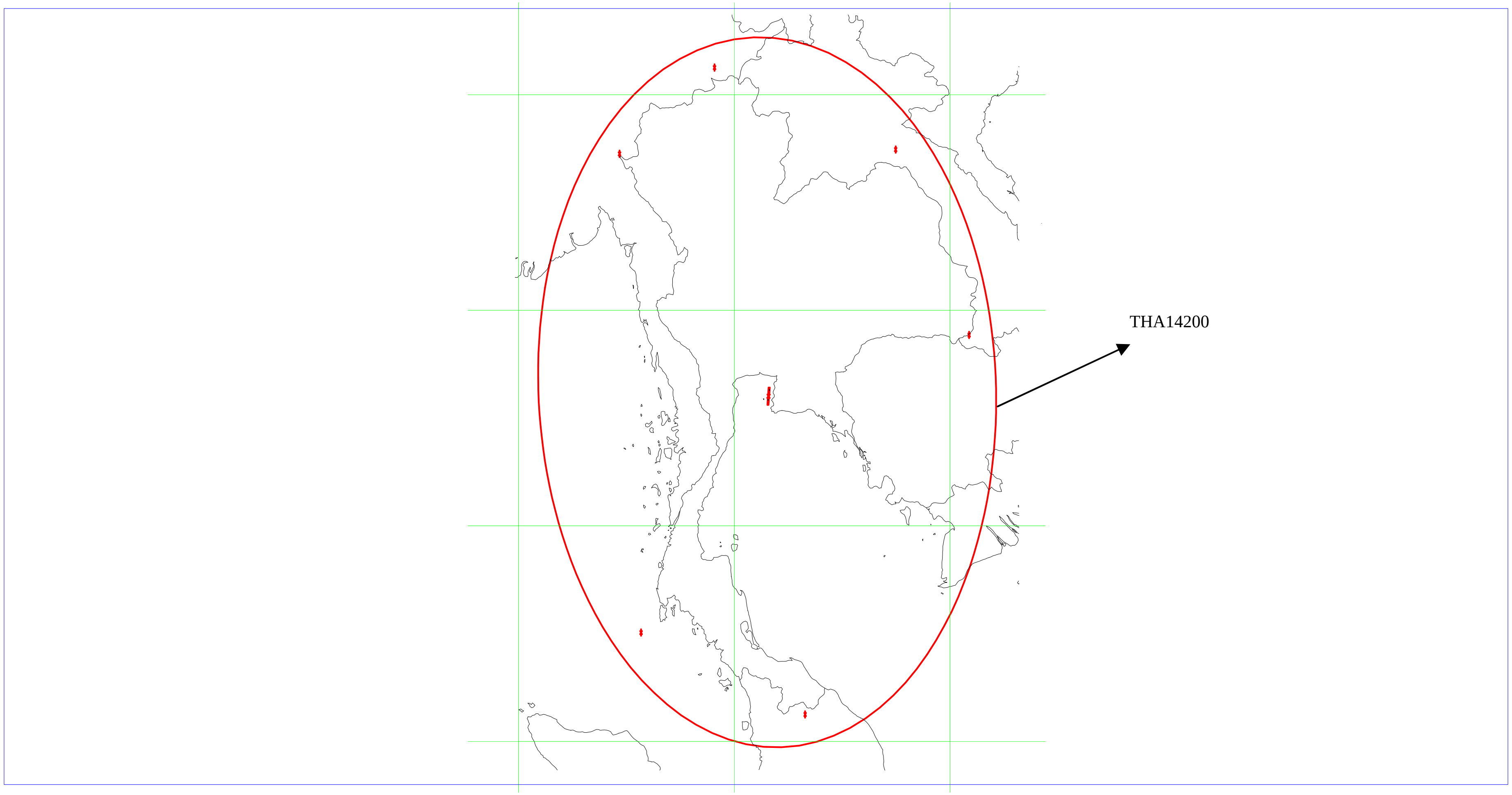
(1) Multinational beam identical for AUT, D, LIE and SUI

SVK (34° E)


SVK14400


ITU Digitized World Map. 99UA34E.PLN UP PLATE-CARREE Scale: 6601555 GRID: 1.0
UP SVK14400 34.00 19.68 48.70 .82 .60 7.75
100
500

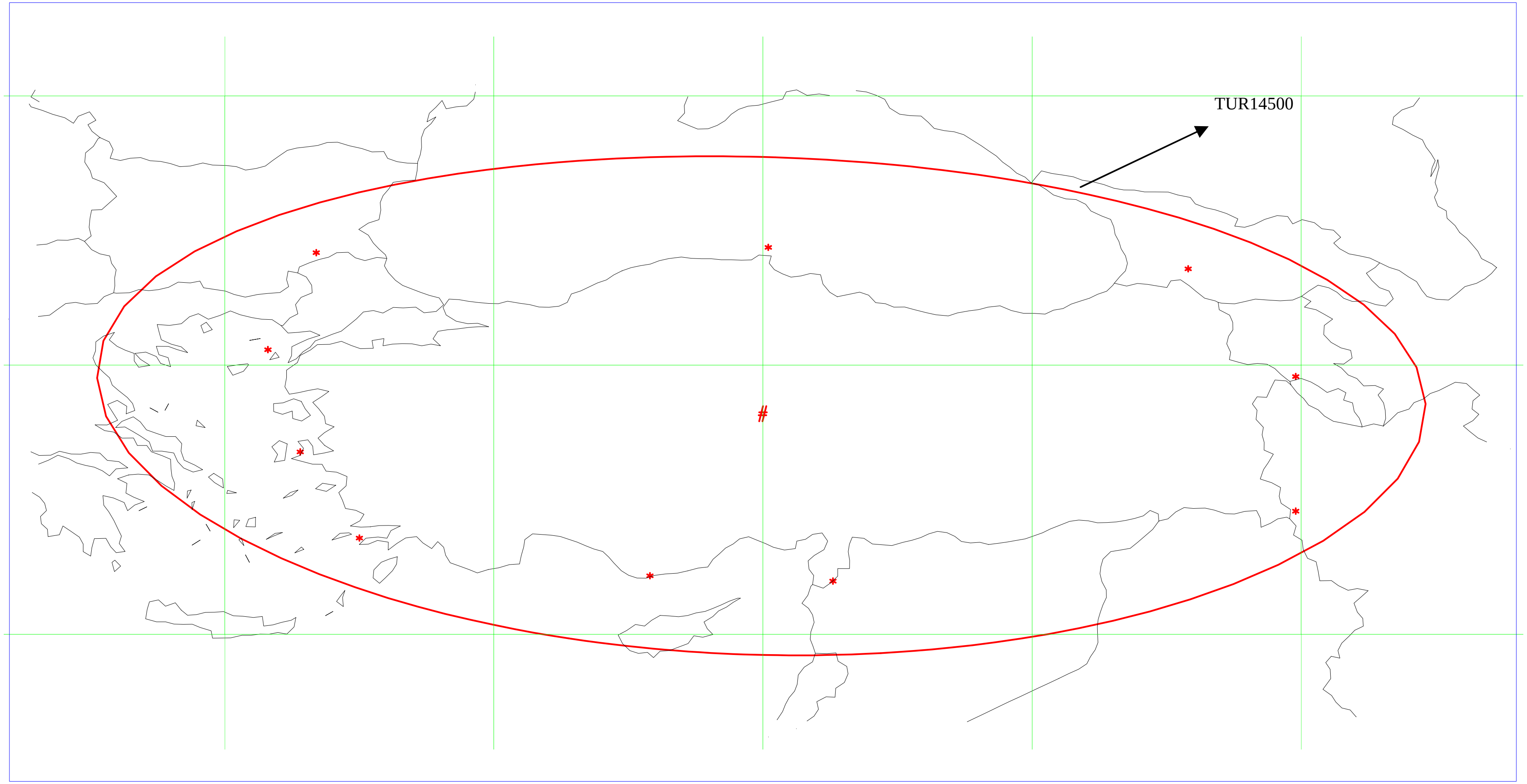
THA (98° E)



ITU Digitized World Map. 99UA01SB.PLN UP PLATE-CARREE Scale: 13636867 GRID: 5.0
UP THA14200 98.00 100.75 12.88 2.80 1.82 93.77

100 500 1000

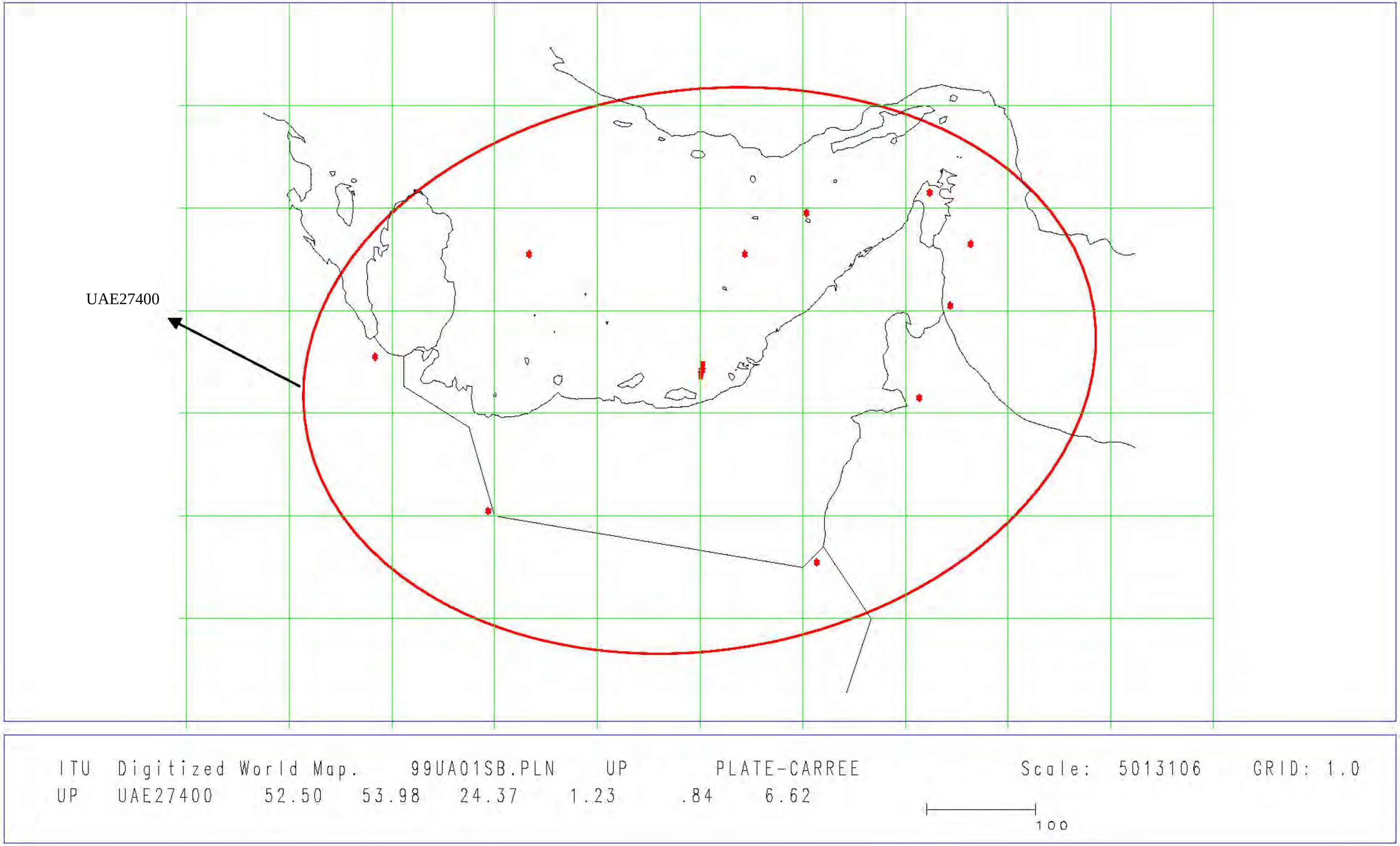
TUR (31° E)



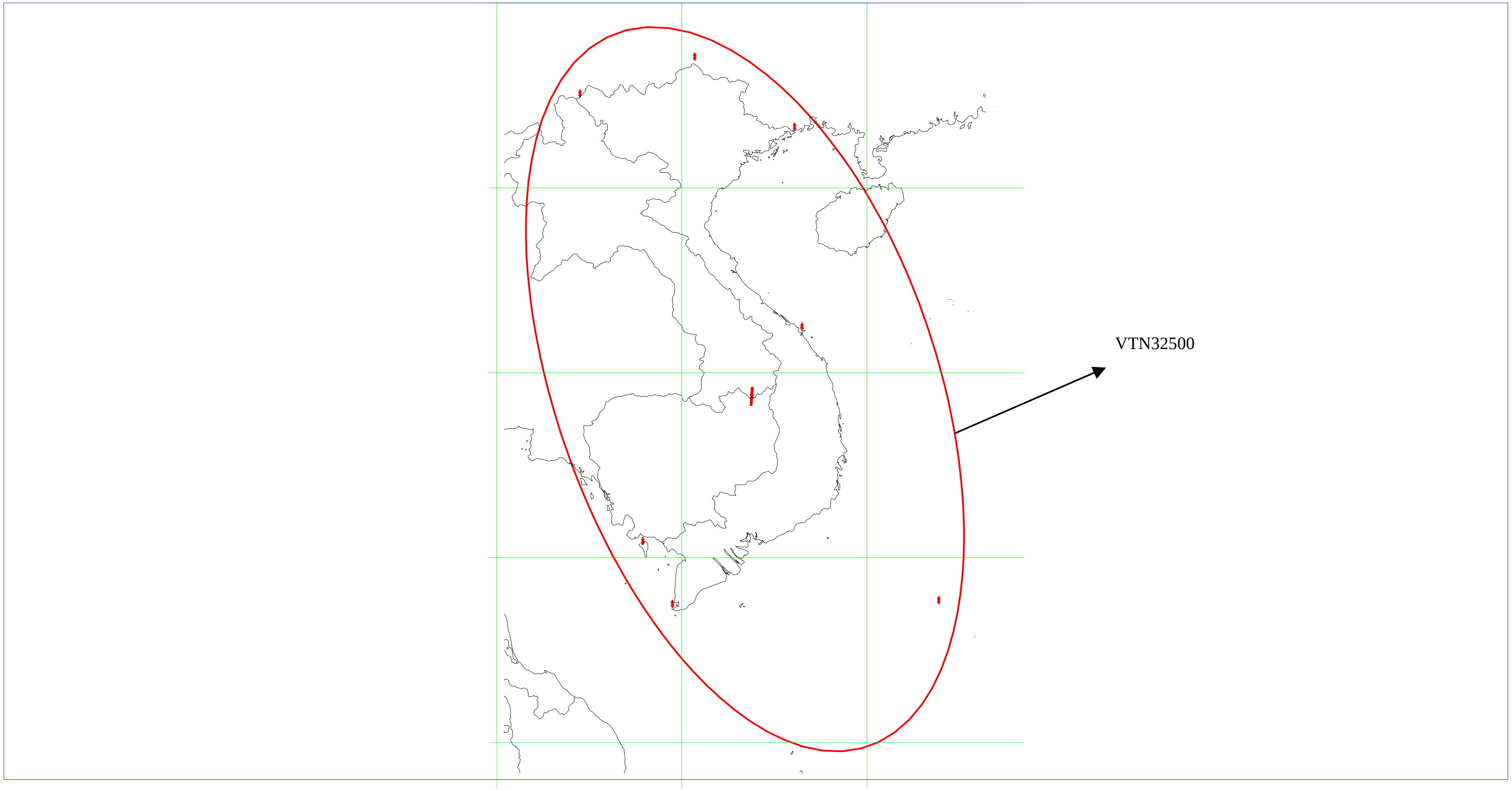
ITU Digitized World Map. 99UA01SB.PLN UP PLATE-CARREE Scale: 11827995 GRID: 5.0
UP TUR14500 31.00 34.89 39.01 3.21 1.10 177.47

100 500

UAE (52.5° E)


UAE27400
ITU Digitized World Map. 99UA01SB.PLN UP PLATE-CARREE Scale: 5013106 GRID: 1.0
UP UAE27400 52.50 53.98 24.37 1.23 .84 6.62
100

VTN (107° E)



ITU Digitized World Map. 99UA01SB.PLN UP PLATE-CARREE Scale: 16476706 GRID: 5.0

UP VTN32500 107.00 106.84 14.21 3.43 1.76 109.43

100 500 1000

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to Document 34-E
10 April 2000
Original: English

PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

COMPLEMENTARY/UPDATED INFORMATION ON METHODOLOGY TO IMPLEMENT THE PLANNING APPROACH

Please find attached complementary/updated information to that contained in Attachment 1 to Document WRC2000/34.

Yoshio UTSUMI
Secretary-General

Attachment: Complementary/updated information on methodology to implement the planning approach

ATTACHMENT

Director, Radiocommunication Bureau

COMPLEMENTARY/UPDATED INFORMATION ON METHODOLOGY
TO IMPLEMENT THE PLANNING APPROACH

Attachment 1 to Document WRC2000/34 contains a description of the methodology used to carry out downlink and feeder-link feasibility studies of "the Planning Approach" prior to the last IRG meeting.

The information provided in this Corrigendum 1 to Document WRC2000/34 incorporates the IRG decisions taken at its last meeting. This information is presented hereafter in terms of revised sections to the text provided in Attachment 1 to Document WRC2000/34, i.e. the IRG Final Report (*Notes in italic characters indicate the areas in which the text of the IRG Final Report has to be modified*).

Consequently, with this Corrigendum, the methodology used by the Radiocommunication Bureau, on behalf of the IRG, to conduct the downlink and feeder-link feasibility studies are more accurately described.

Section 2 Step 1 implementation: Definition of *a priori* selected orbital position

Replace the last paragraph of this section with the following:

At the request of the APT Group of Technical Experts (AGTE) from Region 3, the default orbital positions proposed by AGTE in Document GTE99-4/9, 24 September 1999, will be used as default orbital positions for Region 3 in the replanning feasibility studies, unless a different preferred orbital position had been requested by an administration in that Region in response to Circular Letter CR/117. The Region 3 administrations for which a default orbital position was proposed by AGTE which is different from that of Appendices S30 and S30A, will be consulted by the Bureau in order to confirm or otherwise this course of action, noting that absence of reply will mean agreement with the choice of orbital position indicated in Document GTE99-4/9. A list providing all preferred and default orbital positions used as a starting point in the studies was published in Circular Letter CR/132 of 5 January 2000. Based on recent communications from certain administrations, an updated list of orbital positions is provided in Addendum 1 to Document WRC2000/34.

Section 3 Step 2 implementation: Creation of composite beams

Replace the last paragraph of this section with the following:

Further to this consultation, the Bureau created a set of composite beams to be used in feasibility studies (see Annexes C and D to Attachment 2 to Document WRC2000/34 and its Corrigendum 2).

Section 4.2 Implementation of the 1st criterion: downlink "existing" beams

Replace the second and third paragraphs of this section with the following:

For each downlink "planned" beam falling in this category, ten "new" channels in Region 1, or twelve[#] "new" channels in Region 3, with new parameters are added in the sub-frequency band already assigned to the "existing" assignments as contained in Appendices S30 and S30A of the corresponding downlink "existing" beam. An MSPACE "group" is created between the new channels and their corresponding "existing" assignments, so as not to exceed a total number of ten channels per Region 1 country, or twelve[#] channels per Region 3 country, or the number of channels of an "existing system" which is greater than ten in Region 1 or twelve[#] in Region 3.[3]

A BSS-BSS compatibility analysis is then conducted in order to check if these ten in Region 1 or twelve[#] in Region 3 "new" channels are acceptable or not, i.e. these ten or twelve[#] "new" channels are acceptable if their EPM is positive **and** if they do not degrade[4] by more than 0.45 dB the EPM, if already negative, of the other "existing" assignments (see also Annex 1).

Replace the last but one paragraph of this section with the following:

If a beam cannot get ten "new" channels in Region 1 or twelve[#] "new" channels in Region 3 in the sub-frequency band already assigned to its corresponding downlink "existing" beam, it is then not included in the "Draft Step 3 Plan" at that stage and will be considered together with other beams under section 4.3 below.

Section 4.3 Implementation of national single or composite downlink "planned" beams

Replace the third paragraph of this section with the following:

Then, for each downlink "planned" beam falling in this category, a Victim Study and a Culprit Study (see Annex 1) are conducted in order to assign the most suitable sub-frequency band (with ten channels in Region 1 and twelve[#] channels in Region 3).

Section 4.3.1 Treatment of downlink "planned" beams not included in the "Draft Step 3 Plan" but for which at least one specific orbital position was requested

Replace item C of this section with the following:

C Use of fast roll-off antenna

The IRG agreed to investigate whether the use of a fast roll-off space station antenna, if available, for the downlink "planned" beam under consideration would allow for its inclusion in the "Draft Step 3 Plan" at its preferred orbital position.

[#] Due to time and resource constraints, the automated software was not modified to find a block of 12 channels for Region 3 beams at Steps 3 and 4. It remained unmodified i.e. set to find a block of 10 channels for all beams. The additional 2 channels were manually added to Region 3 beams at the end of Step 5 with a few minor channel adjustments necessary. The result of this action is considered to have had the same effect as finding a block of 12 channels at Steps 3 and 4.

[3] Sweden and Norway reserve their position on this paragraph.

[4] It is to be noted that during the implementation of all steps, such degradations do not accumulate.

Section 5.3.2 Step 4 Orbital spacing study

Replace item A of this section with the following:

A For each possible sub-frequency band (eight with ten channels each in Region 1, four with twelve[#] channels each in Region 3) for the selected beam, perform the three following actions:

Section 6.2 Description of the Step 5 methodology

Replace the third paragraph of this section with the following:

As an optional measure to resolve particular specific cases of remaining incompatibilities in Region 1, and on an exceptional basis, the use of different channel repartition may be envisaged (e.g. in Region 1, spreading the ten channels over the 800 MHz instead of 400 MHz in one polarization). In such a case, the concerned administration(s) should be informed.

The note at the end this section is no longer necessary since IRG decided at its last meeting to include in the basic study 12 channels per beam in Region 3.

Section 8.2 Action 1: Establishment of the "draft new feeder-link Plan" at both 14 GHz and 17 GHz

Replace the third paragraph of this section with the following:

In order to simplify the establishment of the "draft new feeder-link Plan", GTE-4 concluded to start by assigning to each of the feeder-link "planned" beams in the 17 GHz frequency band the block of channels selected for their corresponding downlink "planned" beam at the end of the implementation of the "draft new downlink Plan" (i.e. result of Steps 3, 4, 5 and 6 above).

Section 8.3 Action 2: Analysis of the interference situation

Replace the second paragraph of this section with the following:

Excessive EPM degradations are identified as follows:

a) in the case of "existing" systems, identifying positive reference EPM degraded below –0.45 dB or negative reference EPM degraded by more than 0.45 dB. The reference EPMs are those of the WRC-97 reference situations as evolve;

b) in the case of "planned assignments", identifying negative EPMs below –0.45 dB.

Replace the fourth paragraph of this section with the following:

In order to resolve this situation, the IRG agreed to apply the following measures in an appropriate order:

- reverse the polarization direction;
- assign different channels in the same or the alternative frequency band (i.e. at 14 GHz) if allocated and assigned;

[#] Due to time and resource constraints, the automated software was not modified to find a block of 12 channels for Region 3 beams at Steps 3 and 4. It remained unmodified i.e. set to find a block of 10 channels for all beams. The additional 2 channels were manually added to Region 3 beams at the end of Step 5 with a few minor channel adjustments necessary. The result of this action is considered to have had the same effect as finding a block of 12 channels at Steps 3 and 4.

Add the following text before the last paragraph of this section in order to explain in details how the feeder-link methodology has been implemented.

The practical application of the above-mentioned measures at a given orbital position where beam(s) with EPM degradation(s) have been identified is as follows:

A. A first study is performed in order to find a solution at that orbital position in the 17 GHz frequency band by using:

i) different polarization direction, and/or

ii) different channel arrangements.

B. If the first study is not successful (i.e. there is still excessive EPM degradation(s)) and there is one beam at that orbital position with channel(s) in the Appendix S30A Plan at 14 GHz, this beam is moved to the 14 GHz frequency band and a second study is performed in the 17 GHz frequency band without this beam by using:

i) different polarization direction, and/or

ii) different channel arrangements.

C. If the second study is not successful (i.e. there is still excessive EPM degradation(s)) and/or there is no beam at that orbital position with channel(s) in the Appendix S30A Plan at 14 GHz, then a third study is performed by using:

i) different polarization direction, and/or

ii) different channel arrangements, and/or

iii) a shift of ±0.2 degrees around the nominal orbital position.

D. If the third study is not successful (i.e. there is still excessive EPM degradation(s)), then the most sensitive beam is moved to the 14 GHz frequency band, provided that this beam is located in a Region where this frequency band is allocated, and a fourth study is performed by using:

i) different polarization direction, and/or

ii) different channel arrangements, and/or

iii) if necessary, a shift of ±0.2 degrees around the nominal orbital position.

E. If the fourth study is not successful (i.e. there is still excessive EPM degradation(s)), then one beam has to be moved to another orbital position. This beam is chosen among those which do not have preferred orbital position and/or those which have been moved due to incompatibilities found during the downlink feasibility study. The selection of the beam to be moved is then based on the order of treatment defined for the downlink feasibility study, with the aim to minimize the orbital position changes required to resolve the feeder-link incompatibilities. A fourth study is then performed by using:

i) different polarization direction, and/or

ii) different channel arrangements, and/or

iii) if necessary, a shift of ±0.2 degrees around the nominal orbital position.

Section 8.4 Action 3: Second run of interference calculation

Replace the last paragraph of this section with the following:

As an exceptional measure to resolve the remaining incompatibilities, which could not be resolved by iterations of Action 2 measures, some minor e.i.r.p. adjustments could be implemented in order to meet the required feeder-link objective, i.e. EPM ≥ –0.45 dB or EPM ≥ (Reference EPM - 0.45 dB).

However, any e.i.r.p. adjustment(s) or any remaining EPM degradation(s) will be reported for further appropriate action.

Annex 1 Section A1.2.1 Definition of "artificial" Reference EPM for Culprit study purposes

Add the following definition to the assumptions:

- D is the EPM degradation tolerance (i.e. D = 0.45 dB).

Replace the definition of NR with the following:

If R < 0

If E > (R-D)

$NR = -10 \, Log[(10^{(-R/10)} x 10^{(D/10)}) - 10^{(-E/10)}] + 10 \, Log[10^{(D/10)} - 1]$

Else

NR = 99.99

End if

Else

If E < 0

NR = R

Else

$NR = -10 \, Log[10^{(D/10)} - 10^{(-E/10)}] + 10 \, Log[10^{(D/10)} - 1]$

End if

End if

In addition, the Single Entry C/I Criterion/Limit definition as a function of NR is as follows:

$$C2ILimt = PR - 10 \, Log[10^{(NR/-10)} x (10^{(D/10)} - 1)]$$

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Note by the Secretary-General

REVIEW AND POSSIBLE REVISION OF THE 1997 BROADCASTING-SATELLITE SERVICE PLANS FOR REGIONS 1 AND 3

Under the provisions of *resolves* 2 of Resolution 532 (WRC-97), the Director of the Radiocommunication Bureau shall present to the Conference the results of studies undertaken in accordance with the Resolution. The attached document is the Report by the Inter-conference Representative Group (IRG) established for the purpose of undertaking the required studies.

The Conference is invited to consider the results of the studies as outlined in the attached Report.

Yoshio UTSUMI
Secretary-General

Appendix: 1

APPENDIX

FINAL REPORT OF THE
INTER-CONFERENCE REPRESENTATIVE GROUP (IRG)

CONTENTS

1 Introduction

The 1997 World Radiocommunication Conference (WRC-97) reviewed the broadcasting-satellite service (BSS) planning principles proposed by several administrations and those adopted by the 1995 World Radiocommunication Conference (WRC-95) in Resolution 531 (WRC-95) for the revision of Appendix 30/S30 and Appendix 30A/S30A by WRC-97. WRC-97 agreed to establish an Inter-conference Representative Group (IRG) and tasked it:

- to study the feasibility of increasing the minimum capacity for countries in Regions 1 and 3 to around the equivalent of ten analogue channels in accordance with the principles set out in Annex 1 to Resolution 532 (WRC-97);[1]
- to examine Annex 7 in light of its studies for possible revision of the BSS Plans and with respect to decisions taken by WRC-97, such as the reduction of the downlink e.i.r.p. Its advice on the relevance of that Annex in providing protection to all services sharing the planned bands, and particularly the Region 2 BSS Plan, should be reported to WRC-99;
- to consider concerns identified by WRC-97: modifications of the Plans for additional requirements and subregional systems should not lead to monopolization of the use of the bands by a country or group of countries. Advice on how to address these concerns should be reported to WRC-99.

Pursuant to Annex 2 of Resolution 532 (WRC-97), IRG was established and structured to include a Group of Technical Experts (GTE) working under the guidance of IRG. As a result, administrative circular letters were sent to all Member States and Sector Members, regional broadcasting organizations and regional telecommunications organizations inviting them to participate in the activities of IRG and GTE. IRG held five meetings during 1998 and 1999.

Council 1998 by Resolution 1129 modified the proposed agenda of the Conference as follows:

"1.19 to consider the report of the Inter-conference Representative Group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system;

1.19*bis* in accordance with Article S14, to consider objections expressed by administrations with respect to the Radio Regulations Board's Rules of Procedure relating to the application of RR 2674/S23.13 in order for the Bureau to modify its findings in accordance with the conclusions of the Conference;"

The same Resolution also instructed the IRG to conduct its work in strict conformity with the principles listed in Annex 1 to Resolution 532 (WRC-97).

This report details the actions that were performed by IRG to implement Resolution 532 (WRC-97).

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[1] All references to "draft Plans" in this report are to be considered as referring to the results of these feasibility studies.

2 Unused

3 Outline of the IRG and GTE meetings

3.1 IRG

The first meeting of the Inter-conference Representative Group (IRG) was convened from 2 to 4 February 1998 in response to Circular Letter CR/83 of 15 December 1997. The meeting was attended by 41 representatives of 24 administrations and international organizations.
Mr Robert W. Jones, Director of the Radiocommunication Bureau, noted that IRG had been established as a result of Resolution 532 (WRC-97). That Resolution established the primary mandate of IRG and the Group of Technical Experts (GTE).

Mr Ralph Zeitoun (Canada) was unanimously elected Chairperson of IRG. The Vice-Chairpersons elected to represent different areas were:

Africa	Mr I. Samake (Republic of Mali)
Arab Group	Mr N. Kisrawi (Syrian Arab Republic)
Asia & Asia Pacific	Mr E. Behdad (Islamic Republic of Iran)
Europe	Mr A. Frederich (Sweden)
Region 2	Mr E. Reinhart (United States of America)

It was also agreed that Mr K. Arasteh of the Radiocommunication Bureau would chair GTE and it was expected that GTE would operate in a manner similar to the BSS Planning Exercises Team (PXT) which prepared the draft revised Regions 1 and 3 Plan for WRC-97. In the conclusions of the first IRG meeting (IRG-1), three approaches to replanning the Region 1 and 3 BSS Plan were defined (Approaches A, B and C) as summarized in section 4 of this report.

The second meeting of IRG (IRG-2) was convened in Geneva from 1 to 4 September 1998 in response to Circular Letter CR/98 of 3 July 1998. The meeting was attended by 55 representatives of 34 administrations and international organizations. At IRG-2, the Bureau presented results of replanning studies on "Approach A" and possible requirements needed to implement Approaches B and C. The IRG-2 meeting decided to reduce the number of study approaches by merging a modified "Approach A" and "Approach C" into a new approach, "Approach 1". IRG-2 also reviewed an alternative approach, "Approach 2" (initially referred to as "Approach D").

The third meeting of IRG (IRG-3) was convened in Geneva on 17 February 1999 in response to Circular Letter CR/111 of 8 December 1998. It was attended by 89 representatives of 49 administrations and international organizations. Mr Yoshio Utsumi, the Secretary-General of ITU, addressed the meeting and highlighted the importance of modernizing the BSS Plans for Regions 1 and 3. IRG-3 considered both planning approaches and concluded that a new planning approach that combined elements from both Approaches 1 and 2 should be pursued. This was named "The Planning Approach".

The fourth meeting of IRG (IRG-4) was held in Geneva on 1-2 July 1999 in response to Circular Letter CR/121 of 31 March 1999. The meeting was attended by 106 representatives of 53 administrations and international organizations. It agreed on the methodology and basic technical assumptions to be used in the replanning studies under the "Planning Approach".

The fifth meeting of IRG (IRG-5) was held in Geneva on 29 November - 3 December 1999 in response to Circular Letter CR/130 of 31 March 1999. The meeting was attended by 98 representatives of 51 administrations and international organizations. At this meeting, the report of the Director, BR to WRC-2000, as specified by item 1.19 of the agenda, was prepared.

3.2 GTE

The first meeting of GTE (GTE-1) was convened from 6 to 9 April 1998 in Geneva in response to Administrative Circular CA/52 of 15 December 1997. This meeting was attended by 46 representatives of 32 Member States and Sector Members. Mr K. Arasteh of the Radiocommunication Bureau chaired this and subsequent meetings as designated by IRG.

The second meeting of GTE (GTE-2) was held in Geneva over four days during the period 15-16 and 18-19 February 1999 in response to Administrative Circular CA/56 of 4 December 1998. This meeting was attended by 124 representatives of 67 Member States, Sector Members and other organizations.

The third meeting of GTE (GTE-3) was held in Geneva during the period 28-30 June 1999 in response to Administrative-Circular CA/65 of 15 April 1999. The meeting was attended by 88 representatives of 58 Member States, Sector Members and other organizations.

The fourth meeting of GTE (GTE-4) was held in Geneva during the period 27 September - 1 October 1999 pursuant to Administrative Circular CA/68 of 16 August 1999. This meeting was attended by 81 representatives of 51 Member States, Sector Members and other organizations.

4 Brief review of the initial Planning Approaches

The planning approaches referred to above are hereby reviewed briefly to provide a context for the replanning studies that were considered:

Approach A - Incremental approach based on maintaining the current 1997 Plan structure as it evolves and studying the possibility of adding more channels one by one, up to ten channels, to serve each test point/service area while maintaining the same proportionality principle adopted by WARC BS-77.

Approach B - Additional orbital position approach based on maintaining the current 1997 Plan structure as it evolves and studying the possibility of providing additional channels from another orbital position (it might be the same orbital position for some countries) to form subregional coverage instead of national coverage while maintaining the same proportionality principle adopted by WARC BS-77.

Approach C - Complete replanning approach based on maintaining "existing"[2] systems and reshuffling the rest of the available capacity in order to provide a minimum of ten channels to each test point/service area while maintaining the same proportionality principle adopted by WARC BS-77.

Approach D - Complete replanning approach based on maintaining "existing" systems and allotting in a band of 400 MHz a minimum of ten channels to each test point/service area while maintaining the same proportionality principle adopted by WARC BS-77.

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[2] Whenever the term "existing" system is used in this report, it refers to a system with notified assignments that are in conformity with Appendices S30 and S30A, that have been brought into use and for which the date of bringing into use has been confirmed to the Bureau.

5 Further Planning Approaches

Approach 1 - Based on maintaining the WRC-97 Plan as it evolves. Additional channels are assigned in order to bring the total number of channels to ten per test point for countries with between five and ten channels per test point in the WRC-97 Plan.

Approach 2 - Based on an allotment Plan, splitting the planned band in Region 1 into sub-bands of 400 MHz each, and 500 MHz in Region 3. The replanning consists in allotting to each country/coverage area a sub-band (or block) of 400 MHz with one polarization in Region 1, and 500 MHz with one polarization in Region 3. The replanning is based on the principles contained in Resolution 532 and uses the technical assumptions and methodology defined for Approach 1.

Details of Planning Approaches A, B, C, D as well as Approaches 1 and 2 are contained in the Final Report of GTE (CA/73 posted on the ITU website and TIES).

6 The "Planning Approach"

The "Planning Approach" was defined by IRG at its third meeting. It is based on elements from Approach 1 and Approach 2.

6.1 Description of the "Planning Approach"

The feasibility study is performed on the basis of ten defined channels (see Resolution 532 (WRC-97)) grouped in a continuous band for each country in Regions 1 and 3. There are two options:

i) ten defined channels, with a spacing of 38.36 MHz, grouped in a continuous band of 400 MHz with one predetermined polarization; and

ii) ten defined channels, with a spacing of 38.36 MHz between co-polarized channels, grouped in a continuous band of 200 MHz with two predetermined polarizations.

If studies in Region 3 utilizing 500 MHz demonstrate that more channels could be assigned for some Region 3 countries without creating undue constraints on BSS in Region 1, the results of these studies are to be taken into account.

6.2 Choice of orbital positions

In accordance with Resolution 1129 of Council-98, IRG advised the Bureau to consult with administrations regarding the orbital positions to be used in studies based on the "Planning Approach".

A Circular Letter, CR/117 dated 1 March 1999 (and a reminder), was sent to all administrations of Regions 1 and 3 requesting them to inform the Bureau of their preferred orbital position(s) for their beam(s). The Bureau received replies from 53 administrations in response to that circular letter.

In absence of reply, the nominal orbital positions contained in Appendices S30 and S30A were used as default orbital positions in the case of Region 1 countries, and those provided by the APT Group of Technical Experts (AGTE) from Region 3 were used as default orbital positions in the case of Region 3 countries after consultation with the concerned Region 3 administrations.

A list providing all preferred and default orbital positions used as a starting point in the studies was published in Circular Letter CR/132 of 5 January 2000.

With regard to Annex 7 to Appendix S30, see also section 8.

6.3 Technical assumptions and input data

The basic technical assumptions for the "Planning Approach" are described in **Attachment 2**. A summary is provided below.

Generally, technical assumptions as contained in Appendix S30 and Appendix S30A Plans were used, except in the cases mentioned hereafter.

6.3.1 Emission type and channel bandwidth

Studies were to be based on digital modulation with a reference bandwidth of 27 MHz. However, other bandwidths, such as for example 33 MHz or 34.5 MHz (as requested by Japan for their assignments in the exercises), were to be considered before final adoption of the Plan. ITU-R JWP 10-11S confirmed that interference analysis involving non-standard bandwidth cases or non-standard channel spacing cases could be performed by applying Recommendation ITU-R BO.1293 or the worst-case approach according to the case.

6.3.2 Antenna types

The improved fast roll-off space station transmitting antenna characteristics as defined by JWP 10-11/S (see Document GTE99-3/14) was used in special circumstances to solve compatibility problems after consultation with the concerned administration. However, JWP 10-11S informed that, at least for the time-being, this improved fast roll-off antenna should not be used in the case of composite beams (see definition in section 6.3.9 below).

To improve the interference situation, a receiving earth station antenna diameter of 0.9 m was used for a beam of Russia at test points outside the -3 dB contour but still within the national territory of that Administration.

6.3.3 Polarization, channel configuration and number of channels

Among the four channel arrangements studied, it was decided to use generally one channel raster (raster b)): ten defined channels, with 38.36 MHz frequency spacing, grouped in a continuous band of 400 MHz with one predetermined type of polarization. Adjacent channels, with the opposite sense of polarization will be frequency offset by 19.18 MHz. If necessary on a case-by-case basis it was decided to use a second raster, channel raster d): ten defined channels, with 38.36 MHz spacing between co-polarized channels, grouped in a continuous band of 200 MHz with two predetermined types of polarization (i.e. cross-polarized channels assigned to the same beam will be adjacent channels with a frequency spacing of 19.18 MHz).

The requests of the Administrations of Australia and Russia to use specific channels was agreed and implemented in the studies.

Studies were performed in response to requests of the Administrations of the Republic of India, the Islamic Republic of Iran and the Republic of Korea to consider for their feeder-link assignments the 14 GHz frequency band alternatively or in addition to the 17 GHz frequency band (see section 6.4.6 below).

6.3.4 Test points

New downlink test points were used for the Administrations of Morocco and Russia. One downlink test point of the Administration of Monaco outside its territory was removed.

6.3.5 Ellipse calculations

Ellipse parameters were recalculated using the ITU/EBU software application only if orbital positions changed or if test points were changed.

6.3.6 Protection ratios and reference EPM

Negative Equivalent Protection Margins of WRC-97 Plans for "existing"[3] systems were kept because it was considered that those negative EPM were accepted together with the protection margins at that time when those assignment were included in the Plans or were brought into use.

After confirmation by ITU-R JWP 10-11S, it was agreed to use in the studies new co-channel protection ratios only in the case of protection of the "planned"[4] digital assignments against interference from other digital assignments: 20 dB overall, 21 dB for the downlink and 27 dB for the feeder link. Otherwise, it was agreed to use the WRC-97 protection ratios.

6.3.7 Downlink e.i.r.p. level

Generally, it was agreed to assign the minimum downlink e.i.r.p. level of each WRC-97 beam to all the channels of each beam, except in the case of Japan and the Republic of Korea for which the "planned" beams are associated with "existing" systems.

It was agreed to determine the power density value assuming a uniform power density over a 27 MHz bandwidth.

6.3.8 Minimum elevation angle

It was agreed to use a minimum elevation angle of 20° within the downlink service area without any specific value for mountainous areas, and to use 40° for those downlink test points located in areas subject to high precipitation (rain-climatic zones M, N, P and Q).

6.3.9 Composite beams in replanning studies

In general, composite beams[5,6] ("simulated shaped beams") are created for administrations which have more than one beam at a given orbital position in the current WRC-97 Regions 1 and 3 BSS Plan. Composite beams have been formed by combining the elliptical beams of the relevant administration at the orbital position in question.

Administrations' preferences were generally taken into account in the studies for Australia, China, India, Saudi Arabia, the United States/American Samoa, and France/New Caledonia and France/Wallis and Futuna Islands.

In order to evaluate whether or not these national preferences impose undue constraints to the replanning process, it was agreed to conduct a comparison with respect to the Bureau's original suggestions and to evaluate the results on a case-by-case basis, where required.

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[3] Whenever the term "existing" is used in this document, it refers to notified assignments that are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau.

[4] Whenever the term "planned" is used in this document, it refers to assignments/beams in the results of the feasibility study other than those of "existing" systems as defined in footnote 3 above.

[5] The Administrations of Indonesia and Algeria reserve their positions on the definition of composite beams (see also section 6.3.2).

[6] The United States reserves its position on the use of composite beams for its territories.

6.3.10 Orbital positions

Some countries/administrative regions (CHN/HKG, D, NZL, PNG) were covered by channels from two orbital positions in the WRC-97 Plan. It was agreed to use a separate beam for Hong Kong at 122°, and in the case of Germany, New Zealand and Papua New Guinea, to use an ellipse and associated test points at one of their orbital positions (D: 19° W, NZL: 158° E and PNG: 128° E).

Moreover, the Administration of Germany requested that in addition to the beam D 08700 at 19° W, the beam D2-216000 at 1° W continue to be taken into account in the study until the final clarification of the inclusion of the multinational beams proposed by the Administrations of Germany, Austria, Switzerland and Liechtenstein (see the results of this study in relevant paragraph of section 6.4.5 below).

In response to Circular Letter CR/117 of 1 March 1999, some administrations expressed their wishes to co-locate their beams with the beams of certain other administrations. If it is necessary to move one of these administrations to another orbital location, the other administrations who wish to be co-located should also be moved to the new location. If a given number of administrations insist on a given orbital position in which they are incompatible with one another, this shall in no way impose constraints on the replanning process or limit the capacity of other countries. The concerned countries have to accept any resulting interference or reduction in capacity. See also section 6.2 above.

6.3.11 "Existing" systems[7]

Where an administration has an "existing" system in the Plan and that administration wished to co-locate its national beam with the "existing" system, a new national beam with ten channels was created and grouped with the "existing" system.

In accordance with Principle 3 of Annex 1 to Resolution 532 (WRC-97), eight "existing" systems were considered in the downlink study and seven in the feeder-link study.

At the request of the Administrations of France and Norway, their "existing" systems at 19º W and 5º E respectively in the WRC-97 Plans were not considered in the study.

6.3.12 Multinational beams

It was agreed to maintain in the study the WRC-97 multinational beams with the number of channels they have been assigned in the WRC-97 Plans. It was also agreed to treat the "existing" multinational beam(s) at the same time as other "existing" beams (see section 6.4.1 below).

6.4 BSS/BSS replanning studies (downlink and feeder link)

6.4.1 Methodology

The methodology to implement the "Planning Approach" is described in detail in **Attachment 1**. A summary is provided below.

The methodology was defined assuming the use of channel raster b) (see channel raster definition in section 6.3 above). It is a stepwise approach composed of two parts. The first part corresponds to the downlink study and includes six steps and the second part to the feeder-link study and includes three actions.

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[7] Sweden and Norway reserve their position with respect to the principles for selection of channels for administrations having "existing" systems in the Plan.

6.4.1.1 Downlink study

The downlink study consisted of six steps. Steps 1 and 2 provide for the initial preparation of the downlink study. They are related to the definition of *a priori* selected orbital position and the creation of composite beams respectively.

Step 3 of the downlink study consisted of the establishment of a downlink "starting point plan" composed of the "existing" assignments of all the downlink "existing" systems and their associated "planned" assignments/beams, in order to ensure that Principle 3 of Resolution 532 (WRC-97) is met.

The remaining part of Step 3, and Steps 4 to 5 of the downlink study were based on the successive inclusion in the draft new downlink Plan of all the "planned" beams to be considered, according to the following order:

I beam with minimum service-arc size (high latitude countries with low elevation angles);

II composite beams;

III maximum beam size;

IV multinational beam (see also section 6.3.12 above).

Steps 3, 4 and 5 were separated in order to provide an incremental flexible means to ease the inclusion of the "planned" beams in the draft new downlink Plan.

Thus, Step 3 only considers the possibility of including the "planned" beams at their preferred or default orbital positions, as referred to in section 6.2 above. However, in order to accommodate as much as possible the preferred orbital position(s), specifically those requested by administrations, further enhanced means can be implemented such as: changes in the order of treatment, recalculation/readjustment of the elliptical beam parameters, use of fast roll-off antenna, application of power adjustments.

The purpose of Step 4 was to try to include the remaining "planned" beams after Step 3 at other orbital positions.

Finally, if few "planned" beams remained to be included in the draft new downlink Plan after Step 4, Step 5 considers other manual possibilities to accommodate these Step 5 "planned" beams by changing the channels and/or default orbital positions assigned to the "planned" beams included at Steps 3 and 4, and/or by improving or adjusting some technical parameters. On a specific case-by-case basis, the ten channels assigned could be spread over 800 MHz instead of 400 MHz and the administration of an affected "existing" system could be invited, if necessary, to accept an e.i.r.p. increase up to 1 dB or accept a degradation in EPM up to 1 dB.

Should a significantly high number of beams remain to be included after Step 4, the implementation of both Step 3 and Step 4 would have to be repeated with a reduced number of channels.

Step 6 of the downlink study provides for the successive inclusion in the draft new Step 5 downlink Plan all the "planned" multinational beams to be considered, according to the following order:

I beam with minimum service-arc size (high latitude countries with low elevation angles);

II maximum beam size.

In application of Steps 3, 4, 5 and 6, the following criteria had to be respected:

a) in the case of "existing" assignments/systems, no positive reference EPM is degraded below -0.45 dB and no negative reference EPM is degraded by more than 0.45 dB. The reference EPM values were those of the WRC-97 reference situation as it evolves;

b) in case of "planned" assignments, no negative reference EPM below -0.45 dB, noting that interference from beams located beyond a certain orbital separation was not included in the downlink EPM calculation. See **Attachment 1** for further details.

6.4.1.2 Feeder-link study

Action 1 of the feeder-link study consisted of creating a "draft new feeder-link Plan" by using the "existing" feeder-link systems with their "existing" assignment(s), and by assigning to each of the feeder-link "planned" beams the block of channels and the orbital position selected for their corresponding downlink "planned" beam at the end of the implementation of the "draft new downlink Plan".

Action 2 of the feeder-link study consisted of calculating interference and analysing the "draft new feeder-link Plan" defined at Action 1. The interference incompatibilities were then resolved by using different polarization direction and/or different channels in the same or the alternative frequency band if allocated (i.e. 17 GHz/14 GHz). As a last resort, a shift of ±0.2 degrees around the nominal orbital position, in both the feeder-link and downlink plans, could be envisaged between the beams involved in the incompatibility situation.

Finally, the purpose of Action 3 was to check that the solutions implemented at Action 2 provided successful results in order to ensure that the following criteria were respected:

a) in the case of "existing" assignments/systems, no positive reference EPM is degraded below -0.45 dB and no negative reference EPM is degraded by more than 0.45 dB. The reference EPM values were those of the WRC-97 reference situation as it evolves;

b) in case of "planned" assignments, no negative reference EPM below -0.45 dB;

c) with respect to the resolution of negative equivalent protection margin of ten beams in the feeder-link studies, the same approach/principle used in the downlink implementation to be used i.e. change of orbital position(s) if it was not specifically requested while applying the order of beam treatment according to the size of service arc and minimizing the number of changes.

See **Attachment 1** for further details.

6.4.2 Summary of results

6.4.2.1 Results of downlink study[8]

An initial downlink study based on analogue emissions with ten channels in Regions 1 and 3 utilizing channel raster b) found that 80% of the beams considered were successfully allotted ten channels in a continuous band of 400 MHz at Step 3. The Step 4 process accommodated most of the remaining beams at other orbital positions.

A second replanning study was conducted for the downlink based on the "Planning Approach" using the new digital protection ratios. The results found that 95% of the 198 beams considered were successfully allotted ten channels in a continuous band of 400 MHz. The Step 5 process could

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[8] The Spanish and Russian Administrations observe that the results of this study cannot be considered as final in so far as frequency assignments currently in the WRC-97 Plan pending only of being brought into use, will meet all the requirements of Resolution 532 as soon as they are brought into use, thus qualifying for inclusion in the feasibility study, which will in turn result in the modification of the obtained results. The Spanish Administration has currently frequency assignments in the WRC-97 Plan ready to be brought into use in the immediate future, which will fall into the above described situation. The Russian Administration has the same situation.

not resolve incompatibility problems associated with the remaining ten beams. These beams were located in "Europe". A source of incompatibility emanated from "existing"[9] systems.

A third downlink study based on the "Planning Approach" and revised methodology that included changes to a number of technical parameters[10] found that:

- all national "planned" beams could be accommodated with ten channels in a continuous band of 400 MHz for Region 1 and 12 channels in a continuous band of 500 MHz for Region 3 utilizing channel raster b) as well as all "existing" systems;
- three[11] of the ten multinational "planned" beams that were in the WARC-77 Plan and confirmed in the WRC-97 Plan could be accommodated with the required number of channels. The Conference is recommended to consider this matter; and
- five of the 77 national preferences for orbital positions and channels could not be accommodated as requested.

Details of the downlink study results are in **Attachment 4**.

6.4.2.2 Results of feeder-link study[12]

Results of replanning studies on the feeder link assuming primarily the 17 GHz frequency band indicate that 95% of the beams can be accommodated with 10 channels for Region 1 and 12 channels for Region 3 utilizing channel raster b) or channel raster d), as appropriate, with no excess of interference.

Among the 10 beams[13] remaining with an excess of interference at the end of the study, only four beams at three nominal orbital positions (7° W, 1° W and 44° E) present a high degree of incompatibility. Solutions consisting of moving these beams to other orbital positions have been identified, however, this can be done only by revising together the downlink and feeder-link Plans.

Details of the feeder-link study results are in **Attachment 4**.

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[9] Administrations of Morocco, Syria, Algeria, Tunisia and Kenya consider that the total number of channels per coverage area shall not exceed either 10 channels or the number of channels of an "existing system" which is greater than 10. This is with the understanding that the planning conference will decide on the status of those channels of "existing systems" that exceed the number 10.

[10] A number of European administrations are of the view that some of these changes still need to be proven by studies of their appropriateness.

[11] One "existing" multinational beam was accommodated at Step 3.

[12] The Spanish and Russian Administrations observe that the results of this study cannot be considered as final in so far as frequency assignments currently in the WRC-97 Plan pending only of being brought into use, will meet all the requirements of Resolution 532 as soon as they are brought into use, thus qualifying for inclusion in the feasibility study, which will in turn result in the modification of the obtained results. The Spanish Administration has currently frequency assignments in the WRC-97 Plan ready to be brought into use in the immediate future, which will fall into the above described situation. The Russian Administration has the same situation.

[13] A "beam" in this context is a single elliptical beam, a composite beam or a group of beams forming a satellite system (e.g. two beams of HISPASAT-1 (analogue 27 MHz), four beams of RST-1).

6.4.3 AGTE study

The Asia Pacific Telecommunity Group of Technical Experts (AGTE) reported that it had conducted ongoing studies to investigate the feasibility of replanning under Resolution 532. An example of a trial downlink and feeder-link Plan for Region 3 assumed analogue modulation was conducted. In considering the results of the example exercise, AGTE indicated that the task of Resolution 532 may be feasible, on the basis of providing at least 12 national assignments to all administrations in Region 3. AGTE therefore asked GTE to conduct a similar study based on this point.

6.4.4 Study related to the request made by Region 3

With reference to the 12 channels for each country of Region 3, this resulted from a study on the effect of adding two channels (i.e. 10 + 2) to the beams of Region 3 countries was requested by Region 3 countries in order to more efficiently use the 500 MHz BSS allocation in that Region at 12 GHz. The results of the study show that it is possible to add two channels (i.e. 10 + 2) for each Region 3 country for both feeder link and downlink if the orbital positions and channel blocks and polarization of some beams are properly adjusted.

The Administration of Japan requested GTE to study the impact of including a 34.5 MHz bandwidth for the Japanese national beam. The results of studies found that only a relatively slight degradation in EPM occurs to neighbouring beams. IRG decided to include the request in the replanning exercises.

6.4.5 Multinational beam study for Germany, Austria, Switzerland and Liechtenstein

A study was conducted by GTE to determine the impact of a proposal from the Administrations of Germany, Austria, Switzerland and Liechtenstein to include a new multinational beam covering their territories with ten channels per country in the replanning studies in place of their national beams. The results of the study found that it was possible to accommodate the proposed multinational beam for Germany, Austria, Switzerland and Liechtenstein with ten channels per country into the draft plan without negative EPM.

The IRG decided to include in the planning exercise a beam replacing the national beams of these four administrations with ten channels for each of the administrations concerned. That inclusion was adopted with the understanding that, if the above common beam is found to be compatible with the Plan and is finally included in the Plan by the conference, other similar combined beams compatible with the Plan will also be included in it, and that future modifications of the Plan for a similar purpose are permitted.

6.4.6 Feeder-link studies of national preferences related to the use of the 14 GHz and/or 17 GHz frequency bands

At GTE-4, participants from the Republic of India, the Islamic Republic of Iran and the Republic of Korea indicated their wishes to use for their feeder-link assignments the 14 GHz frequency band alternatively and/or in addition to the 17 GHz frequency band.

These national preferences were examined at the end of the basic study described in Document IRG99-5/16 in which, in accordance with the IRG-4 decision, the 17 GHz frequency band was primarily considered in order to provide each country with the required number of channels in accordance with Resolution 532 (WRC-97). Other technical assumptions used in the above studies are described in Document IRG99-5/13.

For the Islamic Republic of Iran and the Republic of Korea, the required number of channels can be assigned to these countries in the draft new 14 GHz feeder-link Plan without causing any excess interference to any other beam in that draft new Plan.

In the case of the Republic of India, only one of its two beams at 56° E and two of its three beams at 68° E (±0.2°) can be assigned the required number of channels in the draft new 14 GHz feeder-link Plan without causing any excess interference to any other beam in that draft new Plan.

The Republic of Korea indicated that the 17 GHz band is primarily for use as the feeder link for beam KOR11200 as described in Document IRG99-5/16.

6.4.7 Multinational beam for CZE, HNG, HRV and SVK

The Administrations of Croatia, Hungary, Slovak Republic and Czech Republic requested IRG-5 to investigate the inclusion of a new multinational beam covering their territories with ten channels per country in the replanning studies replacing their national beams. The Administrations of Croatia, Hungary, Slovak Republic and Czech Republic requested that their current national beams (HRV14800, HNG10600, SVK14400, CZE14400) continue to be taken into account in the ongoing planning study until the final clarification of the acceptability of inclusion of the proposed multinational beam. IRG-5 agreed to investigate the proposal and include the results in its report to be submitted to WRC-2000. The same evaluation process will be followed as was used in studying the request in section 6.4.5 above, i.e.:

1) Continue the planning exercises based on national coverages with ten channels (principles 1 and 2 of Annex 1 of Resolution 532) at the same orbital position.
2) At the end of this exercise, four identical multinational beams covering the territory of Croatia, Hungary, Slovak Republic and Czech Republic, each with ten channels will be substituted to the national beams of Croatia, Hungary, Slovak Republic and Czech Republic and the e.i.r.p. of this multinational beam be reduced if necessary to a level which does not create more interference than the previous situation (i.e. the four national beams with ten channels). The result of this modification i.e. the level of e.i.r.p. and the EPM associated to this new multinational beam is proposed to the Administrations of Croatia, Hungary, Slovak Republic and Czech Republic for agreement or otherwise.

These administrations shall provide to BR new test points before 31 December 1999 if needed.

6.4.8 Multinational beam for Syria and Lebanon

The Administrations of Syria and Lebanon requested IRG-5 to investigate the inclusion of the multinational beam SYR33900 covering their territories with ten channels per country in the replanning studies replacing their national beams, with possible extension to two additional neighbouring countries if so requested by them. The Administrations of Syria and Lebanon requested that their current national beams continue to be taken into account in the ongoing planning study until the final clarification of the acceptability of inclusion of the proposed multinational beam. IRG-5 agreed to investigate the proposal and include the results in its report to be submitted to WRC-2000. The same evaluation process will be followed as was used in studying the request in sections 6.4.5, and described in section 6.4.7. These two administrations shall provide to BR new test points before 31 December 1999 if needed.

6.4.9 New requests agreed by IRG-5

A number of new requests were put to IRG-5 for its consideration as follows.

Malaysia requested a change in orbital position from 86º E to 91.5º E for its composite beam.

China requested a change in orbital position from 79.8º E to 134º E for its elliptical and composite beams. It also requested that the WRC-97 large feeder-link beams be used at 62º E, 92º E and 134º E.

Iran requested a change in orbital position from 34º E to 54º E for its beam.

Portugal requested the inclusion of a new minimum sized spot beam to cover the territory of Macao, preferably at 122º E.

Australia requested that 10 (12) channels be provided to all Australian test points including its offshore territories for both the downlink and feeder link.

American Samoa requested to split the composite beam between PLM and SMA to have two individual (non-composite) beams. The same request is made for MRA and GUM.

Morocco requested IRG-5 to investigate the use of the 17 GHz band in place of the 14 GHz band for its feeder-link assignments. Should the results indicate that both frequency bands are possible, the administration, once informed, should make its choice of the use of either the 14 or 17 GHz frequency bands.

Seychelles requested IRG-5 to investigate the use of the 14 GHz band in addition to the 17 GHz band for its feeder-link assignments. Should the results indicate that both frequency bands are possible, the administration, once informed, should make its choice of the use of either the 14 or 17 GHz frequency bands.

Bulgaria requested IRG-5 to also study the feeder link with its beam at 1º W with the same beam ellipse and orientation of the downlink beam.

Japan requested IRG-5 to study 12 channels at 109.85º E in addition to and grouped with its assignments at 110º E.

Lao P.D.R. requested IRG-5 to move its national orbital location from 122º E to another orbital position with a 33 MHz bandwidth for the channels.

A group of countries requested the IRG to consider in the replanning exercises a new beam covering the East Timor territory. The orbital position is to be chosen within its service arc in a way that does not put undue constraints on the replanning exercises. The administrative procedures to implement this request have yet to be determined.

BR shall include in the replanning exercises any systems which become existing in the meaning of principle 3 of Annex 1 to Resolution 532 (WRC-97), as time permits. Systems that could not be entered in replanning exercises shall be reported to the Conference.

IRG-5 agreed to investigate the proposals and include the results in its report to be submitted to WRC-2000. For any new beam, the corresponding test points shall be communicated to BR by the responsible/requesting administrations before 31 December 1999.

6.5 Studies of compatibility with other services and the Region 2 Plan

In addition to the Regions 1 and 3 BSS-BSS compatibility analysis, planning Principles 7 and 8 of Annex 1 to Resolution 532 (WRC-97) require a compatibility examination to ensure protection of the Region 2 Plan and not to require more protection from assignments in Region 2. Moreover, it is also necessary to ensure the compatibility between the draft Regions 1 and 3 Plan and those services sharing the same frequency bands (FSS and terrestrial services) in all three Regions.

This section provides the result of compatibility analyses for proposed BSS assignments for Regions 1 and 3 except assignments which are considered as "existing" systems as per Resolution 532.

The analyses comprise both:

- compatibility studies from the proposed Regions 1 and 3 BSS Plan assignments into other services or into Region 2 BSS; and
- compatibility studies into the proposed Regions 1 and 3 BSS Plan assignments from other services or from Region 2 BSS.

Both feeder-link and downlink conditions have been investigated.

The input data used for the compatibility analyses was obtained from the "feasibility study" as described in the previous section.

The satellite systems data that were contained in the SNS database as of [1 February 2000, i.e. all networks which have been received by BR before 19/1/98 have been taken into account and networks for which the complete information has been received between 19/1/98 and 19/8/99 have also been taken into account] were used in the calculation. It is to be noted that those satellite networks not yet processed by the Bureau have not been taken into account in these compatibility analyses.

Compatibility analysis between the draft Regions 1 and 3 BSS Plan and the Region 2 BSS Plan has been based on the present Region 2 BSS Plan assignments and the modifications of the Region 2 Plan that successfully applied the Article 4 procedure.

Two important points should be taken into account in interpreting the results contained in this section.

1) The results of the compatibility analyses will change if the list of satellite systems contained in the SNS database is modified, i.e. new satellite systems/assignments (FSS in Regions 2 and 3 and BSS of Region 2) are included in the list or cancelled as a result of application of relevant provisions of Article S11.

2) The tables of identified administrations show cases where there is a possibility of harmful interference if various additional circumstances apply. Such tables do not imply that harmful interference will actually occur, they merely provide a warning flag that further investigation of the necessity of actual coordination may be required.

The Bureau was requested to also provide the result of compatibility analyses with respect to assignments contained in the WRC-97 Plan using the same criteria and method mentioned below.

6.5.1 Methodology

Sharing criteria and methodologies for the compatibility analyses have been developed by IRG based on those in Appendices S30 or S30A and their associated Rules of Procedure. The criteria that have been applied are summarized in Table 1 below. The details of the calculation basis for each compatibility condition are explained in **Attachment 3**.

TABLE 1

Criteria for assessing compatibility between Plans and services

Interference source: Feeder-link assignments in the draft Regions 1 and 3 BSS Plan

Protected assignments/service	RR provision	Criteria/methodology
Region 2 Plan assignments	4.2.1.4 of Article 4 of APS30A	APS8 (section 5 of Annex 1 of APS30A)
Terrestrial service	4.2.1.3 of Article 4 of APS30A	APS7 (section 2 of Annex 1 of APS30A)/ list of "existing" stations
Receiving FSS specific earth station	4.2.1.2 of Article 4 of APS30A	Annex 4 of APS30A (section 1 of Annex 1 of APS30A)/list of existing stations

Interference source: Downlink assignments in the draft Regions 1 and 3 BSS Plan

Protected assignments/service	**RR provision**	**Criteria/methodology**
Region 2 Plan assignments	4.3.1.2 of Article 4 of APS30	Pfd (section 3 of Annex 1 of APS30)
Terrestrial service	4.3.1.4 of Article 4 of APS30	Pfd (sections 4, 8 of Annex 1 of APS30)
FSS space station associated with a receiving FSS earth station that may suffer interference	4.3.1.5 of Article 4 of APS30	Pfd (section 6 of Annex 1 of APS30)

Protected assignments: Feeder-link assignments in the draft Regions 1 and 3 BSS Plan

Interference source	**RR provision**	**Criteria/methodology**
Region 2 Plan assignments	4.2.3.4 of Article 4 of APS30A	APS8 (section 5 of Annex 1 of APS30A)
Space station of FSS (Regions 1 and 3)	7.1 of Article 7 of APS30A	Annex 4 of APS30A with modification of satellite system noise temperature 600 K and ΔTs/Ts 6%
Space station of unplanned BSS (Region 2)	7.1 of Article 7 of APS30A	Annex 4 of AP30A with modification of satellite system noise temperature 600 K and ΔTs/Ts 6%

Protected assignments: Downlink assignments in the draft Regions 1 and 3 BSS Plan

Interference source	**RR provision**	**Criteria/methodology**
Region 2 Plan assignments	4.3.3.2 of Article 4 of APS30	Pfd (section 3 of Annex 1 of APS30)
Terrestrial service	6.1.1 of Article 6 of APS30	Frequency overlap and Annex 3 of APS30
Space station of FSS	7.2.1 of Article 7 of APS30	Frequency overlap and Annex 4 of APS30

6.5.2 Summary of results

A summary of compatibility analysis results obtained are included in Table 2. Further details of the results are contained in **Attachment 5**.

TABLE 2

Compatibility analyses

The results below apply to the assignments in "the draft Regions 1 and 3 BSS Plan" except assignments which are considered as "existing" as per Resolution 532.

6.5.2.1 Compatibility with respect to the draft Regions 1 and 3 Plan assignments causing interference

6.5.2.1.1 Feeder link

Protected assignments/service	Number of administrations receiving interference from the draft Regions 1 and 3 Plan assignments	Number of administrations in the draft Regions 1 and 3 Plan causing interference to the subject assignments/service
Region 2 Plan assignments	2	3

Protected assignments/service	Number of existing stations sharing the same frequency bands with the draft Regions 1 and 3 Plan assignments
Terrestrial service (all three Regions)	1 142 (14 GHz)* 489 (17 GHz)*
Earth station of FSS (all three Regions)	35
* In addition, there are transmitting terrestrial stations which do not have corresponding receiving terrestrial stations recorded in MIFR (e.g. Typical stations).	

6.5.2.1.2 Downlink

Protected assignments/service	Number of administrations/organizations receiving interference from the draft Regions 1 and 3 Plan assignments	Number of administrations in the draft Regions 1 and 3 Plan causing interference to the subject assignments/service
Region 2 Plan assignments	0	0
Terrestrial service (all three Regions)	95	63
FSS space station associated with a receiving FSS earth station that may suffer interference (Region 2 11.7-12.2 GHz) (Region 3 12.2-12.5 GHz)	25	112

6.5.2.2 Compatibility with respect to the draft Regions 1 and 3 Plan assignments receiving interference

6.5.2.2.1 Feeder link

Assignment/service causing interference to draft Regions 1 and 3 Plan assignments	Number of administrations/organizations causing interference to the draft Regions 1 and 3 Plan assignments	Number of administrations in the draft Regions 1 and 3 Plan receiving interference from the subject assignments/service
Region 2 Plan assignments	3	4
Space station of FSS (all three Regions)	13	88
Space station of unplanned BSS (Region 2)	0	0

6.5.2.2.2 Downlink

Assignment/service causing interference to draft Regions 1 and 3 Plan assignments	Number of administrations/organizations causing interference to the draft Regions 1 and 3 Plan assignments	Number of administrations in the draft Regions 1 and 3 Plan receiving interference from the subject assignments/service
Region 2 Plan assignments	0	0
Terrestrial service (all three Regions)	1	1
Space station of FSS (Region 2 11.7-12.2 GHz) (Region 3 12.2-12.5 GHz)	18	125

6.5.3 Possible solution to incompatibility problems

Possible technical and regulatory measures were discussed to overcome some of the incompatibilities.

For the FSS, there are MIFR systems (usually in operation), or FSS systems coordinated, or in coordination with an actual Plan to be operational soon.

BR was requested to identify the administration as well as the concerned FSS networks that are involved in these incompatibilities upon request. Administrations may request the assistance of BR in recommending actions for resolution of incompatibilities.

7 Conclusions

When considering possible recommendations to WRC-2000, the following statements were made:

1 The annex to this Report contains a proposal by the countries listed in it, requesting WRC-2000:

- to adopt a new Plan for the broadcasting-satellite service in Regions 1 and 3 with appropriate procedures;
- to use to that effect the planning exercise developed by the GTE and IRG;
- to retain the IRG with the task to study any remaining unresolved cases and report to the subsequent WRC.

2 The Administrations of Luxembourg, Sweden, Poland, Germany, Spain, France, Bulgaria, Turkey, Denmark, Austria, Portugal, Finland, New Zealand, Norway, United Kingdom, Russia and Switzerland were of the view that many of the items proposed in Annex 1 are beyond the mandate of the IRG as specified in Resolution 532 (WRC-97).

3 A group of administrations were of the view that, as the task of the IRG was to study the feasibility of increasing the capacity of the assignments to Regions 1/3, the results of the GTE as presented to the IRG have demonstrated that there may be a potential of increasing the capacity based on the data and requirements that were used by the GTE at its meeting in September 1999. However, the results presented to the IRG have not yet fully demonstrated this feasibility for the following reasons:

- the existing systems that will be in accordance with the principle 3 of Annex 1 of Resolution 532 as of the date to be decided by WRC-2000 have not yet been taken into account (principle 3);
- those BSS assignments that were included in the Plans by WRC-97, and referred to in the reports of the analysis presented to IRG-5 but not yet brought into use, have not yet been analysed to show their impact on the results of the analysis (principle 5);
- a number of feeder-link incompatibilities have not been resolved;
- the detailed results of the downlink and feeder-link analysis have not been studied by the IRG;
- all FSS network coordination requests communicated to BR prior to the GTE but not yet processed have not been taken into consideration and there has been no method identified for resolving these potential incompatibilities (principle 8);
- many incompatibilities have been identified with terrestrial services and there is no means yet to resolve these incompatibilities (principle 8);
- most of the multinational beams that were in the Plans since WARC-77 and confirmed by WRC-97 could not be included;
- some administrations' preferences with respect to orbital positions and channels assignments have not been accommodated in the feasibility studies;
- some of the new preferences of administrations for orbital positions have not yet been analysed (see paragraph 6.4.8 of the report);
- some of the technical parameters adopted by the GTE required further consideration.

1) The administrations are: AUT, D, DNK, E, FIN, F, LUX, NOR, HOL, NZL, POL, POR, G, RUS, S, SUI and TUR

4 The delegations of Syria, Indonesia, Morocco, Eritrea, Chad, Tunisia, Seychelles, Iran, Viet Nam, Algeria, Mali and Kenya express their concern in regard to the manner in which some European delegations intending to protect their subregional existing systems created, practically in all IRG meetings, a number of false reasons for avoiding the replanning of the broadcasting-satellite service and, in so doing, attempted to acquire a monopolization of the spectrum/orbit in contravention with the basic principles of the ITU Constitution.

5 One Region 2 administration, the United States of America, also expressed concern about the compatibility of the feasibility studies with other services sharing these bands, as required by principles 7 and 8 of Annex 1 to Resolution 532 (WRC-97), considering the results of the compatibility analyses provided in section 6.5.

8 Review of Annex 7 of Appendix S30

8.1 Introduction

8.1.1 Provisions and original intent of Annex 7

Annex 7 to Appendix S30 of the Radio Regulations was adopted at WARC-77 and maintained without change at WRC-97. It specifies two types of constraints on the development of Plans for the BSS. Part A contains limitations on the nominal orbital positions that may be used in modifying the BSS Plans for the three ITU Regions. Part B deals with the concept of clustering i.e. "the grouping of space stations in nominal orbital positions of +0.2º and -0.2º from the centre of the cluster of satellites".

The limitations most relevant to the replanning studies of the IRG and GTE and for consideration at WRC-2000 are:

> Section A1: "No broadcasting satellite serving an area in Region 1 and using a frequency in the band 11.7-12.2 GHz shall occupy a nominal position further west than 37º W or further east than 146º E."; and
>
> Section A3: "Any new orbital position in the Regions 1 and 3 Plan in the range of the orbital arc between 37° W and 10° E associated with a new assignment, or resulting from a modification of an assignment in the Plan, shall be coincident with, or within 1° to the east of, a nominal orbital position in the Regions 1 and 3 Plan at the date of entry into force of the Final Acts of the 1977 Conference (in force on 1 January 1979).
>
> In the event of a modification to an assignment in the Regions 1 and 3 Plan, the use of a new nominal orbital position not coincident with any nominal orbital position in the Plan at the date of entry into force of the Final Acts of the 1977 Conference (in force on 1 January 1979) shall involve an 8 dB reduction in the e.i.r.p. compared to that appearing in the Regions 1 and 3 Plan for the assignment before modification."

The orbital position limitations in the first paragraph of section A3 were intended to ensure equitable sharing of the frequency band 11.7-12.2 GHz and the orbital arc 37º W to 10º E between Region 2 FSS networks and Region 1 BSS Plan assignments. In particular, they require that a minimum separation of 5º be maintained between adjacent BSS nominal orbital positions. This permits a Region 2 FSS space station to operate at a separation of up to 2.5º from the nearest Region 1 BSS space station, which is sufficient to avoid mutual interference and the need for coordination.

With regard to the equity of sharing between Region 1 BSS and Region 2 FSS, the view was expressed during the fifth meeting of the IRG that the need for orbital position limitations of the type contained in section A3 of Annex 7 had changed since WARC-77. In particular, it was observed that the 1977 BSS Plan provided for a rather dense utilization of the geostationary orbit to the east of 37^{o} W at a time when very few orbital positions were in use for the FSS serving Region 2 countries. In contrast, the utilization of orbital positions for Region 1 assignments in the WRC-97 BSS Plan is quite similar to that of WARC-77, whereas the utilization of orbital positions for the Region 2 FSS has increased substantially. With comparable density of orbital position utilization in the two services, it was considered that the burden of sharing the band in the orbital arc of common interest should be balanced and equitable.

In this connection, however, it may also be observed that, although the countries of North America have indeed made heavy use of orbital positions west of about 60^{o} W for FSS networks providing national coverage, this is not true for the countries of South America. In the orbital arc cited in section A3 of Annex 7, the only existing or planned FSS systems are networks providing trans-Atlantic communications between Regions 1 and 2. It can therefore be argued that due to their geographical situation, some countries in Region 2 continue to need provisions similar to those of Annex 7 to facilitate the development of their FSS systems. Therefore, such provisions need to be included in the revision of Appendices S30 and S30A.

8.1.2 Application of Annex 7 to the WRC-97 Plan

As noted above, Annex 7 was maintained without change at WRC-97. However, in developing the Plan for Regions 1 and 3, WRC-97 did introduce an exception to the orbital position limitations specified in that Annex. Specifically, the nominal orbital position at 31^{o} W from the original WARC-77 Plan was replaced by new positions at 30^{o} W and 33.5^{o} W. The Radio Regulations Board views these two new positions as "nominal orbital positions in the Plan" for the application of the Annex 7 orbital limitations on modifications to the WRC-97 Plan.

8.2 Consideration of Annex 7 in IRG/GTE replanning studies

8.2.1 WRC-97 request for studies of Annex 7

Annex 2 of Resolution 532 (WRC-97) requested the IRG to:

- "examine Annex 7 in the light of its studies for possible revision of the BSS Plans and with respect to the decisions taken by WRC-97, such as the reduction of downlink e.i.r.p.";
- provide to WRC-2000 "its advice on the relevance of that annex in providing protection to all services sharing the Plan bands, and particularly the Region 2 BSS Plan".

8.2.2 Results of ITU-R studies on Annexes 7, 1, and 4

In response to these requests from WRC-97, IRG invited the GTE to carry out the desired examination of Annex 7 in collaboration with elements of ITU-R.

During the course of this examination of Annex 7, the question arose as to whether the sharing criteria of Annexes 1 and 4 of Appendix S30 (which are associated respectively with the Plan modification procedures of Article 4 of Appendix S30 and the coordination procedures of Article 7 of Appendix S30) might make the orbit position limitations of Annex 7 unnecessary. Accordingly, IRG-3 suggested that subsequent studies of Annex 7 be expanded to include this question.

On the basis of these studies and taking account of contributions from administrations, the following conclusions were drawn by the ITU-R:

- The 8 dB e.i.r.p. reduction of section A3 of Annex 7 can be removed insofar as the protection of fixed service systems and current mobile service systems is concerned.
- No conclusion was drawn on the impact that relaxing or removing the 8 dB e.i.r.p. requirement would have on the fixed-satellite service since the pertinent studies are pending.
- With regard to the orbital position limitations of section A3, the first comprehensive technical studies indicated that an orbital separation of at least 2.5° is required to ensure adequate protection of a Region 1 BSS Plan assignment against interference from a Region 2 FSS network. It follows that Region 2 FSS access to the arc 37° W to 10° E is contingent on the maintenance of at least a 5° orbital separation between adjacent nominal BSS positions in this arc.
- The technical studies also concluded that the present Annexes 1 and 4 pfd limits are not, in themselves, sufficient to ensure either access of Region 2 FSS networks or appropriate interference protection to both BSS and FSS in the orbital arc 37° W to 10° E.
- Further studies of Annexes 7, 1 and 4 shed additional light on the Region 2 FSS - Region 1 BSS orbital separation required to avoid mutual interference, as well as on the relevance of the Annexes 1 and 4 limits to Region 2 FSS access to the orbital arc segment in question. In particular, these studies utilized three separate technical approaches for determining the minimum orbital separation between an FSS satellite serving Region 2 and a BSS satellite serving Region 1 with characteristics similar to those in the WRC-97 BSS Plan. The studies concluded that, in the absence of agreement on further technical means for constraining the emissions of Region 1 BSS and Region 2 FSS satellites, besides those currently recommended by ITU-R, orbital position limitations on Region 1 BSS similar to those in section A3 of Annex 7 will continue to be required to ensure a balanced access to the arc from 37° W to 10° E by the BSS and the FSS. The studies also confirmed the previous conclusions regarding the inadequacy of the existing criteria of Annexes 1 and 4 as substitutes for the orbital position limitations of Annex 7.

8.2.3 IRG guidance for the replanning studies

Based on the early results of the studies just described, the Report of the second meeting of the IRG provided the following guidance in selecting orbital positions relative to the "prohibited arc", 37° W to 10° E cited in Annex 7.

> "In selecting orbit positions during the replanning studies, the following priority sequence should be observed:
>
> a) take to the extent possible the existing nominal orbital positions of the WRC-97 Plans;
>
> b) if necessary, create new orbital positions outside the prohibited arc of Annex 7;
>
> c) then if unavoidable and further positions are still required, next try orbital positions within the prohibited arc of Annex 7 to Appendix 30/S30 taking into account Principle 8 of Annex 1 to Resolution 532 (WRC-97)".

The Report of the third meeting of the IRG provided the following additional guidance to the GTE with regard to the use of the Annex 7 limits in its replanning studies.

> "The specific requests of administrations [regarding the orbital positions to be used in planning] will be taken into account. However, in selecting orbit positions, the orbit segmentation limitations contained in Appendix S30 shall be respected.

NOTE 1 - It was understood by the United States that the "orbit segmentations limitations" are those contained in both sections A1 and A3 of Annex 7.

NOTE 2 - A group of APT members have the opinion that selection of orbital positions during the planning process shall be in conformity with Annex 7 of Appendix S30".

Using additional guidance from IRG-4, the Bureau presented the results of new planning exercises to GTE-4 and IRG-5. These exercises included only one orbital position that was not in conformity with the present Annex 7 orbital position limitations. This position was included to satisfy the orbital position preference of one administration and does not pose any constraints on the orbital positions available to the FSS of Region 2. It follows that the Annex 7 limitations need not impose undue constraints on the Regions 1 and 3 replanning exercises.

8.3 Applicability of Annex 7 and Annexes 1 and 4 in the modification procedures associated with a future Regions 1 and 3 Plan

The provisions of Annexes 1 and 7 are associated with the Plan modification procedures of Article 4 of Appendix S30. Likewise the provisions of Annex 4 are associated with the coordination and notification procedures of Article 7 of Appendix S30. The applicability of these Annexes in any revision of the Article 4 and Article 7 procedures at WRC-2000, was discussed in the light the results of the studies summarized in section 2.2 above and a proposal described in Document IRG99-5/26. This discussion led to the identification of three options, as discussed below.

8.3.1 Option 1 - Retention of Annexes 7 and 4 with a minor update of section 6 of Annex 1

In this option, the orbital position limitations of section A3 of Annex 7 would be retained without change, as would the Annex 4 pfd limits for the protection of the BSS systems in the Plans against interference from FSS space stations.

This option is based on the results of three independent analyses conducted within WP 10-11S which demonstrated that the orbital position limitations of Annex 7 continue to be needed, even with the change of BSS and FSS parameters that have occurred since the original development of the Annex. One of these studies, using currently published INTELSAT FSS carrier parameters and BSS planning parameters demonstrated that the current 2.5 degree separation continues to be required, when the respective beams are pointed to the north eastern part of Brazil and West Africa. Although this was a worst-case analysis, it meant that, in order to fulfil the objectives of the original Annex 7 (namely, that modifications to the BSS Plan should not inhibit the growth of the FSS in Region 2) continued applicability of the orbit position limitations of Annex 7 are required.

The only necessary change under this option would be to update the first paragraph of section 6 of Annex 1. Specifically, the condition for determining whether an administration is affected by a proposed Plan modification would refer the 0.25 dB (or greater) increase in pfd to the pfd resulting from the assignments in the WRC-97 Plan rather than the WARC-77 Plan.

Advantages: This option would continue the existing guarantee of access to the arc 37^{o} W to 10^{o} E for a limited number of future Region 2 FSS networks, especially those serving the countries of South America, Central America and the Caribbean. At the same time, it would allow Region 1 countries the opportunity to modify the Regions 1 and 3 Plan by the addition of up to eleven new orbital positions as listed in the RRB rule of procedure for Annex 7. Under this option, the number of Region 2 FSS systems that can be accommodated without major constraints on their system characteristics is about nine.

Disadvantages: Many Region 1 countries feel that, as an unplanned service, the Region 2 FSS is not entitled to guaranteed orbital access and that a "vast orbital arc" is available for Region 2 FSS at positions to the west of the Annex 7 arc. The view was also expressed that, to achieve balanced sharing, more of the burden should be borne by the Region 2 FSS.

8.3.2 Option 2: Revision of Annex 7 with retention of Annex 4 and an update of section 6 of Annex 1

Following the guidelines of the IRG and the GTE, the study cited is section 3.1 above also considered whether the provisions of Annex 1 might be used to replace or modify Annex 7. It was found that using the Annex 1 criterion of -138 dB(W/m^2/27 MHz) as a coordination trigger, the orbital separation requirements could be reduced from 2.5 to 1.5 degrees. This meant that, although Annex 7 type provisions continue to be needed, some measure of relief could be afforded by allowing Region 1 BSS use of positions 1.5 degrees east of the nominal orbital position, as against the original 1 degree. However, the e.i.r.p. reduction specified in section A3 of Annex 7 (8 dB compared with 1977 values, or 3 dB compared with 1997 values) would still be required, and between 1 and 1.5 degrees, the pfd limit of -138 dB(W/m^2/27 MHz) would need to be observed.

The study also examined the reverse situation, namely the application of Annex 4 for interference from the FSS into the BSS in application of Article 7. No changes were found necessary.

Advantages: Continued protection of present and future Region 2 FSS systems as envisioned at WARC-77 and WRC-97. Increased flexibility for Region 1 BSS orbital positions.

Disadvantages: Limits new orbital positions for Region 1 BSS systems to within 1 to 1.5º east of nominal orbital positions.

8.3.3 Option 3: Deletion of section A3 of Annex 7 with revision of section 6 of Annex 1 and retention of Annex 4

The first paragraph of section 6 of Annex 1 to Appendix S30 specifies an increase in power flux-density on the territory of Region 2 countries caused by a proposed modification to the Regions 1 and 3 Plan which acts as a "trigger" for the coordination of that modification with the FSS in those countries. The third paragraph of section 6 specifies a threshold pfd value below which coordination is not required. This threshold was established during WARC-77 and derived from the following expression with θ, the orbital separation between FSS and BSS space stations, set equal to 2.5°:

$$pfd_{limit} = -148 + 25 \log \theta \text{ dBW/m}^2\text{/27 MHz}$$

Under option 3 the first paragraph of section 6 of Annex 1 would be updated as in option 1, and this formula would be used to replace the present orbital and e.i.r.p. limitations of section A3 of Annex 7 to Appendix 30. In particular for the orbital arc 37º W to 10º E, the formula to trigger coordination would specify new limits on the power flux-density of BSS assignments in the Regions 1 and 3 Plan expressed as a function of the orbital separation between these assignments and the nearest nominal orbital positions of the Regions 1 and 3 Plan (i.e. the further these BSS assignments are away from nominal orbital positions of the Plan, the more constraining is the sharing criteria).

The modification of the criteria of section 6 of Annex 1 would be to insert the following new paragraph after the first paragraph of section 6 of Annex 1:

However, in the range of the orbital arc between 37° W and 10° E, where an assignment in the Regions 1 and 3 Plan or its subsequent modification gives a power flux-density which exceeds the value derived from the expression given hereafter anywhere in the territory of an administration of Region 2, that administration shall be considered as affected.

$$-148 + 25 \, Log \, (2.5 - \sigma) \, dBW/m^2/27 \, MHz \text{ for } 0° \leq \sigma \leq 2.06°$$

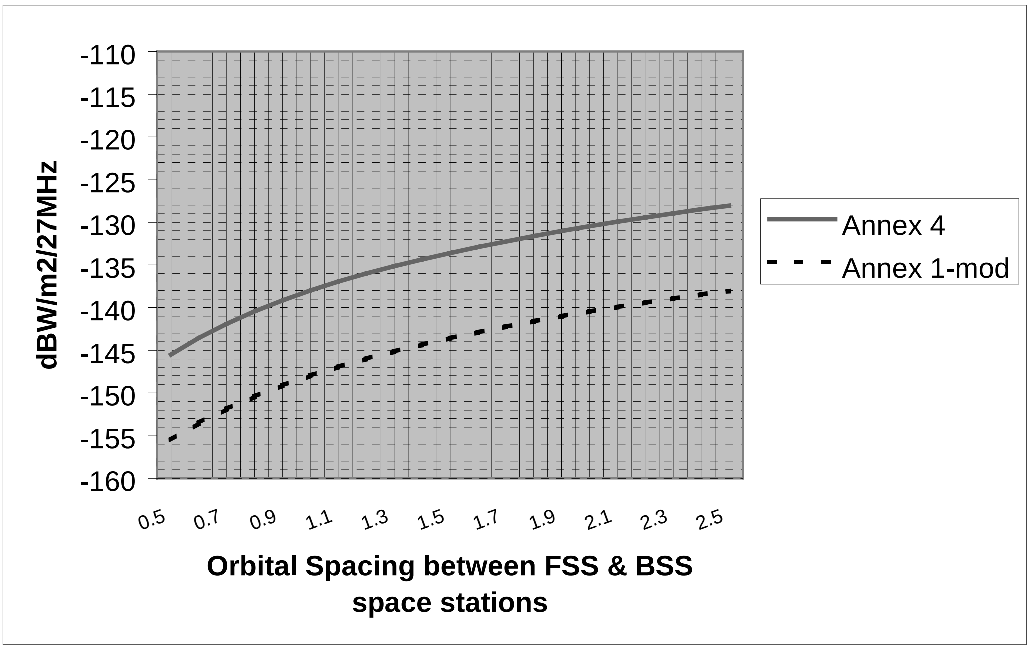
$$-157 \, dBW/m^2/27 \, MHz \text{ for } 2.06 < \sigma \leq 3°$$

Where σ is the separation between the orbital position of the BSS assignment considered and the nearest nominal orbital position of the Regions 1 and 3 Plan.

The existing second paragraph would remain without change, but the first line of the existing third paragraph would be amended so that the paragraph reads:

However, except for the orbital arc between 37º W and 10º E, where an assignment in the Regions 1 and 3 Plan or its subsequent modification gives a power flux-density of less than -138 dB(W/m^2/27 MHz) anywhere in the territory of an administration of Region 2, that administration shall be considered as not being affected; where an assignment in the Region 2 Plan or its subsequent modification gives a power flux-density of less than -160 dB(W/m^2/4 kHz) anywhere in the territory of an administration of Region 1 or 3, that administration shall be considered as not being affected.

The following figure shows a comparison of the proposed new criterion for section 6 of Annex 1 and the existing criterion of Annex 4 to Appendix S30.



Advantages: The two conditions for triggering coordination provided in this option offer the BSS of Region 1 the opportunity to access the entire range of orbital positions in the arc 37^o W to 10^o E on a first-come, first-served basis, while still protecting Region 2 FSS systems already in coordination from unacceptable interference

Disadvantages: The fact that access to the arc in question would be on a first-come, first-served basis could lead to the submission to the BR of a significant number of "paper" satellites for both BSS and FSS networks, leading to lengthy delays.

NOTE - Option 3 has not been studied by Working Party 4A or Joint Working Party 10-11S. In particular, the equation for the pfd limit proposed for the orbital arc between 37º W and 10º E requires further study for the range 2.5º < σ ≤ 3º. In addition, this equation needs a general review of the way it protects both narrow-band and broadband FSS systems. For example, to protect narrow-band systems, a pfd trigger limit per 4 kHz may also be required. Such a general review may also be required for the other pfd limits in Annexes 1 and 4 to Appendix S30.

9 Monopolization of the BSS resource

Annex 2 of Resolution 532 (WRC-97) requested IRG to examine concerns raised at WRC-97 regarding the modification of the Plans for additional requirements or subregional systems which should not lead to monopolization of the use of the bands by a country or a group of countries.

IRG considered one contribution from the United States on this issue. It cited a dictionary definition of the term "monopolization", and observed that based on this definition, monopolization should not be an issue, since the Plans provide access for each Member State of the Union to the BSS orbit/spectrum resource. Some administrations were of the view that the definition provided did not adequately cover their concerns on the issue.

Some administrations believed that action in relation to the avoidance of monopolization of the BSS resources may require appropriate procedures to be adopted by the Conference.

10 Direct-to-home transmission/broadcasting-satellite service

The minutes of the final Plenary Meeting of WRC-97 requested the Inter-conference Representative Group (IRG):

> *"to review the possibility of combining the direct-to-home transmission services by satellite and satellite broadcasting services in the planned and non-planned bands and its implication on the relevant Articles of the Radio Regulations."*

Initial discussions on this subject were held by GTE-1. However, although no contributions were available for consideration at GTE-1, it was noted that Question 247/11[14] is directly relevant to this subject. This Question is assigned to JWP 10-11S. GTE-1 requested that Special Rapporteur Group JWP 10-11S/SRG-1 carry out the studies described in the Question and report its conclusions to GTE. The Special Rapporteur for 10-11S/SRG-1A received no contributions in response to the requested studies but JWP 10-11S did review one contribution which considered the fundamental question cited in Question 247/11:

> "*What are the technical differences between the BSS and the FSS as a function of frequency and use, and should these differences continue to require differences in the methods of treatment of the two services in the RR?*"

On the basis of its review of this Question, JWP 10-11S drew the following conclusions in its comments to IRG:

> *"After a careful review of the current definitions of the BSS and FSS as provided in the Radio Regulations and of the various types of satellite applications that have been implemented in these two services, the following conclusions were drawn.*
>
> *As presently defined, one particular application, TV programme distribution directly to the home or via a cable system, can be implemented in either service. But many other applications are unique to only one of the services. For example, unlike the FSS, the BSS includes transmission of digital radio programmes to portable and mobile receivers. And the FSS includes many applications, including VSATs, in which the transmissions are clearly not intended for the general public, and hence are not in the BSS.*

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[14] Syria opposed the adoption of Question 247/11 based on the assumption that DTH transmissions should not cover broadcasting and if it will do so, provision S23.13 should be applied.

In view of these distinctions and the continuing major differences in the regulatory constraints governing access to the orbit and spectrum in the two services, it is concluded that no useful purpose would be served by abandoning the present distinction between the FSS and the BSS and the methods of treatment of the two services in the Radio Regulations."

IRG did not provide any more information on this subject.

11 Acknowledgements

The Chairperson thanks all those participants who contributed to the successful conclusions of all five IRG meetings. The Chairperson also thanks the management of the BR, particularly Mr K. Arasteh for his efficient organization and management of the whole replanning process, and the Bureau staff (planning, administrative, translation and software development) for their efforts associated with the replanning studies and in assisting with the preparation of many of the meeting's documents and for organizing the meetings. The Bureau staff always delivered even under the most extreme time pressures.

Annex: 1

Attachments: 5

ANNEX

Source: Document IRG99-5/1(Rev.1)

Algeria (People's Democratic Republic of), Saudi Arabia (Kingdom of), China (People's Republic of), Eritrea, Indonesia (Republic of), Kenya (Republic of), Lebanon, Mali (Republic of), Morocco (Kingdom of), Syrian Arab Republic

The original document was modified to include in it slight modifications requested by APT. It was endorsed by:

The participants in the Arab States meeting of September 1999 in Damascus.

The participants in the APT meeting of October 1999 in Australia.

The participants in the ABU meeting of November 1999 in Australia.

The participants in the 35th ASBU meeting of October 1999 in Tunisia.

PROPOSED STRATEGY FOR PLANNING

Since the very first allocation of bands to the broadcasting-satellite service, planning was considered as the only means to allow for the equitable access to the frequency bands and spectrum. Planning was generally considered by those who have the means to launch and operate satellite systems as an inefficient use of the spectrum. The principles adopted by WRC-95 and WRC-97 recognized the need to provide each ITU Member State to dispose of an amount of spectrum wide enough to permit economical development of satellite systems. They also recognized the need for other systems to develop by avoiding to fulfil the bands by national requirements.

It is now more than four years since the question was discussed in conferences and meetings, making negotiations more and more difficult within the framework of IRG. Some countries asked for at least a spectrum of 400 MHz per coverage area in Region 1 and 500 MHz in Region 3, others considered that that amount of spectrum could not be available and would overload the bands, making the development of other systems difficult. IRG decided in its third meeting to develop the plan on the basis of 10 channels per country in Region 1 corresponding to a total spectrum of 400 MHz and 12 channels in Region 3 corresponding to a total spectrum of 500 MHz.

Exercises carried out by BR indicate that a plan based on 10 channels per coverage area in Region 1 and 12 channels in Region 3 is feasible. The results appearing in Document IRG-5/18 demonstrate that all the cases were resolved. The planning exercise contained in the above document and its improvements was based on an analogue-analogue configuration with a co-channel protection ratio of 24 dB. The revised Appendix 30 will be based on a digital-digital configuration with a co-channel protection ratio of 20 dB. One can easily deduce from this that a digital-digital plan will be in position to satisfy a number of additional systems.

On the basis of this positive result the question is to know what other systems should be included in the planning exercise and what planning strategy should be adopted in order to avoid multiplication of Article 4 systems to be considered or even non-coordinated systems already in operation. Considering that systems defined in principle 3 of Resolution 532 are already included in the planning exercise, the remaining candidates for inclusion in the planning exercise are:

- Part B systems, i.e. systems for which the procedure of Article 4 was successfully implemented; and
- systems being coordinated and having been brought into use.

At this stage in the evolution of the work within IRG, it becomes necessary to consider the extent to which the work already done and the work to be done will remain valid if Part B systems are not included in the planning exercise and if the number of such systems vary by the addition of new systems and deletion of some of them. What action can ITU adopt in respect to systems not fully coordinated and brought into use? What would be the situation of a Member State which entry in the plan is incompatible with a system which is operated without being coordinated and without appearing in the plan? The more the planning is delayed the more systems, such as those described above, will exist making it practically impossible to prepare a plan.

In order to avoid these difficulties, a compromise package is proposed intended to prepare a plan as early as possible, taking account of as many of those systems coordinated or in operation as possible and to set up a system for the resolution of any unresolved case. In this package a distinction is to be made between the technical preparation of a plan and the status of the entries in the plan such as the application or not of due diligence. Components of the package may be refined, however, the acceptance by the Administrations sponsoring this document of any of them is subject to adoption of the whole package.

The package is proposed to have the following components:

1) BR shall prepare a draft plan that includes 10 channels per coverage area in Region 1, 12 channels in Region 3, and the existing systems as defined in principle 3 of Resolution 532.

2) The draft plan will also include those systems appearing in Part B which have provided due diligence information in accordance with Resolution 49 (WRC-97) up to a cut-off date to be decided by WRC-2000; the draft plan shall take account of the protection to be afforded to the FSS systems in Regions 2 and 3.

3) The draft plan shall be communicated to administrations some weeks before WRC-2000 to permit them to examine it.

4) WRC-2000 shall be recommended to decide, in conformity with its agenda, to consider itself as the conference entitled to adopt a plan.

5) The conference will review the draft plan and adopt it together with any modification that could be agreed upon during the conference.

6) Cases which could not be resolved at the conference will be entered in the plan with appropriate indication of the means to resolve them.

7) IRG should be continued after WRC-2000, as a single group, GTE becoming part of it, if required, with the following mandate:
   - to consider unresolved cases as well as any modification to the plan adopted by WRC-2000 that may facilitate their resolution;
   - to consider means permitting further amendments to that plan and development of subregional systems avoiding monopolization of the spectrum/orbit by a country or a group of countries;
   - in respect of unresolved cases any amendments proposed to the revised plan, which have the potential to cause interference to assignments of other administrations, should be subject to endorsement by a conference.

In case this approach is accepted, ITU will avoid convening a conference within an overloaded programme of conferences and meetings. Part of the resulting saving should be used by the Director of BR to make available the required resources for the preparation of software and the draft plan.

To evaluate the difficulties associated with the convening of ITU conferences, the programme of meetings adopted by the Plenipotentiary Conference (Minneapolis, 1998) in its Resolution PLEN/9 is attached. Considering the programme of meetings for the years 2002 and 2003, the only possible date for convening a planning conference would be 2004, i.e. nearly five years from now, which cannot be accepted.

Attachment: 1

ATTACHMENT

(to the Annex)

RESOLUTION PLEN/9

Future conferences and assemblies of the Union

The Plenipotentiary Conference of the International Telecommunication Union (Minneapolis, 1998),

having considered

a) Document 28 submitted by the Secretary-General on planned conferences and assemblies;

b) the proposals submitted by several Member States;

c) the necessary preparatory work to be carried out by Member States, Sector Members and the Sectors of the Union before each session of a conference or assembly,

resolves

1 that the schedule of future conferences and assemblies shall be as follows:

1.1 Regional Telecommunication Development Conference (RTDC): fourth quarter of 1999 or first quarter of 2000[1][2];

1.2 Radiocommunication Assembly (RA-2000): Turkey, 1-5 May 2000;

1.3 World Radiocommunication Conference (WRC-2000): Turkey, 8 May - 2 June 2000;

1.4 World Telecommunication Standardization Assembly (WTSA-2000): Canada, 27 September - 6 October 2000;

1.5 Regional Telecommunication Development Conference (RTDC): first quarter of 2001;

1.6 World Telecommunication Development Conference (WTDC-02): first quarter of 2002;

1.7 Plenipotentiary Conference (PP-02): Morocco, latter part of 2002;

1.8 World Radiocommunication Conference (WRC-02/03): place and date to be determined;

2 that the Council shall take a decision on the need for a radiocommunication assembly in 2002-2003;

3 that the agenda of the above conferences shall be established by the Council, taking into account the resolutions and recommendations of the relevant conferences and assemblies;

4 that the conferences and assemblies shall be held within the periods indicated in *resolves* 1, the precise dates and places, where not already decided, being set by the Council after consultation of the Member States, and leaving sufficient time between the various conferences. However, in cases where precise dates are specified, they shall not be changed except as provided for in the Convention. The durations indicated in *resolves* 1 for conferences and assemblies for which agendas have already been established shall not be changed; the precise duration of the other conferences and assemblies shall be decided by the Council after their agendas have been established, within the time periods indicated in *resolves* 1.

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[1] Place and dates to be decided by the Council at its November 1998 session.

[2] Place and dates to be decided by the Council at its 1999 session.

ATTACHMENT 1

Source: Document IRG99-5/12

METHODOLOGY TO IMPLEMENT THE PLANNING APPROACH

1 Preliminary studies

The Bureau conducted a preliminary theoretical study to assess whether the four channel rasters defined by GTE-2 could be implemented or not in the sequence they were defined (see Document GTE99-3/7).

This study showed that it would be more appropriate to start with channel raster b).

GTE-4 agreed to develop the methodology, which is provided below, based on the use of channel raster b).

2 Step 1 implementation: Definition of *a priori* selected orbital position

As a result of IRG-3 conclusions, the Radiocommunication Bureau sent a Circular Letter, CR/117 dated 1 March 1999, to all administrations requesting them to kindly inform the Bureau of their preferred orbital position(s) for their beam(s) as an alternative to existing one(s) in order for GTE to start its replanning studies.

If in response to CR/117, an administration requested to move its assignments to an orbital position different from that mentioned in Appendices S30/S30A, which is the orbital position proposed by default, then the Bureau recalculates the beam parameters (antenna gain and ellipse parameters) associated with those assignments by using the WRC-97 ellipse software.

At the request of the APT Group of Technical Experts (AGTE) from Region 3, GTE will use the default orbital positions proposed by AGTE in Document GTE99-4/9, 24 September 1999, as default orbital positions for Region 3 in the GTE replanning studies, unless a different preferred orbital position had been requested by an administration in that region in response to CR/117. The Region 3 administrations for which a default orbital position was proposed by AGTE which is different from that of Appendices S30 and S30A, will be consulted by the Bureau in order to confirm or otherwise this course of action, noting that absence of reply will mean agreement with the choice of orbital position indicated in Document GTE99-4/9. A Circular Letter will then be issued by the Bureau in order to inform all administrations of the orbital positions used in the GTE replanning studies.

3 Step 2 implementation: Creation of composite beams

In accordance with IRG-3 instructions, the Bureau consulted with all relevant administrations subject to use a composite beam.

Following this consultation, the Bureau created a set of composite beams to be used in replanning studies (see Addenda 1 and 2 to Document GTE99-4/5, 24 September 1999).

4 Step 3 implementation

4.1 Introduction

As concluded by GTE-2, Step 3 is described by a list of general criteria to be implemented to define the order list of the downlink "existing"[1] and "planned"[2] beams to be introduced in the revised Plan (see section A6.4.3 of Attachment 6 to Document GTE99-2/20).

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[1] Whenever the term "existing" is used in this document, it refers to notified assignments that are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau.

[2] Whenever the term "planned" is used in this document, it refers to assignments/beams other than those of "existing" systems.

In order to implement these criteria, further considerations were needed and are presented in the following sections. A flow chart in Annex 2 summarizes the algorithm used to implement Step 3.

Once the "Step 3 Starting Point Plan" (downlink only) has been defined as indicated under section 4.2 below, the first Step 3 beam to consider is analysed with respect to this "Step 3 Starting Point Plan". Then, if the results of the analysis meet the criteria, the first Step 3 beam is included in that "Step 3 Starting Point Plan" which is then called the "Draft Step 3 Plan" (downlink only). The "Draft Step 3 Plan" is thus updated after each inclusion into it of a Step 3 beam which passed successfully the Step 3 analysis and met the criteria. This "Draft Step 3 Plan" as it evolves is then used to analyse the subsequent Step 3 beams.

4.2 Implementation of the 1st criterion: downlink "existing" beams

In order to define the "Step 3 Starting Point Plan", all the "existing" assignments of all the downlink "existing" beams are included in the "Step 3 Starting Point Plan".

For each Plan downlink "planned" beam falling in this category, ten "new" channels with new parameters are added in the sub-frequency band already assigned to "existing" assignments as contained in Appendices S30 and S30A of the corresponding downlink "existing" beam. An MSPACE "group" is created between the new channels and their corresponding "existing" assignments, so as not to exceed a total number of ten channels per country or the number of channels of an "existing system" which is greater than ten.[3]

A BSS-BSS compatibility analysis is then conducted in order to check if these ten "new" channels are acceptable or not, i.e.: these ten "new" channels are acceptable if their EPM is positive and if they do not degrade[4] by more than 0.45 dB the EPM, if already negative, of the other "existing" assignments (see also Annex 1).

In the case where there are many beams falling in this category, the order of treatment of the beams is defined on the basis of:

I beam with minimum service-arc size (high latitude countries with low elevation angles);

II maximum beam size.

However, in the case where there are only few beams falling in this category and if these beams are likely to be mutually compatible, they are treated simultaneously.

If a beam cannot get ten "new" channels in the sub-frequency band already assigned to its corresponding downlink "existing" beam, it is then not included in the "Draft Step 3 Plan" at that stage and will be considered together with other beams under section 4.3 below.

After a successful introduction of one or all beams into the "Draft Step 3 Plan", according to the case of treatment, all the positive reference situations of the "Draft Step 3 Plan" are updated in order to prepare for the treatment of the next beam or the implementation of section 4.3 below, according to the case.

4.3 Implementation of national single or composite downlink "planned" beams

Taking into account the preferred orbital positions expressed by **administrations** in response to Circular Letter CR/117, the downlink "planned" beams in the new Planning Approach are considered as follows.

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[3] Sweden and Norway reserve their position on this paragraph.

[4] It is to be noted that during the implementation of all steps, such degradations do not accumulate.

The first action to be done is to define the order of treatment of the downlink "planned" beams. This order is defined on the basis of:

I beam with minimum service-arc size (high latitude countries with low elevation angles);

II composite beams;

III maximum beam size.

Then, for each downlink "planned" beam falling in this category, a Victim Study and a Culprit Study (see Annex 1) are conducted in order to assign the most suitable sub-frequency band.

The selection of the sub-frequency band is based on the same criterion which was used for Approach 1 Step 4, i.e. select the sub-frequency band which has the highest EPM sum of all the channels at the worst test point.

In cases where a single criterion could not be enough to select between two sub-frequency bands, a second criterion will be introduced in the future, i.e. select the sub-frequency band which has the smallest (mathematical) standard deviation of EPM.

If one downlink "planned" beam cannot be included in the "Draft Step 3 Plan", it will be considered under section 4.3.1 or section 5 (Step 4) below.

After a successful introduction of one downlink "planned" beam into the "Draft Step 3 Plan", all the positive reference situations of the "Draft Step 3 Plan" are updated in order to prepare for the treatment of the next downlink "planned" beam or the implementation of section 4.3.14 or section 5 (Step 4) below, according to the case.

In order to reduce the excess of interference with the same and other services sharing the same frequency band, an alternative implementation is carried out where the first criterion to select the most appropriate sub-frequency band is to reuse to the extent possible the same sub-frequency band where corresponding assignments were assigned by WRC-97.

This alternative implementation is then selected if it allows the introduction of more downlink "planned" beams in the "Draft Step 3 Plan".

However, for orbital positions specifically requested, this order of treatment may be different. administrations are free to choose orbital positions and channels, subject to not putting undue constraints on the replanning process.

4.3.1 Treatment of downlink "planned" beams not included in the "Draft Step 3 Plan" but for which at least one specific orbital position was requested

In order to implement paragraph 4.3 above (to accommodate as much as possible the preferred orbital position(s) specifically requested by administrations), the following steps are to be implemented in sequence as listed below. These steps are to be applied to all those downlink "planned" beams not included in the "Draft Step 3 Plan" but for which at least one specific orbital position was requested.

A Change the order of treatment

Partly repeat Step 3 with a different order of treatment in order to process the downlink "planned" beam under consideration (e.g. beam A) before other downlink "planned" beams (e.g. beams B1, B2, B3, B4) for which a specific orbital position was **not** requested and which, because of their treatment before beam "A" as done in section 4.3 above, were included successfully in the "Draft Step 3 Plan". The identification of beams "B1, B2, B3, B4" is done on the basis that beam "A" together with beams "B1, B2, B3, B4" are likely to be incompatible around the orbital position preferred for beam "A" (generally, beams "B1, B2, B3, B4" are located at the orbital position preferred for beam "A" or at a next adjacent orbital position).

B Use the ITU/EBU program to generate a smaller ellipse

Considering that, in the worst situation, the downlink "planned" beam under consideration would have to move to another orbital position (i.e. if considered at step 4), where it would get a recalculated ellipse which would be generally smaller than that generated at WARC-77, GTE-4 agreed to check whether or not a new ellipse recalculated at the preferred orbital position can ease the inclusion of this downlink "planned" beam in the "Draft Step 3 Plan".

C Use of fast roll-off antenna

GTE-4 agreed to check whether the use of a fast roll-off space station antenna for the downlink "planned" beam under consideration would allow for its inclusion in the "Draft Step 3 Plan" at its preferred orbital position.

D Power adjustment

Considering that most of the "existing systems" use higher or lower power levels than that of the "planned" assignments, GTE-4 agreed to check whether some increase or reduction in the power level of the downlink "planned" beam under consideration would allow for its inclusion in the "Draft Step 3 Plan" at its preferred orbital position, noting that the adjustment of the power level should be considered on a case-by-case basis and should not put any unacceptable constraints on the possible operation of that beam.

E Use of fast roll-off antenna and/or apply power adjustment to the beams which are putting undue constraints because of their national preference, noting that the adjustment of the power level should be considered on a case-by-case basis and should not put any undue constraints on the possible operation of that beam.

If all means described above do not resolve the situation, the downlink "planned" beam under consideration has to be assessed at another preferred orbital position specifically requested by the responsible administration, if any, or has to be processed at Step 4 below where it would have to move to another orbital position.

After a successful inclusion in the "Draft Step 3 Plan" of one downlink "planned" beam, for which a specific orbital position was requested, all positive reference situations of the "Draft Step 3 Plan" are updated in order to process the next downlink "planned" beam, for which a specific orbital position was requested, or for the implementation of section 5 (Step 4) below, according to the case.

4.4 Implementation of multinational beams[5]

4.4.1 "Existing" multinational beams from those appearing in the WARC-77 Plan are to be treated under section 4.2.

4.4.2 Other multinational beams from those appearing in the WARC-77 Plan are to be treated after Step 5 (see Step 6 described in section 7 below). See also section 2.12.7 of Document IRG99-4/19.

4.5 Verification if required of any undue constraints on the replanning process

The purpose of this action is to check whether there is any downlink "planned" beam, among those which were not included in the Plan after Step 3, which is subject to undue constraints imposed by

[5] Syria reserves its position regarding this section.

other beams which were included successfully in the Plan under Step 3 before it. Administrations are free to choose orbital positions and channels, subject to not putting undue constraints on the replanning process.

If it is the case for a given beam, the undue constraints (e.g. request for multiple overlapping beams instead of a composite beam and/or request for multiple orbital positions instead of one) will then be removed (e.g. use of a composite beam instead of multiple overlapping beams and/or use one position instead of multiple orbital positions) and another Step 3 study will be conducted.

5 Step 4 implementation

5.1 Introduction

The methodology defined below is to be applied to each single or composite downlink "planned" beam not entered in the "Draft Step 3 Plan". The "Draft Step 3 Plan" at the end of Step 3 is thus used as the "Step 4 Starting Point Plan" (downlink only). The first Step 4 beam to consider is analysed with respect to this "Step 4 Starting Point Plan". If the results of the analysis meet the criteria, the first Step 4 beam is included in that "Step 4 Starting Point Plan" which is then called the "Draft Step 4 Plan" (downlink only). The "Draft Step 4 Plan" is thus updated after each inclusion into it of a Step 4 beam which passed successfully the Step 4 analysis and met the criteria. This "Draft Step 4 Plan" as it evolves is then used to analyse the subsequent Step 4 beams.

A flow-chart in Annex 3 summarizes the draft algorithm used to implement Step 4.

5.2 Definition of the beam order list

The order of treatment of the downlink "planned" beams which were not included in the plan at Step 3 is defined on the basis of:

I national beam co-located with "existing" beam, if any (rest of section 4.2 above);

II beam with minimum service-arc size;

III composite beams;

IV maximum beam size.

NOTE - An administration with an "existing" system that ceased or is about to cease operation may request the Bureau to change the orbit position of its "existing" system. In this case, the system will no longer be considered as an existing system. It will receive a new orbital position and would have the new parameters used for replanning studies.[6]

5.3 Step 4 methodology description

For each downlink "planned" beam under consideration at Step 4, apply the following sub-steps.

5.3.1 Step 4 Culprit study

Perform a Culprit study (see Annex 1) against the "Draft Step 4 Plan" of the selected beam at its orbital position used at Step 3 in order to obtain the level of the Single Entry C/I values between this beam and the "Draft Step 4 Plan" beams/assignments.

[6] Syria reserves its position on this note.

5.3.2 Step 4 Orbital spacing study

Determine the required increase in the orbital spacing(s) in order to be compatible with respect to the "Draft Step 4 Plan" beams/assignments.

A For each possible sub-frequency band (eight in Region 1, four in Region 3) for the selected beam, perform the three following actions:

A.1 For each "Draft Step 4 Plan" beam for which there is at least one Single Entry C/I value below the associated C/I limit [*], convert this Single Entry C/I excess in terms of a required eastward or westward increase of the orbital spacing between the "Draft Step 4 Plan" beam and Step 4 beam under consideration, using for that purpose the discrimination provided by the Equivalent Antenna Gain which is generally dominated by the receiving earth station antenna off-axis discrimination.

A.2[**] For each "Draft Step 4 Plan" beam convert its Single Entry C/I margins, i.e. Single Entry C/I value above the associated C/I limit [*], in terms of a required eastward or westward minimum orbital separation between the "Draft Step 4 Plan" beam and Step 4 beam under consideration, using for that purpose the discrimination provided by the Equivalent Antenna Gain which is generally dominated by the receiving earth station antenna off-axis discrimination.

A.3[***] Check whether the downlink single entry C/I limits of 25 dB (co-channel) and 20 dB (adjacent channel) to protect the Step 4 beam under consideration are met, to the extent possible, if time and resources permit.

A.4 Considering the required orbital spacing increases and minimum orbital separations calculated under A.1, A.2 and A.3 above, define the nearest eastern and the nearest western suitable orbital positions for this sub-frequency band within the service arc.

NOTE - Annex 4 to this document provides an example of the Equivalent Antenna Gain functions (as defined in Recommendation ITU-R BO.1212, which combine the effects of transmitting and receiving antenna co-polar and cross-polar patterns as per section 2.3 of the "assumptions" document).

B Move the selected beam to a suitable orbital position considering eastern and western suitable orbital positions of all sub-frequency bands as identified under A above, and considering the guidelines of IRG-2 under B.1 below, and then recalculate the beam parameters accordingly.

B.1 In selecting orbit positions during the replanning studies the following priority sequence should be observed:

a) take to the extent possible the existing nominal orbital positions of the WRC-97 Plans;

b) if necessary, create new orbital positions outside the prohibited arc of Annex 7.

c) then, if unavoidable and further positions are still required, next try orbital positions within the prohibited arc of Annex 7 to Appendix S30 taking into account Principle 8 of Annex 1 to Resolution 532 (WRC-97).

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[*] Each Single Entry C/I limit is increased by up to 1 dB in order to take into account the conversion imprecision due to approximations (e.g. no recalculation of the elliptical beam at the new orbital position).

[**] Action not yet implemented.

C Perform a new Culprit study (see Annex 1) against the "Draft Step 4 Plan" with for the Step 4 beam under consideration, the suitable orbital position selected under B above and all sub-frequency bands. This analysis is necessary in order to ensure that all Single Entry C/I limits of the "Draft Step 4 Plan" beams/assignments are met[***].

D Repeat A, B and C above until a position is found within the service arc, or until the service arc boundaries are reached.

If for a given beam no suitable orbital position can be found under the studies above, i.e. the service arc boundaries have been reached, it means that this beam cannot be included in the "Draft Step 4 Plan", and thus it will be considered under Step 5 below.

5.3.3 Step 4 Victim study

Perform a Victim study (see Annex 1) of the Step 4 beam under consideration from the "Draft Step 4 Plan" at the orbital position selected under section 5.3.3 above in order to check whether the reference situation of this Step 4 beam is positive or not.

If it is not the case, some adjustments to the orbital position are needed. For that purpose, the "Draft Step 4 Plan" beams which produce the lowest co-channel and/or adjacent channel C/I values have to be identified and the EPM excess, plus 1 dB margin to compensate the aggregate effect, has to be converted in terms of a required increase of the orbital spacing between the "Draft Step 4 Plan" beams thus identified and the Step 4 beam under consideration. Then actions described in section 5.3.2 have to be repeated.

However, if for the Step 4 beam under consideration all the EPM values are positive, then this beam is added to the "Draft Step 4 Plan", and all the positive reference situations are updated in order to prepare for the treatment of the next Step 4 beam.

In cases where more than one sub-frequency band at a new orbital position passed both the Culprit and the Victim studies and all have positive EPM values, then the selection of the sub-frequency band will be based on the same criterion which was used for Approach 1, Step 4 and in section 4.3 above, i.e. select the sub-frequency band which has the highest EPM sum of all the channels at the worst test-point.

In cases where a single criterion would not be enough to select between two sub-frequency bands, a second criterion will be introduced in the future, i.e. select the sub-frequency band which has the (mathematical) smallest standard deviation of EPM.

After a successful introduction of one Step 4 beam into the "Draft Step 4 Plan", all the positive reference situations of the "Draft Step 4 Plan" are updated in order to prepare for the treatment of the next beam.

6 Step 5 implementation

6.1 Definition of the beam order list

The order of treatment of the downlink "planned" beams which were not included in the Plan at Steps 3 and 4 is defined on the basis of:

I national beam co-located with "existing" beam, if any (rest of section 4.2 and Step 4 above);

II beam with minimum service-arc size;

[***] In particular since action A2 is not yet implemented.

III composite beams;

IV maximum beam size.

6.2 Description of the Step 5 methodology

Two situations might occur after implementation of both Step 3 and Step 4:

i) only a few beams remain not included in the "Draft Step 4 Plan" at the end of Step 4;

ii) a significantly high number of beams remain not included in the "Draft Step 4 Plan" at the end of Step 4.

Under situation i) above, it is proposed to apply one of the three following practical methods, either:

a) to modify manually the blocks and/or orbital positions assigned to the beams causing difficulties to introduce in the Plan the Step 5 beam under consideration; or

b) to repeat the implementation of Step 3 and to try to find a solution to each beam by applying when necessary the Step 4 methodology, and then to continue Step 3 with other remaining Step 3 beams; or

c) to repeat the implementation of both Step 3 and Step 4 but with a different order of treatment of the beams, where the beam under consideration at Step 5 will be treated before the beams causing difficulties to introduce it in the "Draft Step 3 Plan".

As an optional measure to resolve particular specific cases of remaining incompatibilities in Region 1, and on an exceptional basis, the use of different channel repartition may be envisaged (e.g. spreading the ten channels over the 800 MHz instead of 400 MHz in one polarization). In such a case, the concerned administration(s) should be informed.

If at the end the study, there remains excess interference into "existing" systems, the Bureau will request the responsible administration(s) of that "existing" system(s) if they were prepared to either accept a small e.i.r.p. increase in the order of a maximum of 1 dB, or alternatively to accept the respective EPM degradation. In the absence of a reply within 15 days from the date of the Bureau's Telefax, it will be understood that this administration agrees with either the e.i.r.p. increase or the EPM degradation. Such e.i.r.p. increase is only for the purpose of replanning exercises and should be understood as not having any impact on the status of coordination already undertaken by the responsible administration(s) of such "existing" system(s).

Under situation ii) above, it is proposed to repeat the implementation of both Step 3 and Step 4 with a reduced number of channels.

It might also be required, if necessary, to adjust appropriately other beam parameters such as e.i.r.p. on a case-by-case basis.

In both situations, when test points with very low EPM (less than about -10 dB) receive excess interference, such test points can be ignored for the purpose of the replanning exercises, if necessary, on a case-by-case basis. In such cases, the concerned administration(s) are informed accordingly, and the issue will be reported to IRG-5.

NOTE - See also the conclusions of IRG regarding alternative Region 3 channel arrangements in section 2.4.2 of Document IRG99-4/19-E.

7 Step 6: Implementation of multinational downlink "planned" beams

The order of treatment of the multinational downlink "planned" beams is defined on the following bases:

i) beam with minimum service-arc size (high latitude countries with low elevation angles);

ii) maximum beam size.

Step 6 includes elements of Steps 3, 4 and 5 described respectively in sections 4, 5 and 6 above for application to multinational downlink "planned" beams. However, for these multinational beams, the selection of channels is limited to the maximum number of channels already assigned to these multinational beams contained in the WRC-97 Plans.

8 Establishment and compatibility analysis of the feeder-link Plan

8.1 Introduction

IRG-4 suggested that initial studies relating to the feeder-link replanning exercises should primarily consider the 17 GHz band. GTE-4 concluded from preliminary feeder-link replanning studies undertaken by the Bureau at 17 GHz, that limitation to the 17 GHz frequency band may not provide all assignments with the required number of channels and protection.

As a consequence, the feeder-link replanning studies should consider both the 14 GHz and 17 GHz frequency bands. Furthermore, some administrations expressed their specific preferences to use the 14 GHz frequency band in addition or alternatively to the 17 GHz frequency band.

8.2 Action 1: Establishment of the "draft new feeder-link Plan" at both 14 GHz and 17 GHz

The first action is to create the "draft new feeder-link Plan" by using the "existing" feeder-link systems with their "existing assignment(s)" which were notified, which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau.

All feeder-link "planned" beams are included in the "draft new feeder-link Plan" at the same time.

In order to simplify the establishment of the "draft new feeder-link Plan", GTE-4 agreed to start with assigning to each of the feeder-link "planned" beams the block of channels selected for their corresponding downlink "planned" beam at the end of the implementation of the "draft new downlink Plan" (i.e. result of Steps 3, 4, 5 and 6 above).

In the 14 GHz frequency band, only 14 channels are available (seven channels per circular polarization). GTE-4 decided to assign channels in the 14 GHz frequency band in case an administration already has assignments for their feeder-links in this band. The assignment of channels should start from the top of the band (i.e. from channel 14 downwards on both bands of polarization).

For the implementation of this course of action, it is also required to move to a new orbital position each feeder-link "planned" beam for which the corresponding downlink "planned" beam has been moved at that new orbital position. The ellipse parameters of the moved feeder-link "planned" beam are then recalculated with the ITU/EBU program.

8.3 Action 2: Analysis of the interference situation

Once the "draft new feeder-link Plan" has been established, as described in section 8.2 above, a first MSPACE run is performed in order to assess the interference situation of this "draft new feeder-link Plan".

EPM degradations are identified as follows:

a) in the case of "existing" systems, identifying positive reference EPM degraded below -0.45 dB or negative reference EPM degraded by more than 0.45 dB. The reference EPMs are those of the WRC-97 reference situation as it evolves;

b) in the case of "planned assignments", identifying negative EPMs below -0.45 dB.

For each feeder-link "planned" beam having an EPM degradation, identify its major interfering beam(s) based on the level of the corresponding Single Entry C/I value (generally, the other beams located at the same orbital position are major interfering beams).

In order to resolve this situation, GTE-4 agreed to apply the following measures in any appropriate order:

- reverse the polarization direction;
- assign different channels in the same or the alternative frequency band if allocated;
- apply fast roll-off receiving space station antenna patterns (e.g. as described in Annex 3 to Appendix S30A).

As a last resort, a shift of ±0.2 degrees around the nominal orbital position, in both the feeder-link and downlink plans, can be envisaged between the beams involved in the incompatibility situation. Such orbital shifts will necessarily imply reassessment of the downlink plan.

However, none of the above-mentioned measures are applied to the "existing" feeder-link systems. In addition, every effort will be made to accommodate a national "planned" beam at the orbital position of the "existing" system.

8.4 Action 3: Second run of interference calculation

In order to confirm that the measures described in section 8.3 above have been effective, a second MSPACE run is performed.

Any remaining incompatibilities which could not be resolved by iterations of Action 2 measures will be reported for further appropriate action.

Annexes: 4

ANNEX 1

(to Attachment 1)

Detailed description of Victim and Culprit studies

A1.1 "Victim" (Receiving interference) study

This study involves evaluating levels of interference from assignments in the "starting point Plan" (i.e. assignments previously successfully included in the draft new plan) to new channels which could possibly be added for a given beam(s) under consideration.

In addition to the "starting point Plan", for each beam that will receive additional channel(s) a complete set of possible candidate channels (40 for Region 1, 24 for Region 3) for each polarization (Circular Right-hand, Circular Left-hand) is generated. These sets of candidate channels are then treated as "Victims" in an MSPACE study that runs all of these candidate channels as a grouped addition to the "starting point Plan". This provides information about which candidate channels/beams would receive an excess of interference (negative EPM) from the "starting point Plan".

The result of this step is a table which lists the channels/blocks, for all beam and polarization combinations, that would not receive negative EPM values from the "starting point Plan". It should be noted that in the case of composite beams, the only channels that would be considered as valid candidate channels would be those that were available for all subsidiary beams of a given composite beam. (Candidate channels that are not available for all subsidiary beams should be removed from the table.)

A1.2 "Culprit" (causing interference) study

This study involves evaluating levels of interference from new channels which could possibly be added to assignments in the "starting point Plan".

This study can be implemented by many MSPACE runs for each candidate channel. However, in order to shorten the MSPACE calculation time the following method was developed.

In addition to the "starting point Plan", potential new channels determined after a Victim study are included as "additions" in an MSPACE study. Then values of single entry C/I are calculated for each beam/polarization/channel/test point of the "starting point Plan" with respect to potential new channels.

By comparing the Single Entry C/I Criterion/Limit for each beam/polarization/channel/test point of the "starting point Plan" with calculated Single Entry C/I, potential new channels that cause unacceptable interference to assignments of the "starting point Plan" are removed from the list of candidate channels.

The definition of the Single Entry C/I Criterion/Limit, denoted as C2Ilimit, is as follows:

$$\text{C2ILimt} = \text{PR} - 10 \text{ Log}\left(10^{\left(\min\left(0,\text{Ref.EPM}\right)/-10\right)} \text{ x } 10^{0.045} - 10^{\left(\text{Ref.EPM}/-10\right)}\right)$$

where:

PR is the co-channel or the adjacent channel protection ratio associated with the wanted assignment in the case of a co-channel or adjacent channel interfering assignment, respectively; and

Ref.EPM is the Reference EPM associated with the wanted assignment.

This definition means that a separate Single Entry C/I Criterion/Limit needs to be associated with each Reference EPM of the "starting point Plan".

A1.2.1 Definition of artificial Reference EPM for Culprit study purposes

In order to provide appropriate protection of the Plan assignments during the Culprit study (i.e. no more than what was provided by any starting point Plan), the reference situation of these Plan assignments should be updated as follows:

Assumptions:

- R is the Reference EPM of the starting point Plan as contained in the MSPACEG scenario/input file (e.g. could be calculated after the successful addition of each beam during Step 3 implementation);
- E is the new and last calculated EPM as contained in the MSPACEG reference situation/output file;
- NR is the New Reference EPM to be used to update the R value.

The definition of NR is done according to the following criteria:

If R < 0

if $E < -10 \text{ Log}[1-10^{0.045}(1-10^{(-R/10)})]$

$NR = -10 \text{ Log}[10^{0.045}(1-10^{(-R/10)})+10^{(-E/10)}]$

else

$NR = -10 \text{ Log}[10^{(-R/10)}10^{0.045}-10^{(-E/10)}] + 10 \text{ Log}(10^{0.045}-1)$

end if

else

NR = E

end if

A1.3 Interference calculation in both "Victim" and "Culprit" studies

As a practical measure to better simulate the real situation, the GTE-4 concluded not to take into account interference generated by assignments located at orbital position distances greater than **S** degrees from the nominal orbital position of the wanted assignment, where **S** is defined in order to provide an orbital position discrimination at the receiving earth station antenna greater than 35 dB. The formula for **S** takes into account the difference in e.i.r.p. between interfering and wanted signals and allows for correction if the receiving earth station antenna diameter of the wanted assignment is not in conformity with Recommendation ITU-R BO.1213 (60 cm). Provisionally[7], **S** is defined as follows:

$S = 15 + 10^{((|\Delta e.i.r.p.| + 20*\text{Log}(d/60) - 29)/25)}$ degrees in a co-polar situation

$S = 9 + 10^{((|\Delta e.i.r.p.| + 20*\text{Log}(d/60) - 29)/25)}$ degrees in a cross-polar situation

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[7] It will be up to the Bureau to implement the formulae in a simplified form provided that it serves the same purpose.

where

Δe.i.r.p. is the difference in dB between the maximum e.i.r.p. of the interfering signal and the maximum e.i.r.p. of the wanted signal

d is the receiving earth station antenna diameter of the wanted assignment.

This GTE-4 conclusion was included as a practical measure to improve the replanning exercises. Considering that the configuration of the BSS Plan is rather homogeneous, it is understood that the plateau effects of the receiving earth station antenna patterns are negligible compared to the other sources of interference. Indeed, interference received from BSS satellites beyond a certain orbital distance is in practice negligible.

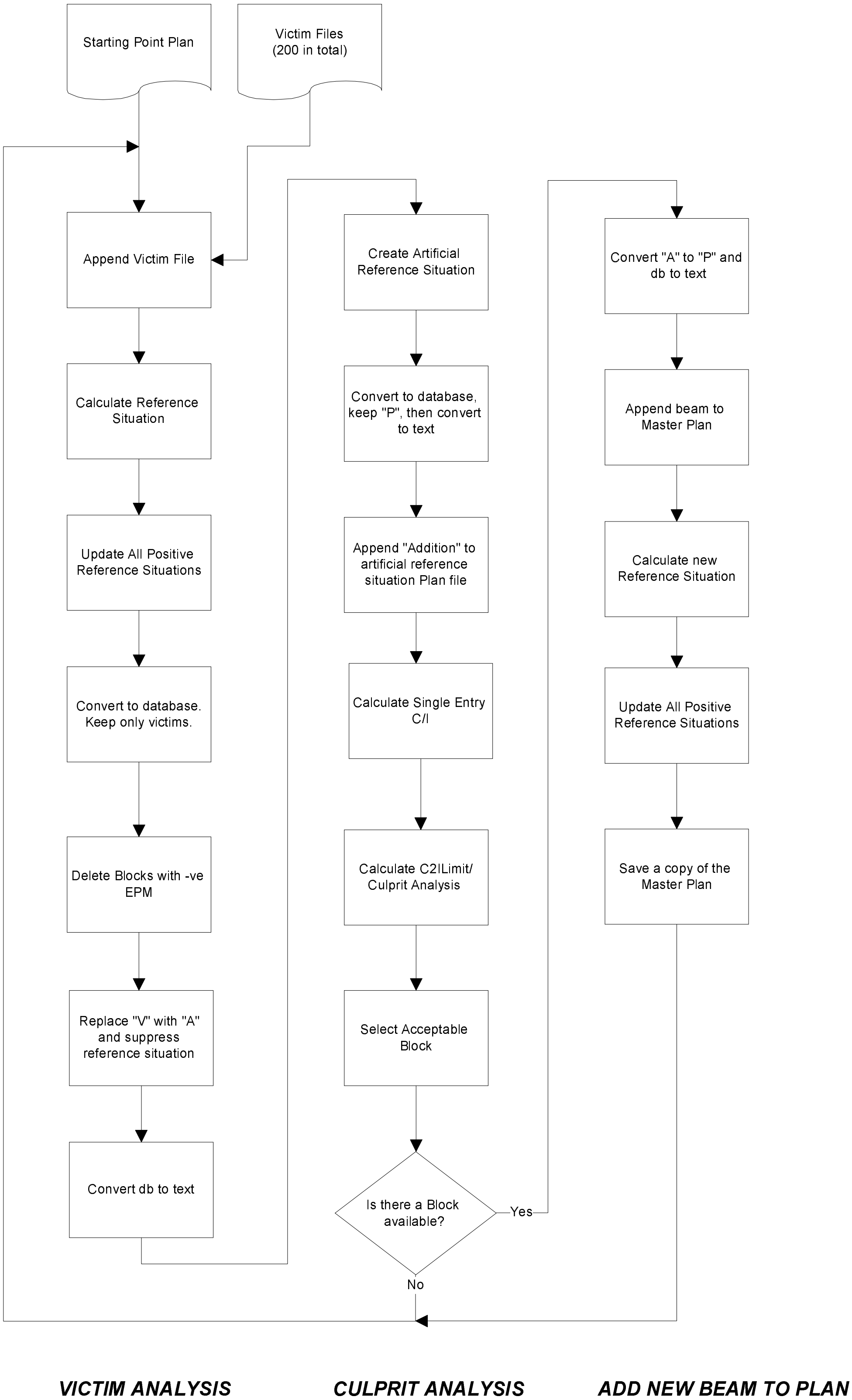
If such interference was taken into account, it could result in an unrealistically high level of interference in the replanning exercises.

As indicated in Annex 4 to this document, all receiving earth station antennas include in their patterns a slope (29 - 25 log φ) and a plateau as a mask for the high-order side lobes. It is considered that interference levels below -35 dB correspond to this negligible area. As can be seen from Annex 4, and to be on the safe side, the co-polar and cross-polar distances of 15 and 9 degrees respectively, which were chosen, provide almost 40 dB of discrimination. This value is further qualified by taking into account differences in e.i.r.p.s and receiving earth station antenna diameters as defined above.

ANNEX 2

(to Attachment 1)

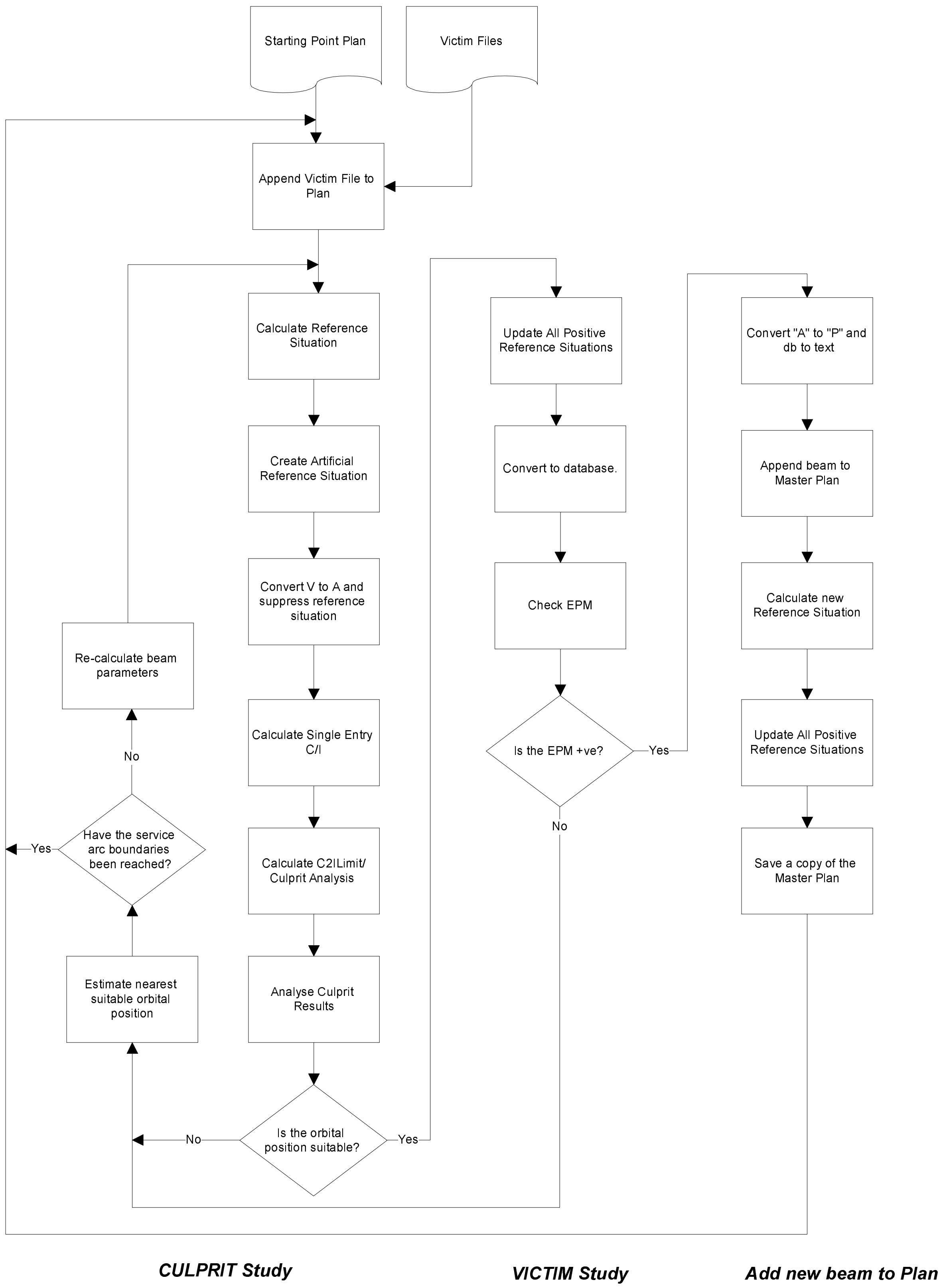
Automated software process implemented for Step 3



ANNEX 3

(to Attachment 1)

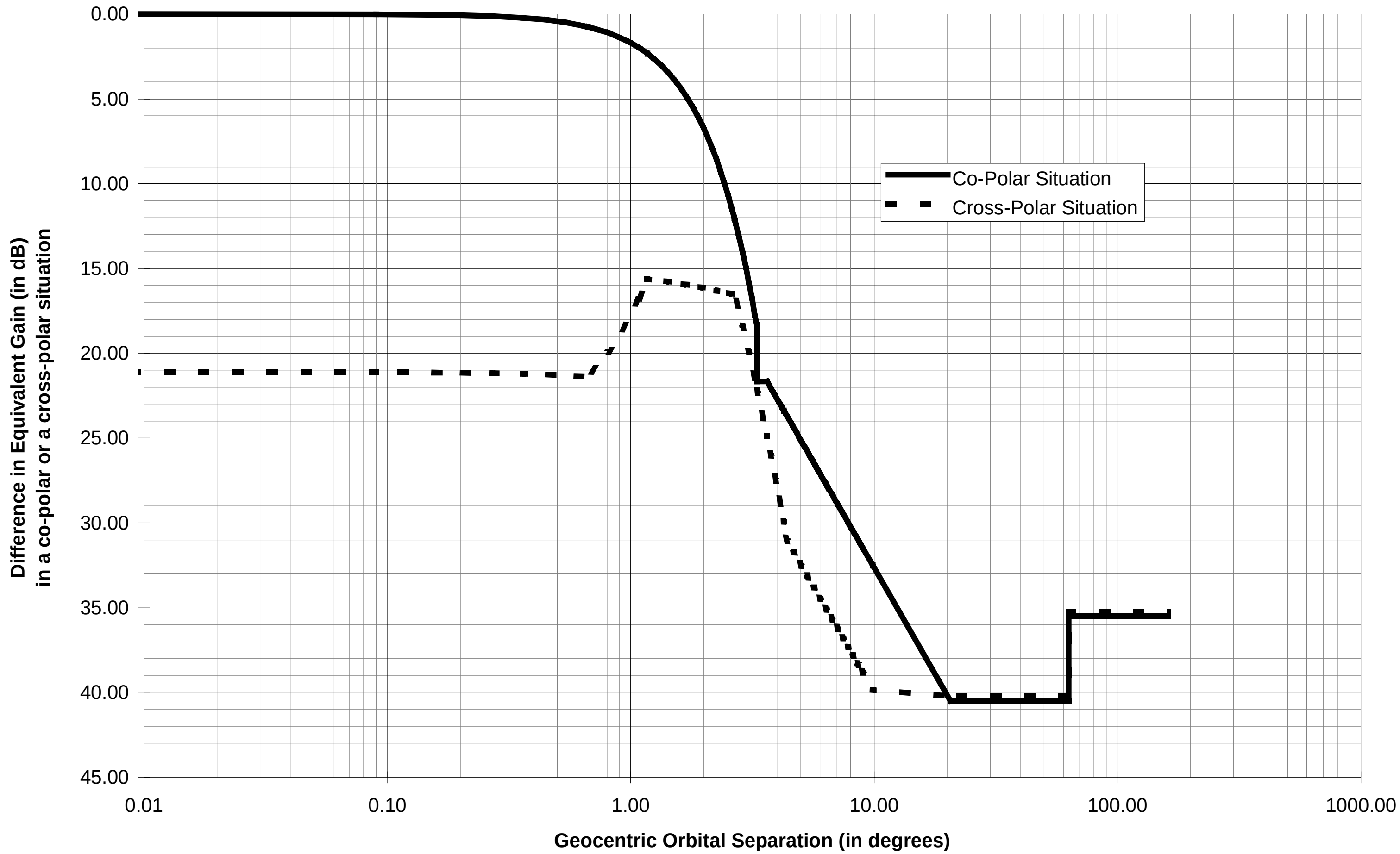
Automated software process implemented for Step 4



ANNEX 4

(to Attachment 1)

Example of Equivalent Antenna Gain as a combined function of space station transmit antenna and earth station receive antenna



ATTACHMENT 2

Source: Documents IRG99-5/13, IRG99-5/13(Add.1), IRG99-5/13(Add.2), IRG99-5/19 and IRG99-5/19(Add.1)

BASIC TECHNICAL ASSUMPTIONS FOR THE PLANNING APPROACH

1 Introduction

During the third meeting of IRG (IRG-3), a study approach referred to as the "Planning Approach" was defined. The second meeting of GTE (GTE-2) then developed the technical assumptions and methodology associated with this new approach. Initial replanning studies commenced in accordance with Resolution 532. The results were presented to GTE-3. Based on a review of these results, IRG-4 made further refinements to the technical assumptions.

GTE-4 made further amendments to the technical assumptions in order to:

- include IRG-4 decisions on other issues as contained in Attachment D to the IRG-4 Report;
- update previous assumptions (e.g. list of "existing" systems);
- define new assumptions to carry out replanning studies of the feeder-link Plan.

2 Technical assumptions to carry out studies on the Planning Approach

2.1 MSPACE input file assumptions

MSPACE interference calculations are performed with the following default values:

- 0.1° for the station-keeping error;
- 1.0° for the rotation error; and
- 0.1° for the mis-pointing error,

except for:

- assignments, notified with specific values, which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau.

2.2 Emission type and channel bandwidth

So far, studies have been carried out with analogue emissions, except for notified digital assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau.

However, future studies are to be based on digital emissions with a reference bandwidth of 27 MHz using the protection ratios described in paragraph 7. However, other bandwidths such as 33 MHz have to be considered before final adoption of the Plan (e.g. 34.5 MHz as suggested by Japan at GTE-4 (Document GTE99-4/2, 20 September 1999) for their assignments).

Japan requested to use 34.5 MHz of bandwidth for their assignments in the replanning exercises. This request will be studied at the end of the basic study as is the case for other national preferences, provided that all necessary elements for such a study (e.g. protection ratios) are available in draft revised Recommendation ITU-R BO.1293 or in any other draft new Recommendation from JWP 10-11S.

NOTE - For notified assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau, the parameters notified are used.

2.3 Antenna types

Except for notified assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the

Bureau and which use antenna types different from those described below, the following default antenna types are to be used:

- downlink receiving earth station antenna according to Figure 7*bis* of Annex 5 of Appendix S30 (Recommendation ITU-R BO.1213);
- downlink space station transmitting antenna according to Figure 9 of Annex 5 of Appendix S30 (i.e. the R13TSS pattern)[1];
- uplink transmitting earth station antenna according to Curves A' and B' of Figure A of Annex 3 of Appendix S30A (Recommendation ITU-R BO.1295); and
- uplink receiving space station antenna according to Curves A' and B' of Figure B of Annex 3 of Appendix S30A (Recommendation ITU-R BO.1296)[2] .

In the initial studies conducted by GTE-3, there were two cases where downlink BSS-BSS compatibility problems arose from downlink test points located outside the -3 dB contour. GTE-3 reported that receive antenna diameters larger than 60 cm in accordance with Recommendation ITU-R BO.1213 may be used in order to compensate for the lower gain of the satellite antenna in that direction, as follows:

Beam ID	Adm.	Test point location (downlink)	Contour where test points are located	Compatibility problem at Step 3 (beam not included)	Ant. Diameter used
MCO11600	MCO	46N00 5E60	-7.4 dB	One beam	0.99 m
RSTRSA11 RSTRSA12 RSTRSD11 RSTRSD12	RUS	54N33 22E88 55N07 22E74 55N11 20E78 54N44 20E00 41N20 47E82 46N40 48E90	-8.1 dB	Two beams	1.09 m

Alternatively, GTE-3 determined the following options that could be applied for the purposes of the replanning studies:

For MCO:

a) do not consider the downlink test point located outside the -3 dB contour; or

b) increase the size of the downlink beam provided that it remains in the territory of the Administration or include a minimum sized downlink spot beam so that it includes the test point within the -3 dB contour.

IRG-4 decided to apply the approach described in a) above in the MCO case.

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[1] The improved fast roll-off space station transmitting antenna characteristics as defined by JWP 10-11/S (see Document GTE99-3/14) or other types of antennas contained in ITU-R Recommendations may be used in special circumstances to solve compatibility problems. In such cases the Administration for which the fast roll-off antenna is to be applied should be consulted.

[2] Improved space station receiving antenna characteristics may be used in special circumstances to solve compatibility problems (e.g. fast roll-off antenna described in Annex 3 to Appendix S30A). In such cases the Administration for which the improved antenna is to be applied should be consulted.

For RUS:

a) increase the size of the downlink beam or include a minimum sized spot beam so that it includes the test points within the -3 dB contour.

IRG-4 decided that this is a technical issue that can be solved between Russia and GTE.

After IRG-4, the Administration of Russia requested to use a receiving earth station antenna diameter of 0.9 m at the following downlink test-points: 41.20° N-47.82° E, 46.40° N-48.90° E, 54.33° N-22.88° E, 55.07° N-22.74° E, 55.11° N-20.78° E and 54.44° N-20.00° E. This request was implemented in the replanning studies. For that purpose, these six test points were removed from WRC-97 downlink beams RSTRSD11 and RSTRSD12 and added to new downlink beams RSTRSD13 and RSTRSD14, with the same coverage and the same channels as beams RSTRSD11 and RSTRSD12, at the orbital position 36° E.

2.4 Polarization and channel spacing

Circular polarization, CR or CL, will be used except for cases where assignments have linear polarization and are:

> "notified assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau".

2.4.1 Possible Regions 1 and 3 channel arrangements

Following IRG-3 conclusions, GTE-3 derived four channel arrangements utilizing a continuous band of 400 MHz:

a) ten defined channels, with 38.36 MHz frequency spacing, grouped in a continuous band of 400 MHz with one predetermined type of polarization. The channel scheme is based on co-channels only;

b) ten defined channels, with 38.36 MHz frequency spacing, grouped in a continuous band of 400 MHz with one predetermined type of polarization. The channel scheme assumes adjacent-channels;

c) ten defined channels, with 38.36 MHz frequency spacing between co-polarized channels, grouped in a continuous band of 200 MHz with two predetermined types of polarization (i.e. cross-polarized channels assigned to the same beam will be co-channels). The channel scheme is based on co-channels only; and

d) ten defined channels, with 38.36 MHz spacing between co-polarized channels, grouped in a continuous band of 200 MHz with two predetermined types of polarization (i.e. cross-polarized channels assigned to the same beam will be adjacent channels with a frequency spacing of 19.18 MHz).

The four corresponding channel rasters are shown in Figure 1.1 below.

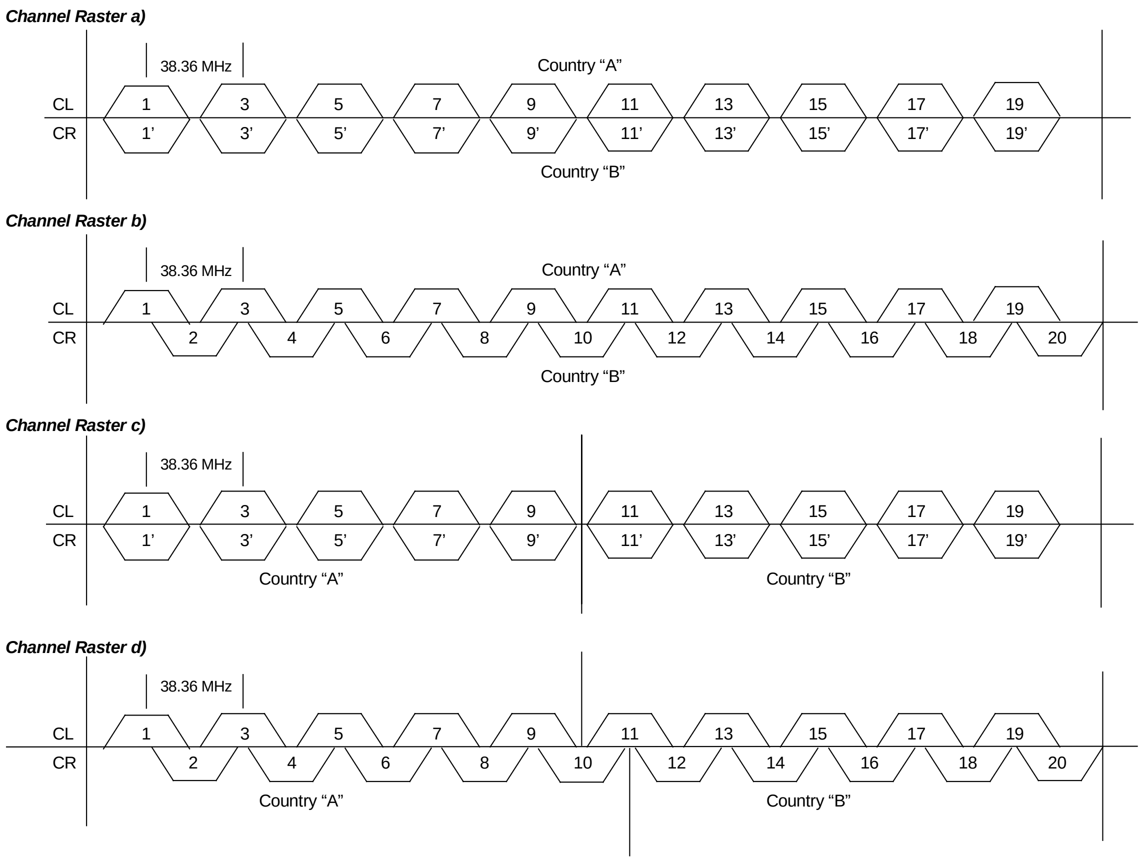

FIGURE 1.1

Studies (see Document GTE99-3/18) were generally based upon raster b) of Figure 1.1.

GTE-4 decided to assume both the 14 GHz and the 17 GHz frequency bands in the feeder-link replanning studies in order to provide all assignments with the required number of channels and protection and also in order to cope with specific preferences expressed by some Administrations.

With respect to the 14 GHz feeder-link band, it was concluded to use the WRC-97 channel raster, i.e.: similar to raster d) above, but reduced to the 14 available channels in that band (7 channels per circular polarization). It was also concluded, that, to begin with, to assign channels from the top of the band whilst not taking into account the internal adjacent channel interference effect.

2.4.2 Alternative Region 3 channel arrangements

Following IRG-3 conclusions, GTE-3 derived four channel arrangements utilizing a continuous band of 500 MHz:

a) 12 defined channels, with 38.36 MHz frequency spacing, grouped in a continuous band of 500 MHz with one predetermined type of polarization. The channel scheme is based on co-channels only;

b) 12 defined channels, with 38.36 MHz frequency spacing, grouped in a continuous band of 500 MHz with one predetermined type of polarization. The channel scheme assumes adjacent channels;

c) 12 defined channels, with 38.36 MHz frequency spacing between co-polarized channels, grouped in a continuous band of 250 MHz with two predetermined types of polarization (i.e. cross-polarized channels assigned to the same beam will be co-channels). The channel scheme is based on co-channels only; and

d) 12 defined channels, with 38.36 MHz spacing between co-polarized channels, grouped in a continuous band of 250 MHz with two predetermined types of polarization (i.e. cross-polarized channels assigned to the same beam will be adjacent channels with a frequency spacing of 19.18 MHz).

The four corresponding channel rasters are shown in Figure 1.2 below.

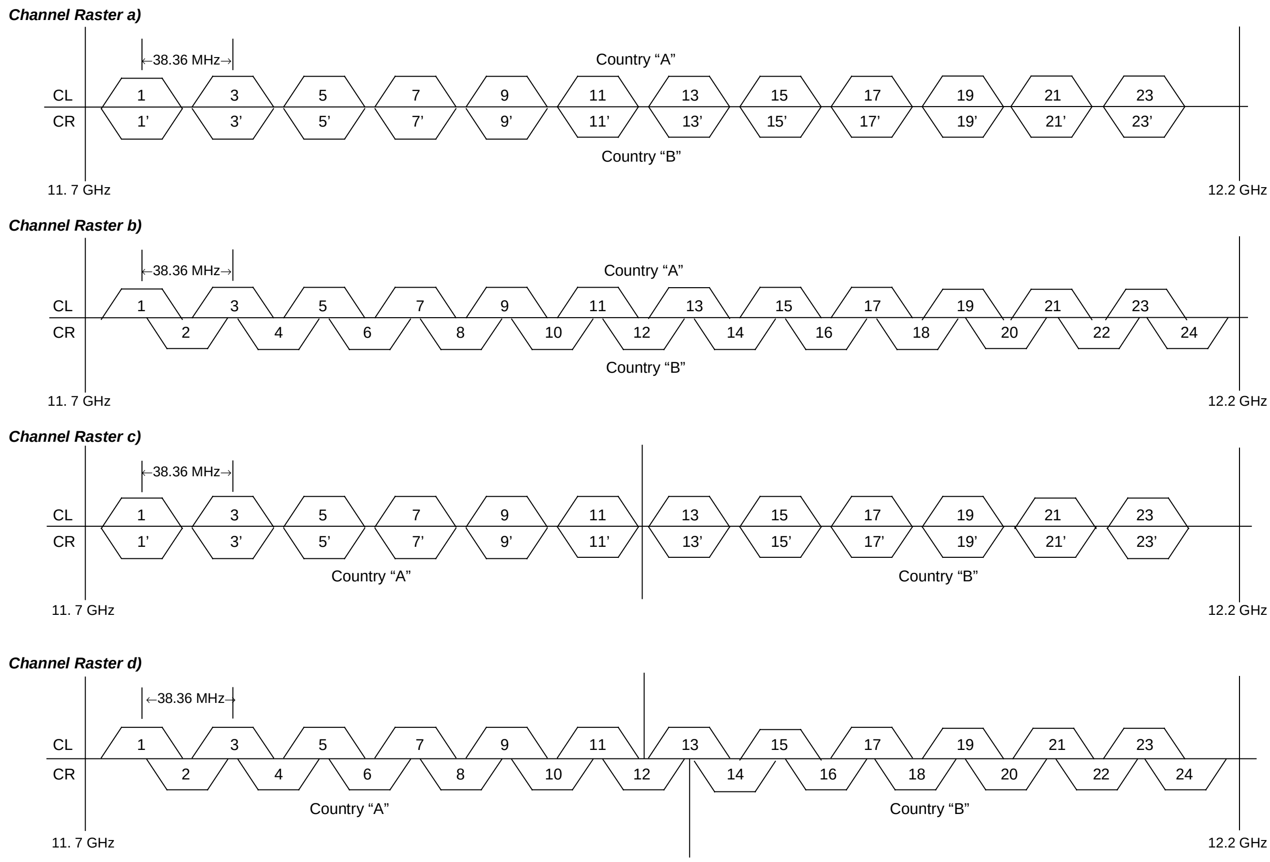

FIGURE 1.2

Another initial study (see Document GTE99-3/17) was generally based upon raster b) of Figure 1.2 for Region 3 and raster b) of Figure 1.1 for Region 1. The results of this initial study indicate that it is possible to conduct a satisfactory replanning exercise on this basis.

In regards to the number of channels to be used in Region 3, APT members have discussed the issue. It is very important to Region 3 countries to achieve an efficient usage of the 500 MHz of BSS spectrum. As a compromise to advance the work of the meeting, Region 3 Administrations agreed with the general approach outlined by the distinguished delegate of the Kingdom of Morocco described below:

Stage 1: Further replanning should be conducted on the basis of ten channels for each country in Regions 1 and 3, as described in the report of the IRG-3 meeting.

Stage 2: At the end of Step 4 (see Document IRG99-4/[11]), GTE will attempt to add two additional channels for each Region 3 country at the orbital positions determined at the end of Step 4. In determining the feasibility of these additional two channels, GTE will also perform studies to identify any undue constraints on Region 1 BSS resulting in the border area between Regions 1 and 3.

2.4.3 Preferred channel rasters

Raster b) is considered to better accommodate "existing" assignments compared with raster d) and is, for the parameters (frequency spacing, channel bandwidth, protection ratios etc.), more efficient than rasters a) and c). Considering that emphasis should be placed on channel raster(s) that give the greatest chance of achieving a successful result, IRG determined that raster b) should be used (see Document GTE99-3/7). Channel raster d) may be used in certain circumstances on a case-by-case basis.

2.4.4 Agreement on channels specifically preferred by Administrations

2.4.4.1 Channels preferred by AUS

The Administration of Australia requested that the beam and channels arrangement of the current WRC-97 Plans should be used (see also Documents GTE99-3/11 and GTE99-3/12).

Downlink channels introduced from the WRC-97 Plan for AUS

Orb.	Beam	Channel	Pol	Emission
152° E	AUS00600	2, 6, 10, 14, 18, 22	CL	digital
	AUS00400	3, 7, 11, 15, 19, 23	CR	digital
	AUS0040A	3, 7, 11, 15, 19, 23	CR	digital
	AUS0040B	3, 7, 11, 15, 19, 23	CR	digital
	AUS0040C	3, 7, 11, 15, 19, 23	CR	digital
	AUS00500	4, 8, 12, 16, 20, 24	CL	digital
164° E	AUS00900	1, 5, 9, 13, 17, 21	CR	digital
	AUS0090A	1, 5, 9, 13, 17, 21	CR	digital
	AUS0090B	1, 5, 9, 13, 17, 21	CR	digital
	AUS00800	2, 6, 10, 14, 18, 22	CL	digital
	AUS00700	3, 7, 11, 15, 19, 23	CR	digital
	AUS0070A	3, 7, 11, 15, 19, 23	CR	digital

Feeder-link channels introduced from the WRC-97 Plan for AUS

Orb.	Beam	Channel	Pol	Emission
152° E	AUS00600	28, 32, 36, 40, 26, 30	CR	digital
	AUS00400	3, 7, 11, 15, 19, 23	CL	digital
	AUS0040A	3, 7, 11, 15, 19, 23	CL	digital
	AUS0040B	3, 7, 11, 15, 19, 23	CL	digital
	AUS0040C	3, 7, 11, 15, 19, 23	CL	digital
	AUS00500	4, 8, 12, 16, 20, 24	CR	digital
164° E	AUS00900	27, 31, 35, 39, 25, 29	CR	digital
	AUS0090A	27, 31, 35, 39, 25, 29	CR	digital
	AUS0090B	27, 31, 35, 39, 25, 29	CR	digital
	AUS00800	2, 6, 10, 14, 18, 22	CL	digital
	AUS00700	3, 7, 11, 15, 19, 23	CR	digital
	AUS0070A	3, 7, 11, 15, 19, 23	CR	digital

The Administration of Australia also requested that extra capacity should be provided for that Administration by an additional national coverage beam at two orbital positions (152° E and 164° E) with two channels per beam (see also Documents GTE99-3/11 and GTE99-3/12). This involves beams at multiple orbital positions covering the same area in the replanning studies.

IRG decided to pursue these requests of Australia in the further replanning studies.

2.4.4.2 Channels preferred by RUS[3]

Channels in the WRC-97 Plan for RUS at orbital positions 36° E, 56° E, 86° E and 140° E

Orb.	Beam	Channel	Feeder Link Pol	Downlink Pol	Emission
36° E	RST-1	25, 27, 29, 31, 33, 35, 37, 39	CR	CL	digital & analogue
		26, 28, 30, 32, 34, 36, 38, 40	CL	CR	digital & analogue
56° E	RST-2	25, 27, 29, 31, 33, 35, 37, 39	CR	CL	digital & analogue
		26, 28, 30, 32, 34, 36, 38, 40	CL	CR	digital & analogue
86° E	RST-3	25, 27, 29, 31, 33, 35, 37, 39	CR	CL	digital & analogue
		26, 28, 30, 32, 34, 36, 38, 40	CL	CR	digital & analogue
140° E	RST-5	25, 27, 29, 31, 33, 35, 37, 39	CR	CL	digital & analogue
		26, 28, 30, 32, 34, 36, 38, 40	CL	CR	digital & analogue

The Administration of Russia requested that the beam and channels arrangement of the current WRC-97 Plan be used at orbital positions 36° E, 56° E, 86° E and 140° E, as referred to in paragraph 2.12.5 and paragraph 4.4 of Documents GTE99-3/12 and 11, respectively. IRG decided to pursue this request of Russia in the further replanning studies.

Further to IRG-4, the Administration of Russia notified with analogue and digital modulations eight channels (27, 28, 31, 32, 35, 36, 39, 40) of the RST-1 network asking not to group odd and even channels.

Considering also the IRG decision to use only digital modulation for the "planned" assignments introduced in the draft new Plan during the replanning studies, GTE-4 agreed to assume the following channels for Russia in doing the replanning studies:

[3] The Administrations of Morocco and Syria consider that the total number of channels per coverage area shall not exceed either ten channels or the number of channels of an "existing system" which is greater than 10. This is with the understanding that the planning conference will decide on the status of those channels of "existing systems" that exceed the number 10.

Channels assumed in the replanning studies for RUS

Orb.	Beams (Network)	Channel	Feeder Link Pol	Downlink Pol	Emission
36° E	RSTREA11 (RST-1)	27, 31, 35, 39	CR	CL	analogue
	RSTREA12 (RST-1)	28, 32, 36, 40	CL	CR	analogue
	RSTRED11 (RST-1)	27, 31, 35, 39	CR	CL	digital
	RSTRED12 (RST-1)	28, 32, 36, 40	CL	CR	digital
	RSTRSD11 RSTRSD13*	25, 27, 29, 31, 33, 35, 37, 39	CR	CL	digital
	RSTRSD12 RSTRSD14*	26, 28, 30, 32, 34, 36, 38, 40	CL	CR	digital
56° E	RSTRSD21	25, 27, 29, 31, 33, 35, 37, 39	CR	CL	digital
	RSTRSD22	26, 28, 30, 32, 34, 36, 38, 40	CL	CR	digital
86° E	RSTRSD31	25, 27, 29, 31, 33, 35, 37, 39	CR	CL	digital
	RSTRSD32	26, 28, 30, 32, 34, 36, 38, 40	CL	CR	digital
140° E	RSTRSD51	25, 27, 29, 31, 33, 35, 37, 39	CR	CL	digital
	RSTRSD52	26, 28, 30, 32, 34, 36, 38, 40	CL	CR	digital
* downlink only (see section 2.3 above)					

Where MSPACE grouped have been created between the following beams:

– RSTREA11, RSTRED11, RSTRSD11 and RSTRSD13 (downlink only)

– RSTREA12, RSTRED12, RSTRSD12 and RSTRSD14 (downlink only)

– RSTRSD21, RSTRSD22

– RSTRSD31, RSTRSD32

– RSTRSD51, RSTRSD52

After IRG-4, the request of the Administration of Russia to use for its beam at 110° E downlink channels 25, 27, 29, 31, 33, 35, 37, 39 CL and 26, 28 CR and feeder-link channels 25, 27, 29, 31, 33, 35, 37, 39 CR and 26, 28 CL was implemented. In addition, these channels were grouped in order not to take into account the internal adjacent channel interference effect.

2.4.4.3 Channels preferred by IND

(See section 2.10.2.3 below.)

2.4.4.4 Channels preferred by IRN

The Islamic Republic of Iran requested to study their feeder links at both the 14 GHz and 17 GHz frequency bands. The 17 GHz frequency band will be assumed in the basic study, whereas the 14 GHz frequency band will be studied at the end of the basic study as is the case for other national preferences.

2.4.4.5 Channels preferred by KOR

The Republic of Korea requested to study their feeder links at both the 14 GHz and 17 GHz frequency bands. The 17 GHz frequency band will be assumed in the basic study, whereas the 14 GHz frequency band will be studied at the end of the basic study as is the case for other national preferences.

2.5 Test points

By default, the test points of the WRC-97 Regions 1 and 3 Plan shall be used (see also paragraph 2.10.2).

2.5.1 Revised downlink test points for MRC

The Administration of Morocco requested the following new downlink test points to be used for the creation of the elliptical beam for Morocco (see also Document GTE99-3/11). This request would align the downlink beam of Morocco with its WARC Orb-88 feeder-link beam. IRG decided to pursue this request from Morocco in the further replanning studies.

Latitude (° N)	Longitude (° W)
20.40	17.00
23.50	12.80
23.70	15.90
26.40	9.60
27.20	13.20
29.90	5.80
30.40	9.60
32.30	1.30
34.90	2.10
35.80	5.90

The new downlink test points of Morocco were implemented in the replanning studies and used for the recalculation of its downlink beam.

2.5.2 Revised downlink test points for MCO

For the reason mentioned in section 2.3 above, IRG-4 decided to remove from the downlink Plan one test point of Monaco located at 46N00 5E60.

2.5.3 Revised downlink test-points for RUS

The Administration of Russia requested two new downlink test points (42.42° N, 130.62° E and 46.02° N, 143.42° E) to be added to its beam RUS-4 in order to cover its territory (Primorsky) more properly (see also Document GTE99-3/11). IRG agreed that this proposal should remain in the replanning studies. Japan, China and Korea agreed with this proposal under the following conditions:

1) no unacceptable interference to Japanese FSS, Chinese FSS, and Korean FSS;

2) simulated shaped beam or other means should be used for reducing, to the maximum, the radiation over the territory of other countries.

After IRG-4, the Administration of Russia confirmed its request which was implemented in the replanning studies. The elliptical beam RUS00400 was thus recalculated.

2.6 Ellipse calculations

Ellipses are recalculated only if orbital positions change or if test points are changed. If there are no changes to orbital positions or test points, ellipses of the WRC-97 Plan are used.

The ITU/EBU computer program will be used for any necessary calculations including the maximum co-polar antenna gain and, in accordance with WRC-97 practice, a satellite antenna pointing accuracy of 0.1° will only be used in calculating ellipses and a minimum half-power beamwidth of 0.6° is assumed as specified in Appendices S30 and S30A.

2.6.1 Calculation of ellipse parameters for the Monaco downlink beam

The Administration of Monaco requested the new orbital position (13° W) for the study. In order not to change the beam dramatically, one of the downlink test points (5.60° E, 46.0° N) which is located outside the beam area of the downlink beam in the WRC-97 Plan (i.e. close to the -9 dB gain contour) was not taken into account when new ellipse parameters were calculated as described in paragraph 2.6.

This course of action is in line with the IRG-4 decision to delete this downlink test point (5.60° E, 46.0° N) as indicated in section 2.5.2 .

2.7 Protection ratios

Studies which were performed up to GTE-3 used the following assumptions concerning protection ratios (identical to those used in the Article 4 procedure after WRC-97):

a) separate uplink and downlink replanning (i.e. EPM approach).

Except for notified assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau before 27 October 1997, the following protection ratios will apply:

b) downlink co-channel protection ratio: 24 dB;

c) downlink upper and lower adjacent channel protection ratio: 16 dB;

d) uplink co-channel protection ratio: 30 dB;

e) uplink upper and lower adjacent channel protection ratio: 22 dB.

For notified assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use was confirmed to the Bureau before 27 October 1997, the following protection ratios apply:

f) downlink co-channel protection ratio: 31 dB;

g) downlink upper and lower adjacent channel protection ratio: 15 dB;

h) uplink co-channel protection ratio: 40 dB;

i) uplink upper and lower adjacent channel protection ratio: 21 dB.

The interference calculations were performed according to the calculation methods adopted by the RRB, as described in Document GTE99-2/3.

IRG determined that further studies using 27 MHz all-digital emissions (except for notified assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use was confirmed to the Bureau before 27 October 1997) should be performed using the advice of JWP10-11S (see Document GTE99-3/6) i.e.:

- an overall co-channel protection ratio between digital emissions of 20 dB (i.e. 21 dB for the downlink and 27 dB for the feeder link) except for "existing" assignments mentioned above,
- an overall co-channel protection ratio for digital emissions with respect to "existing" analogue emissions of 23 dB (i.e. 24 dB for the downlink and 30 dB for the feeder link) and an adjacent protection ratio of 15 dB (i.e. 16 dB for the downlink and 22 dB for the feeder link) using the worst-case approach (see paragraph 2.2.2.1 of Attachment 1 of Document GTE99-2/2).

The protection ratios to be applied to "existing" systems (i.e., notified assignments that are in conformance with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau) are provided in Annex A. This in no way prejudices a decision of the Conference related to use of this criteria for future systems intended to replace these existing systems.

2.7.1 Negative Equivalent Protection Margin for "existing" systems in the WRC-97 Plan

Negative Equivalent Protection Margins of WRC-97 Plans for "existing" systems were kept because it is considered that those negative EPM were accepted together with the protection margins at that time when those assignments were successfully included in the plans or were brought into use.

2.8 Downlink e.i.r.p. levels and power density

Except for notified assignments which are in conformity with Appendices S30 and S30A, which have been brought into use and for which the date of bringing into use has been confirmed to the Bureau, the downlink e.i.r.p. to be used for each channel of a beam will be the minimum downlink e.i.r.p. of any channel of that same beam which existed in the WRC-97 Plan. For composite beams, the downlink e.i.r.p. in the direction of the test points relating to the envelope of such a beam should be that or close to that of the corresponding subsidiary beam[4].

For additional channels which are added in the course of the replanning exercise to the downlink beams whose national plan assignments (J) and modified national plan assignments (KOR) have been notified and brought into use and for which the date of bringing into use has been confirmed to the Bureau before 27 October 1997 (KOR11201, KO11201D and J 11100), the downlink e.i.r.p. level will be the level of the nearest channel of the WRC-97 Plan reduced by 5 dB (see paragraph 2.3 of Attachment C of the IRG-2 report).

This measure is taken in order to avoid having inconsistent values of e.i.r.p. for different channels and to facilitate the replanning studies. The minimum e.i.r.p. is chosen in order to ensure compatibility with other services.

The power density value is determined assuming a uniform power density over a 27 MHz bandwidth.

2.9 Minimum elevation angle

As defined in Section 3.12 of Annex 5 of Appendix S30.

[4] subsidiary beam = individual elliptical beam component of a composite beam.

The minimum elevation angle to be met within the downlink service area is assumed to be 20° in the replanning studies. In cases where a country has a lower elevation angle in the WRC-97 Plan, the actual elevation is taken and the possible service arc for the purposes of the replanning exercise is determined by any positive increase in elevation angle. A minimum elevation angle of 40° should be assumed for those downlink test points located in areas subject to high precipitation (rain-climatic zones M, N, P and Q).

2.10 Composite beams in replanning studies

Based on the conclusions of IRG-2 and IRG-3, in general, composite beams are created for Administrations which have more than one beam at a given orbital position in the current WRC-97 Regions 1 and 3 BSS Plan. According to the conclusions of IRG-3 and IRG-4, Administrations' preferences were generally taken into account in the studies for Australia[5], China, India, Saudi Arabia, the United States/American Samoa, and France/New Caledonia and Wallis and Futuna Islands. Annex C to this document contains the diagrams illustrating the -3 dB beam areas for Administrations which had downlink composite beams created for the initial studies. Annex D provides the diagrams of the feeder-link composite beams created for the feeder-link studies.

In order to evaluate whether or not these national preferences impose undue constraints on the replanning process, a comparison with respect to the Bureau's original suggestion was conducted. In regards to composite beams, IRG decided to proceed with the requests of Administrations, and to evaluate the results on a case-by-case basis, where required.

2.10.1 General definition of composite beams

Composite beams ("simulated shaped beams") have been formed by combining the existing elliptical beams of the relevant Administration at the orbit position in question.[6]

The orbital positions which were requested by Administrations or the default orbital positions of the WRC-97 Plan were used for the ellipses that make up the composite beam.

Because a "composite beam" is a *de facto* single beam ("simulated shaped beam"), the same set of channels will be used throughout the area covered by the composite beam.

For the downlink C/I calculation, the highest downlink e.i.r.p. of the composite beam will be assumed in the direction of each visible receiving earth station. In the feeder-link Plan, the highest receiving space station antenna gain value of the composite beam will be assumed in the direction of each visible transmitting earth station.

2.10.2 Specific considerations concerning composite beams

2.10.2.1 Downlink situation of AUS

Taking into account a request from Australia, the beam and channel arrangement (6 channels per beam) in the WRC-97 Plan were included in the initial studies. In addition, Australia requested that its additional channels should be provided in national coverage beams.

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[5] See also section 2.10.2.1.

[6] The United States reserves its position regarding the composite beams for its territories.

However, this request has been referred to IRG for its consideration. In the studies performed before GTE-3, two composite beams were derived from the WRC-97 beams (as shown in Attachment 1 of Document GTE99-3/12), one at each of the two orbital positions, with four channels per beam were included (see paragraph 3.3 of Document GTE99-3/11).

In line with the IRG-4 decision referred to in section 2.4.4.1 above, and after further clarifications from Australia, two new composite beams with national coverage are created for Australia, one at 152° E using feeder-link beam AUS0040A and downlink beams AUS0040A, AUS0040B, AUS0040C, AUS0070A, AUS0090A and AUS0090B, and one at 164° E using feeder-link beam AUS0070A and downlink beams AUS0040A, AUS0040B, AUS0040C, AUS0070A, AUS0090A and AUS0090B (see Attachment 1).

2.10.2.2 Downlink situation of CHN

Taking into account a request from China, the composite beams and elliptical beams as shown in Attachment 1 were used in the initial studies. There is one composite and one elliptical beam at orbital position 62° E, one composite and one elliptical beam at orbital position 79.8° E, and two composite beams at orbital position 92° E (see paragraph 3.4 of Documents GTE99-3/11 and GTE99-4/13).

In order to reduce excessive overlaps between the different composite beams at each of the different orbital positions and to cover the Chinese territory appropriately, some of the test points of a number of beams (CHN15400, CHN15500, CHN15600, CHN15700, CHN15800, CHN15900 and CHN16100) have been modified and the orbital position of one beam (CHN15700) was changed from 62° E to 79.8° E.

- Test points at 42.8° N and 96.3° E, 34.3° N and 79° E, and 36.3° N and 90° E of beam CHN15400 were replaced with those at 44.29° N and 95.36° E, 35.3° N and 79° E, and 36.5° N and 89° E, respectively.
- A test point at 36.3° N and 90° E of beam CHN15500 was replaced with a test point at 35.3° N and 90° E and a new test point at 33.5° N and 79.5° E was added to that beam.
- Test points at 35.4° N and 108.5° E, 32.6° N and 105.2° E, and 31.7° N and 95.9° E of beam CHN15600 were replaced with those at 35.4° N and 105.5° E, 32.6° N and 100.2° E, and 34.7° N and 95° E, respectively.
- A test point at 33° N and 105.8° E of beam CHN15700 was replaced with a test point at 30° N and 105.8° E. Test points at 32.9° N and 105.8° E, and 31.5° N and 115.3° E of beam CHN15800 were replaced with those at 34.9° N and 105.8° E, and 33.5° N and 115.3° E, respectively.
- Test points at 31.5° N and 115.3° E, and 33.1° N and 109.5° E of beam CHN15900 were replaced with those at 29.5° N and 115.3° E, and 30.1° N and 109.5° E, respectively.
- Test points at 39.6° N and 120.2° E, 36° N and 115.4° E, and 37.4° N and 122.6° E of beam CHN16100 were replaced with those at 36.6° N and 120.2° E, 35.5° N and 115.4° E, and 35.4° N and 122.6° E, respectively.

The Administration of the People's Republic of China requested that a feeder-link beam covering the Chinese Mainland should be provided from three orbital positions. China then accepted BR's proposal as conveyed to them by correspondence (see resulting composite beams in Attachment 2).

2.10.2.3 Feeder-link and downlink situation of IND

Taking into account a request from India, the composite beams and elliptical beams as shown in Attachment 1 were used in the initial studies. There are two composite beams at orbital position 56° E and one composite beam and two elliptical beams at orbital position 68° E (see paragraph 3.6 of Document GTE99-3/11).

In order to reduce excessive overlaps between the different composite beams at each of the different orbital positions and to cover the Indian territory appropriately, some test points of a limited number of beams have been modified (IND04100, IND04200, IND04500 and IND04600). The orbital positions of beams IND04200, IND04600 and IND4800 were changed from 68° E to 56° E and those of beams IND03800 and IND04000 were changed from 56° E to 68° E.

- A test point at 19.0° N and 84.9° E of beam IND04100 was replaced with a test point at 17.8° N and 81.4° E of beam IND04600.
- A test point at 29.9° N and 74.5° E of IND04200 was replaced with a test point at 31.2° N and 79.0° E of beam IND03800.
- A test point at 21.6° N and 80° E of beam IND4500 was deleted from that beam and added to beam IND04600.

GTE-4 concurred with India's request to use for the above described beams both the 14 GHz and 17 GHz frequency bands, either alternatively or in combination for their feeder links.

[h]2.10.2.4 Downlink situation of the United States

According to a request from the United States, one downlink composite beam was modified by adding a downlink spot beam for American Samoa in order to reduce the sensitivity derived from a downlink test point outside the downlink beam area (i.e. 14 dB gain contour) (see paragraph 3.11 of Document GTE99-3/11).

IRG agreed that this arrangement would be used in the further replanning studies.

2.10.2.5 Downlink situation of F

According to a request from France, two downlink elliptical beams (WAL10200 and NCL10000) in the WRC-97 Plan were included without being grouped in the initial studies instead of the downlink composite beam.

The IRG agreed that this arrangement will be used in the further replanning studies.

With respect to the feeder-link situation, in both the study presented at GTE-4 and the study presented at IRG-5, a similar situation was assumed at the request of France, i.e.: to define one feeder-link composite beam for WAL (composed of WRC-97 beams WAL10200 and WAL10201), and another feeder-link composite beam, not grouped with the first one, for NCL (composed of WRC-97 beams NCL10000 and NCL10001). See the corresponding 3 dB contours in Attachment 2.

IRG-5 is invited to confirm or otherwise this course of action which was not presented at IRG-4.

[h] Editorial Note - Deleted since now in line with general principles.

2.11 Orbital positions[7]

Based on the responses received from Administrations with respect to Circular Letter CR/117 of 1 March 1999, and/or the reminder of 15 March 1999, the orbital positions shown in Document GTE99-3/11 were used for Steps 1 to 3. Orbital positions of some beams were modified during initial Step 4 studies in order to accommodate these beams in the Plan.

Some Administrations strongly disagreed with the results after Step 4 and requested that their preferred orbital positions be maintained. All Administrations whose specific requests cannot be met in the replanning exercise will be contacted by the Bureau individually. If the request is maintained, every effort will be undertaken in order to satisfy the requirements of the Administration concerned.

This course of action was implemented in the replanning studies prior to GTE-4.

At the request of the APT Group of Technical Experts (AGTE) from Region 3, GTE will use the default orbital positions proposed by AGTE in Document GTE99-4/9, 24 September 1999, as default orbital positions for Region 3 in the GTE replanning studies, unless a different preferred orbital position had been requested by an Administration in that Region in response to CR/117. The Region 3 Administrations for which a default orbital position was proposed by the AGTE which is different from that of Appendices S30 and S30A, will be consulted by the Bureau in order to confirm or otherwise this course of action, noting that absence of reply will mean agreement with the choice of orbital position indicated in Document GTE99-4/9. A Circular Letter will then be issued by the Bureau in order to inform all Administrations of the orbital positions used in the GTE replanning studies.

2.11.1 Countries/administrative regions covered by channels from two orbital positions in the WRC-97 Plan

Some countries/administrative regions (CHN/HKG, D, NZL, PNG) are covered by channels from two orbital positions in the WRC-97 Plan. In accordance with the IRG-3 conclusion, a separate beam for Hong Kong at 122° with 10 channels was included in the initial studies to determine if this beam causes any difficulties for the replanning. In case of Germany, New Zealand and Papua New Guinea, an ellipse and associated test points at one of their orbital positions were taken (D: 19° W, NZL: 158° E, and PNG: 128° E using test-points of PNG at 110° E).

2.11.2 Case of CHN/HKG

IRG-4 considered the report of GTE on this issue, and advised GTE to continue to take account of the request of China together with other requests from this Administration under the various steps of the replanning process. If there are any problems, GTE should consult the Administration concerned.

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[7] NOTE - During the GTE-3 meeting, the Syrian Administration emphasized the importance for each Administration to enjoy full freedom to select its existing nominal orbital position or to modify it to meet its requirements during the exercise. This should not necessarily be a nominal orbital position. It could be any angular value between nominal orbital positions.

2.11.3 New multinational beam and multiple orbital positions for D[8]

The Administrations of Germany, Austria, Switzerland and Liechtenstein requested to include ten channels per country with four new identical multinational beams covering their territories while deleting their national beams (see also Document GTE99-3/11). The Administration of Germany requested that in addition to the beam D 08700 at 19° W, the beam D2-216000 at 1° W continue to be taken into account in the replanning study until the final clarification of the inclusion of the multinational beams proposed by the Administrations of Germany, Austria, Switzerland and Liechtenstein.

IRG reviewed this request, and decided to continue with the existing planning approach. In addition, before the next meeting of IRG, IRG requested that GTE perform the study outlined in Annex B to determine the impact of the request from Germany, Austria, Switzerland and Liechtenstein on the replanning process. This study in no way should prejudice the decision of IRG that it may take at its next meeting. IRG will review the results of this study at its next meeting and determine how to proceed. IRG also agreed that any process within ITU should be open, transparent and non-discriminatory.

As for the multiple orbital positions for Germany under the existing planning approach, IRG decided that the basic study will be carried out using one orbital position for Germany with ten channels covering its national territory.

2.11.4 Request for collocation of orbital positions

In response to Circular Letter CR/117, some Administrations expressed their wishes to collocate their beams with the beams of certain other Administrations. If it is necessary to move one of these Administrations to another orbital location, the other Administrations who wish to be co-located should also be moved to the new location.

If a given number of Administrations insist on a given orbital position in which they are incompatible with one another, this shall in no way impose constraints on the replanning process or limit the capacity of other countries. The concerned countries have to accept any resulting interference or reduction in capacity.

2.11.5 Requested new beam(s)

The Bureau reported at GTE-4 that it had received a request from the Republic of Seychelles for the inclusion of a beam in the replanning studies under Resolution 532 (see Document GTE99-4/10). GTE considered the request and had no objections with it.

IRG-5 is invited to confirm or otherwise this course of action which was not presented at IRG-4.

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[8] The German Administration has agreed to the conclusions of IRG-4. However, it reserves its right to reiterate the request for including, into the planning exercises, both national beams of Germany as contained in Appendices S30 and S30A at two orbital positions when the results of the studies described in this section and their further treatment within the IRG are known.

2.12 "Existing systems"[9, 3]

Where an Administration has an "existing system" in the Plan and the Administration wishes to collocate its national beam with the "existing system", a new national beam with ten channels is created and grouped with the "existing system".

2.12.1 Case of E

New national downlink beam arrangements for Spain, E 12900 and CNR13000, with ten channels (ch. 21, 23, 25, 27, 29, 31, 33, 35, 37, 39 CL) with WRC-97 e.i.r.p., new protection ratios, digital modulation and MODRES receiving earth station antenna type, were created at orbital position 30° W. In order not to exceed a total of ten channels and to be compatible with the "existing" beams HISPASA4 and HISPA27D (ch. 23, 27, 31, 35, 39 CL) all Spanish beams were grouped.

A similar course of action was taken with respect to the feeder-link beam arrangements for Spain, E 12900 and CNR13000, which were created at orbital position 30° W with ten channels (ch. 1, 3, 5, 7, 9, 11, 13, 15, 17, 19 CR), with new protection ratios, digital modulation and with MODRSS receiving space station antenna type and MODTES transmitting earth station antenna type.

2.12.2 Case of J

A new national downlink beam for Japan, J 11100, with ten channels (ch. 1, 3, 5, 7, 9, 11, 13, 15, 17, 19 CR) with reduced e.i.r.p., new protection ratios, digital modulation and MODRES receiving earth station antenna type, was created at orbital position 110° E. In order not to exceed a total of ten channels and to be compatible with the "existing" beam J 11100, now renamed J 1110E, at 110° E (ch. 1, 3, 5, 7, 9, 11, 13, 15 CR) and with "existing" beam 000BS-3N at 109.85° E, all Japanese beams were grouped.

A similar course of action was taken with respect to the feeder-link beam for Japan, J 11100, which was created at orbital position 110° E with ten channels (ch. 1, 3, 5, 7, 9, 11, 13, 15, 17, 19 CR), with new protection ratios, digital modulation and with MODRSS receiving space station antenna type and MODTES transmitting earth station antenna type.

2.12.3 Case of KOR

A new national downlink beam for the Republic of Korea, KOR11200, with ten channels (ch. 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 CL) with reduced e.i.r.p., new protection ratios, digital modulation and MODRES receiving earth station antenna type, was created at orbital position 116° E (see also section 2.8 above). In order not to exceed a total of ten channels and to be compatible with the "existing" beams KO11201D and KOR11201 (ch. 2, 4, 6, 8, 10, 12 CL) all beams were grouped. Because the orbital position of the national beam was changed from 110° E to 116° E, new ellipse parameters were calculated as described in section 2.6 above.

Despite the fact that the feeder-link parts of the KOREASAT-1 system are using the 14 GHz frequency band, a similar course of action was taken with respect to the feeder-link beam for the

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[9] See definition in section 2.2. Currently there are eleven systems which fall into this category (see Annex A).

[3] The Administrations of Morocco and Syria consider that the total number of channels per coverage area shall not exceed either ten channels or the number of channels of an "existing system" which is greater than 10. This is with the understanding that the planning conference will decide on the status of those channels of "existing systems" that exceed the number 10.

Republic of Korea, KOR11200, which was created at orbital position 116° E with ten channels (ch. 2, 4, 6, 8, 10, 12, 14, 16, 18, 20 CL at 17 GHz), with new protection ratios, digital modulation and with MODRSS receiving space station antenna type and MODTES transmitting earth station antenna type (see also section 2.4.4.5 above).

2.12.4 Case of S

As the "existing" downlink beam S 13902 (ch. 40 CL) is a multinational beam and the orbital position 5.2° E of "existing" downlink beams SIRIUS01 (ch 4, 8 CR) and SIRIUS02 (ch. 12, 16, 20 CR) is different from that preferred by the Administration of Sweden (5° E), the national downlink beam S 13800 of Sweden at 5° E is treated together with national beams of other Administrations with WRC-97 e.i.r.p., new protection ratios, digital modulation and MODRES receiving earth station antenna type.[10]

A similar course of action was taken with respect to the feeder-link beam for Sweden, S 13800, which was treated at 5° E, with ten channels, with new protection ratios, digital modulation and with MODRSS receiving space station antenna type and MODTES transmitting earth station antenna type.

The e.i.r.p. of the "existing" downlink beam S 13902 (ch. 40 CL) was reduced from 68.2 dBW to 63.2 dBW which is the value notified by the Administration of Sweden.

2.12.5 Case of NOR

Downlink beam NOR12102 is no longer considered as "existing" orbital position 5° E as agreed by the Administration of Norway.

According to the request from the Administration of Norway, a new national beam NOR12000 was created at orbital position 0.8° W. This beam has been assigned ten channels (ch. 22, 24, 26, 28, 30, 32, 34, 36, 38, 40 CR) with WRC-97 e.i.r.p., new protection ratios, digital modulation and MODRES receiving earth station antenna type. In order not to exceed a total of ten channels within a sub-frequency band of 400 MHz, and in order to be compatible with some channels (ch. 24, 28, 32, 36, 40 CR) of the "existing" system BIFROST-2 at 0.8° W, beam of BIFROS22 of BIFROST-2 and beam NOR12000 were grouped. Because the orbital position of the national beam NOR12000 was changed from 5° E to 0.8° W, new ellipse parameters were calculated as described in section 2.6 above.

A similar course of action was taken with respect to the feeder-link beam for Norway, NOR12000, which was created at orbital position 0.8° W with ten channels (ch. 22, 24, 26, 28, 30, 32, 34, 36, 38, 40 CL) with new protection ratios, digital modulation and with MODRSS receiving space station antenna type and MODTES transmitting earth station antenna type.

2.12.6 Case of F

Beam F 09300 is no longer considered as an "existing" orbital position 19.0° W as agreed by the Administration of France. According to the request from that Administration, a new national beam F 09300 was created at orbital position 7.0° W and was treated together with national beams of other Administrations with reduced e.i.r.p., new protection ratios, digital modulation and MODRES receiving earth station antenna type. Because the orbital position of the national beam F 09300 was changed from 19.0° W to 7.0° W, new ellipse parameters were calculated as described in section 2.6 above.

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[10] Sweden reserves its position on the grouping of beams and on the selection of channels.

A similar course of action was taken with respect to the feeder-link beam for France, F 09300, which was created at orbital position 7.0° W with ten channels, with new protection ratios, digital modulation and with MODRSS receiving space station antenna type and MODTES transmitting earth station antenna type.

2.12.7 Case of LUX

Although the Administration of Luxembourg has not requested to move beam LUX11400 from orbital position 19.0° W to orbital position 19.2° E where its "existing" system DBL is located, for the replanning studies, beam LUX11400 has been moved to orbital position 19.2° E in order to be included successfully in the draft new Plan with ten channels (ch. 21, 23, 25, 27, 29, 31, 33, 35, 37, 39 CL), WRC-97 e.i.r.p., new protection ratios, digital modulation and MODRES receiving earth station antenna type. In order to be compatible with the same channels used by the "existing" system DBL, all beams of DBL and beam LUX11400 were grouped. Because the orbital position of the national beam LUX11400 was changed from 19.0° W to 19.2° E, new ellipse parameters were calculated as described in section 2.6 above.

Desipte the fact that the feeder-link part of the DBL system is not yet considered as an "existing" feeder-link system, a similar course of action was taken with respect to the feeder-link beam for Luxembourg, LUX11400, which was created at orbital position 19.2° E with ten channels (ch. 21, 23, 25, 27, 29, 31, 33, 35, 37, 39 CL) with new protection ratios, digital modulation and with MODRSS receiving space station antenna type and MODTES transmitting earth station antenna type.

2.12.8 Case of RUS

New national downlink beams for Russia, RSTRSD11, RSTRSD12, with eight channels each (ch. 25, 27, 29, 31, 33, 35, 37, 39 CL and 26, 28, 30, 32, 34, 36, 38, 40 CR respectively) and with WRC-97 e.i.r.p., new protection ratios, digital modulation and MODRES receiving earth station antenna type, were created at orbital position 36° E. In order to be compatible with beams RSTRSA11 and RSTRSD11 (ch. 27, 31, 35, 39 CL), RSTRSA12 and RSTRSD12 (ch. 28, 32, 36, 40 CR) of the "existing" system RST-1, now renamed RSTREA11, RSTREA12, RSTRED11 and RSTRED12 respectively, all Russian beams at 36° E were grouped (see section 2.4.4.2 above).

A similar course of action was taken with respect to the feeder-link beams for Russia, RSTRSD11, RSTRSD12, which were created at orbital position 36.0° E with eight channels each (ch. 25, 27, 29, 31, 33, 35, 37, 39 CR and 26, 28, 30, 32, 34, 36, 38, 40 CL respectively) with new protection ratios, digital modulation and with MODRSS receiving space station antenna type and MODTES transmitting earth station antenna type.

The Russian Administration has requested to create beams RSTRSD11 and RSTRSD12, with only four channels each (ch. 25, 29, 33, 37 and 26, 30, 34, 38 respectively) and with reduced e.i.r.p., new protection ratios, digital modulation and MODRES receiving earth station antenna type.

GTE-4 agreed with the first assumption mentioned above.

2.12.9 National beams collocated with assignments that are included in the Appendix S30/S30A Plan resulting from the successful completion of the Article 4 procedures[3]

According to the request from the Administrations of France and Norway, new national beams F 09300 and NOR12000 were created at orbital positions 7° W and 0.8° W, respectively. The channels and polarization that were the same as those in the collocated assignments (those included in the Appendix S30/S30A Plan resulting from the successful completion of the Article 4 procedures) are considered first as candidate channels[11]. However, IRG concluded that in the follow-up studies, these requests for co-location should no longer be pursued.

2.13 Multinational beams[12]

In accordance with the conclusion of IRG-3, multinational beams for the following Administrations are maintained in the studies with the following number of channels. The "existing" (as defined in section 4.2 of Document IRG99-4/18) multinational beams will be treated in Step 3. The other multinational beams in the WRC-97 Plan will be treated in Step 4, or later steps.[13]

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[3] Administrations of Morocco and Syria consider that the total number of channels per coverage area shall not exceed either ten channels or the number of channels of an "existing system" which is greater than 10. This is with the understanding that the planning conference will decide on the status of those channels of "existing systems" that exceed the number 10.

[11] Norway reserves its position on the selection of channels.

[12] Sweden and Norway reserve their position on this section.

[13] In so doing, Morocco does not accept in any way that protection of these "existing" multinational beams places any undue constraints on the replanning process. In addition, Lao P.D.R. expressed its view that under no conditions the number of channels in a multinational beam shall exceed the number of channels assigned to these beams in the 1997 Plans.

	No. of channels of WRC-97 Plan		No. of channels in replanning studies	
	national beam	multinational beam	national beam	multinational beam
ARS	5	1	10	1
CVA	4	1	10	1
DNK	3	2	10	2
DNK/FRO	-	2	10	2
FIN	3	2	10	2
ISL	5	3	10	3
NOR	3	2	10	2
S	3	2	10	2
SYR	4	1	10	1
TUN	4	1	10	1

2.14 Application to feeder-link studies

In the absence of further guidance, technical assumptions and methodologies adopted for the downlink replanning exercises should be applied in a similar way and as far as practical to the subsequent feeder-link replanning exercises. Initial studies relating to the feeder-link replanning exercises will consider primarily the 17 GHz band.

GTE-4 concluded from preliminary feeder-link replanning studies undertaken by the Bureau at 17 GHz, that limitation to the 17 GHz frequency band may not provide all assignments with the required number of channels and protection.

As a consequence, GTE-4 concluded that the feeder-link replanning studies should consider both the 14 GHz and 17 GHz frequency bands. Furthermore, some Administrations expressed their specific preferences to use the 14 GHz frequency band in addition or alternatively to the 17 GHz frequency band.

Unless otherwise specified in the other sections of this document, the technical assumptions assumed are valid for both the feeder-link and the downlink studies.

Several beams have the same ellipse characteristics in the WRC-97 Plan. In order to simplify the replanning studies, only one version of them has been kept and renamed in order to avoid confusion, as shown in the following table (see also Attachment 3):

Name of WRC-97 Beams	Corresponding proposed new name
AFG24500 and AFG24600	AFG24546
ALG25100 and ALG25200	ALG25152
ARS00300 and ARS00275	ARS00375
INS02800 and INS03000 and INS03200	INS02832
INS03500 and INS03600	INS03536
LBY28000 and LBY32100	LBY28021

Annexes: 4

ANNEX A

(to Attachment 2)

Protection ratios applicable to "existing" systems in the replanning studies

	Type of emission of wanted "Existing" system	**Applicable protection ratios (overall/down/up in dB)**				**"Existing" systems included in the replanning studies**
		Interfering analogue		Interfering digital		
		Co-channel	Adjacent channel	Co-channel	Adjacent channel	
"Existing" systems prior to WRC-97	**Analogue**	30/31/40	14/15/21	30/31/40	14/15/21	[1]
(i.e. prior to 27/10/97)	**Digital**	30/31/40	14/15/21	30/31/40	[3]	[2]
"Existing" systems after WRC-97	**Analogue**	23/24/30	15/16/22	23/24/30	15/16/22	[4]
prior to WRC-2000	**Digital**	23/24/30	15/16/22	23/24/30	[3]	[5]

[1] BS-3N, HISPASAT-1 (27 MHz bandwidth, analogue modulation), Beam J 11100, KOREASAT-1, Beam S 13902, SIRIUS

[2] KOREASAT-1

[3] Value automatically determined, as a function of frequency difference, by the method of the draft revision of Recommendation BO.1293 (see Document GTE99-3/6 Annex 2).

[4] RST-1, BIFROST-2

[5] RST-1, DBL (downlink only), HISPASAT-1 (27 MHz bandwidth, digital modulation).

ANNEX B

(to Attachment 2)

The Administrations of Germany, Austria, Switzerland and Liechtenstein requested to include ten channels per country with four new identical multinational beams covering their territories while deleting their national beams (see also Document GTE99-3/11).

IRG agreed that these new multinational beams be included in the studies if this inclusion does not have any impact on the replanning itself, i.e. if this inclusion will not create more interference nor request more protection than the four national beams with ten channels.

In order to determine if the inclusion of these beams impact replanning, GTE was requested by IRG to perform the following studies:

1) continue the replanning exercises based on national coverages with ten channels (Principles 1 and 2 of Annex 1 of Resolution 532) at the same orbital position;

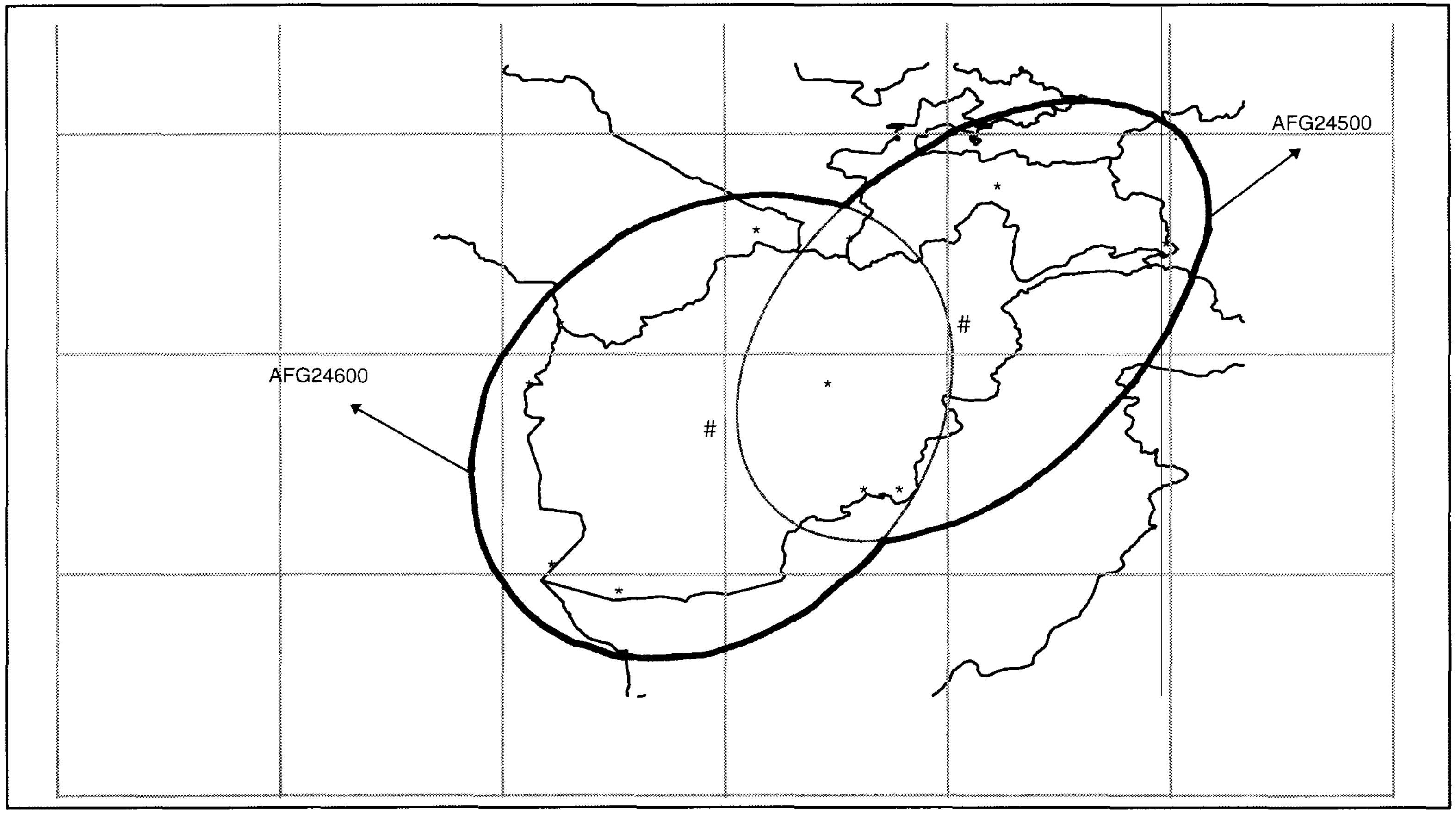
2) at the end of this exercise, four identical multinational beams covering the territory of Germany, Austria, Switzerland and Liechtenstein, each with ten channels will be substituted to the national beams of Germany, Austria, Switzerland and Liechtenstein and the e.i.r.p. of these multinational beams may be reduced if necessary to a level which does not create more interference than the previous situation (i.e. the four national beams with ten channels). The result of this modification i.e. the level of e.i.r.p. and the EPM associated with these new multinational beams is proposed to the Administrations of Germany, Austria, Switzerland and Liechtenstein for agreement or otherwise.

ANNEX C

(to Attachment 2)

The ellipses provided in this document with respect to composite beams in the draft new downlink Plan at 12 GHz are based on the default or preferred orbital positions, according to the case. When posting the information on the Web, the updated orbital positions and beam parameters will be provided.

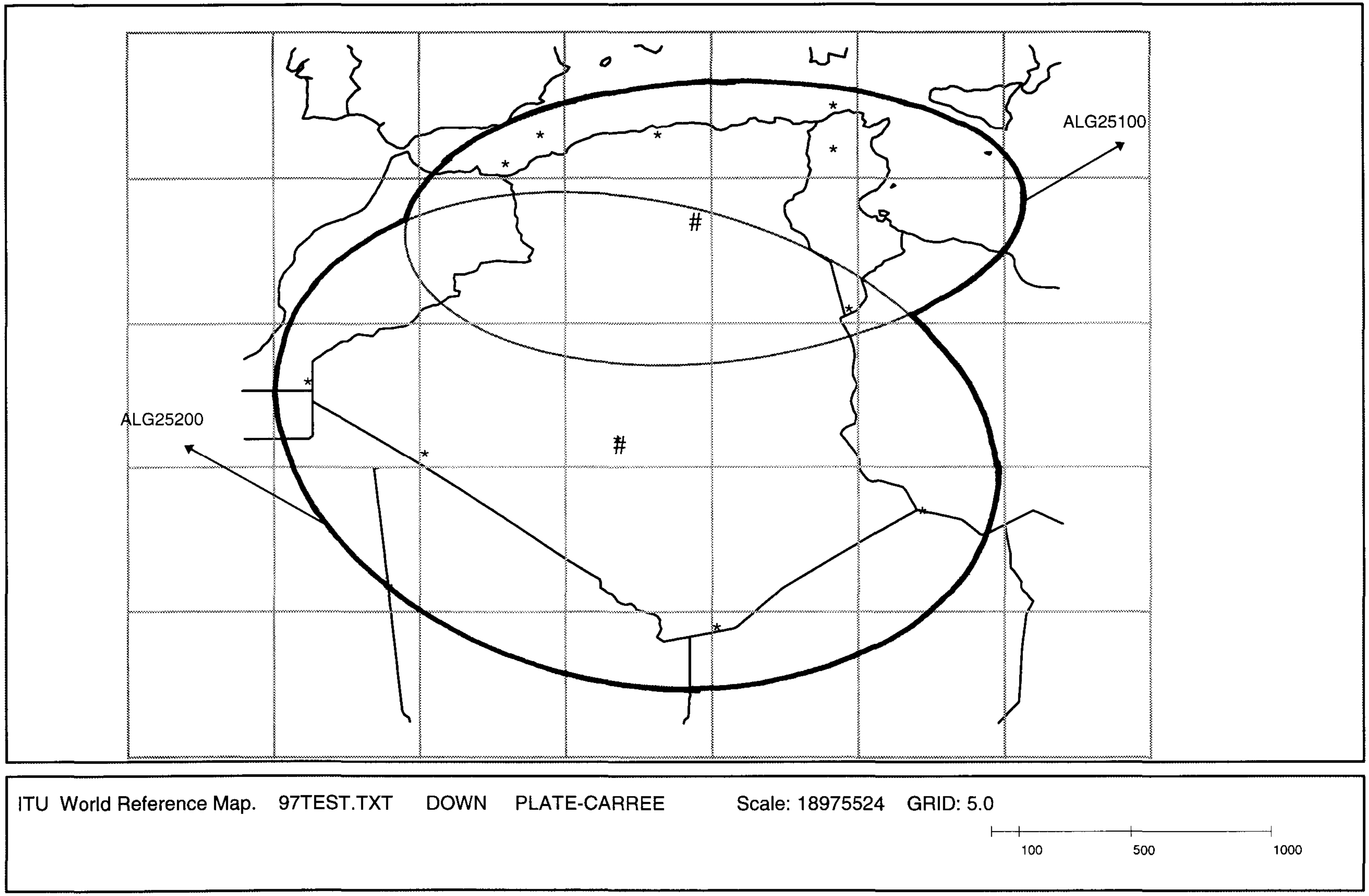
AFG (50.0 E)



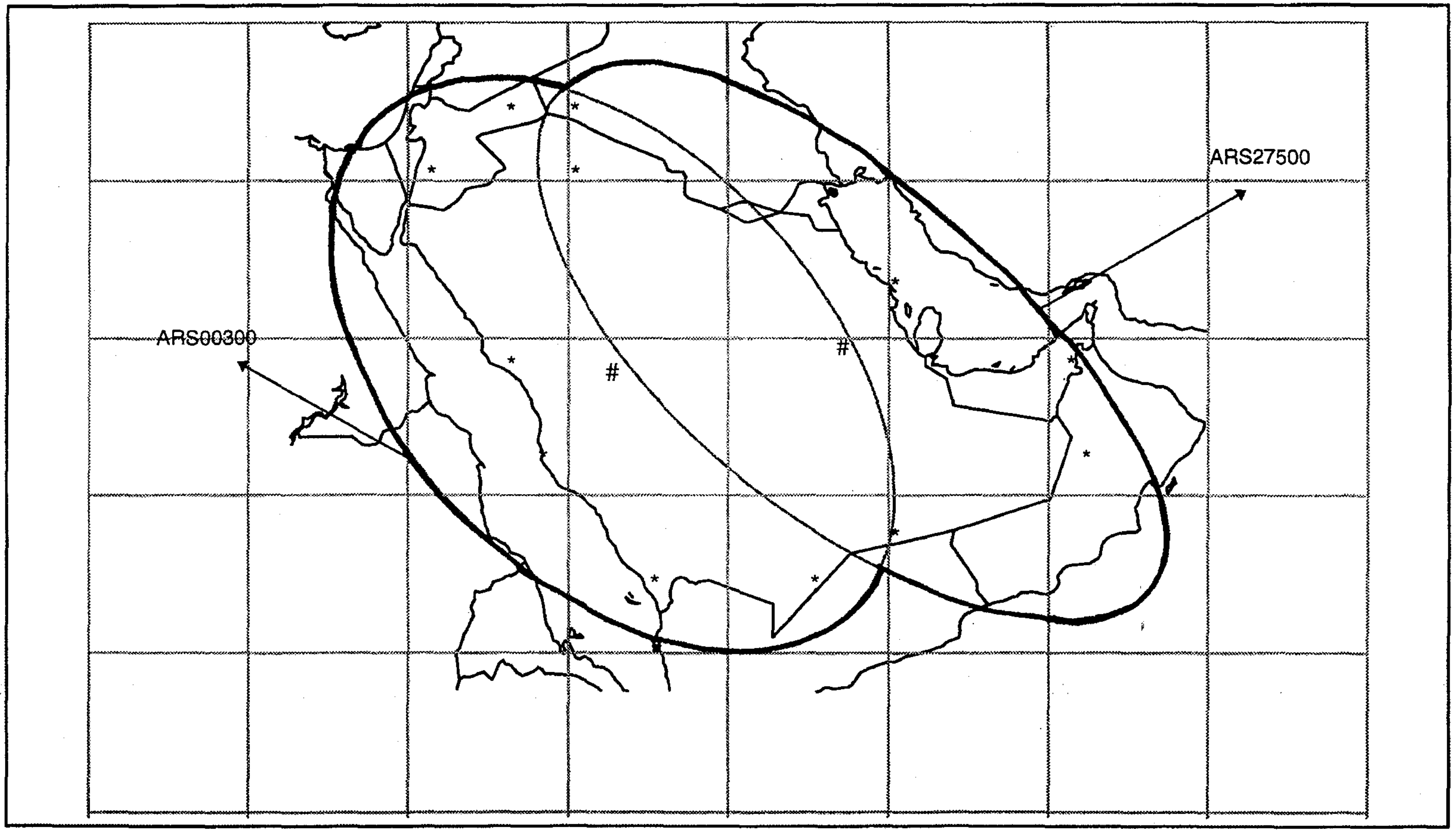
ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 12106531 GRID: 5.0

100 500 1000

ALG (25.0 W)


ALG25100
ALG25200
ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 18975524 GRID: 5.0
100
500
1000

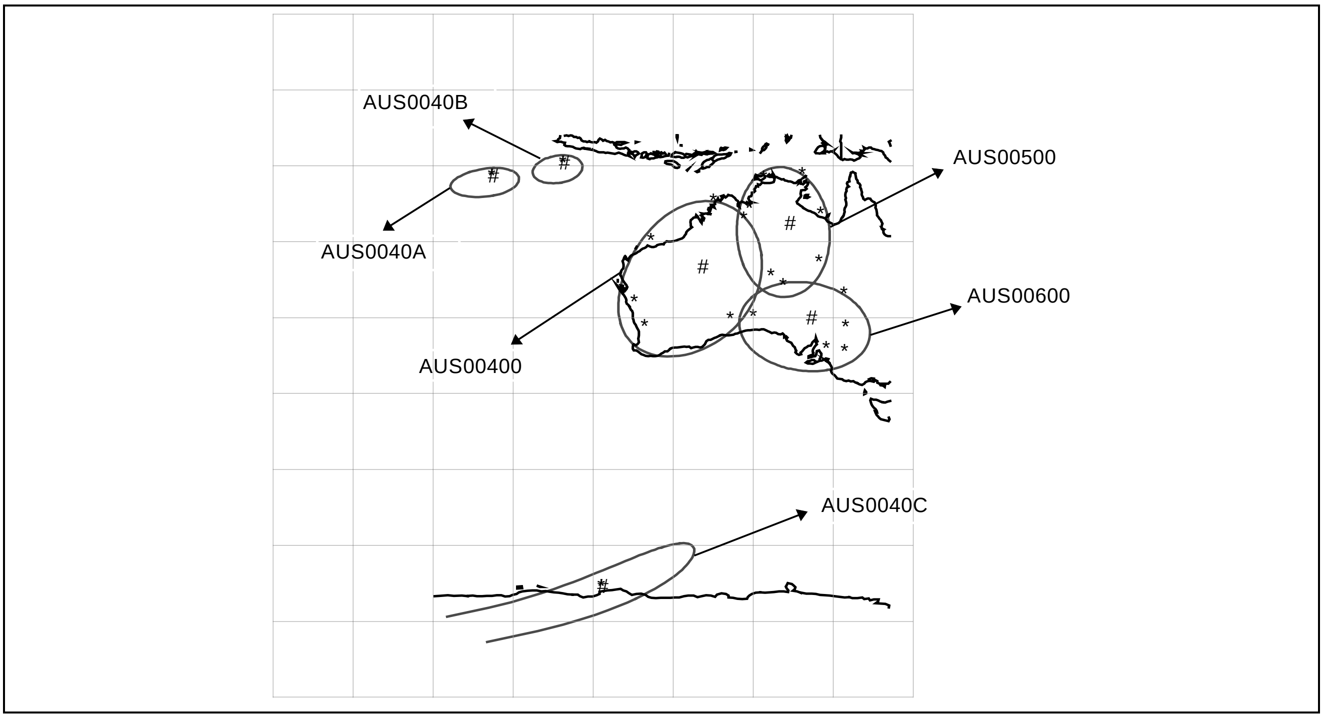
ARS (17.0 E)



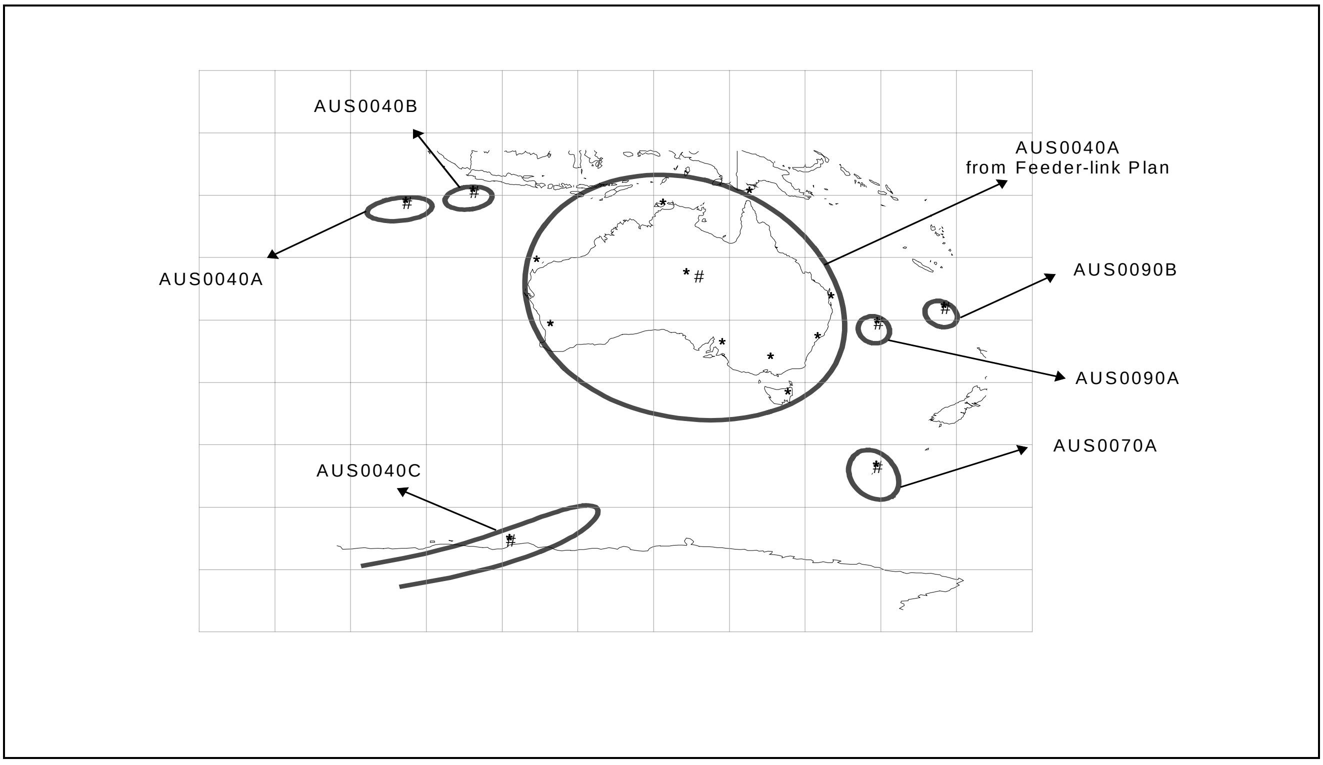
ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 18611974 GRID: 5.0

100 500 1000

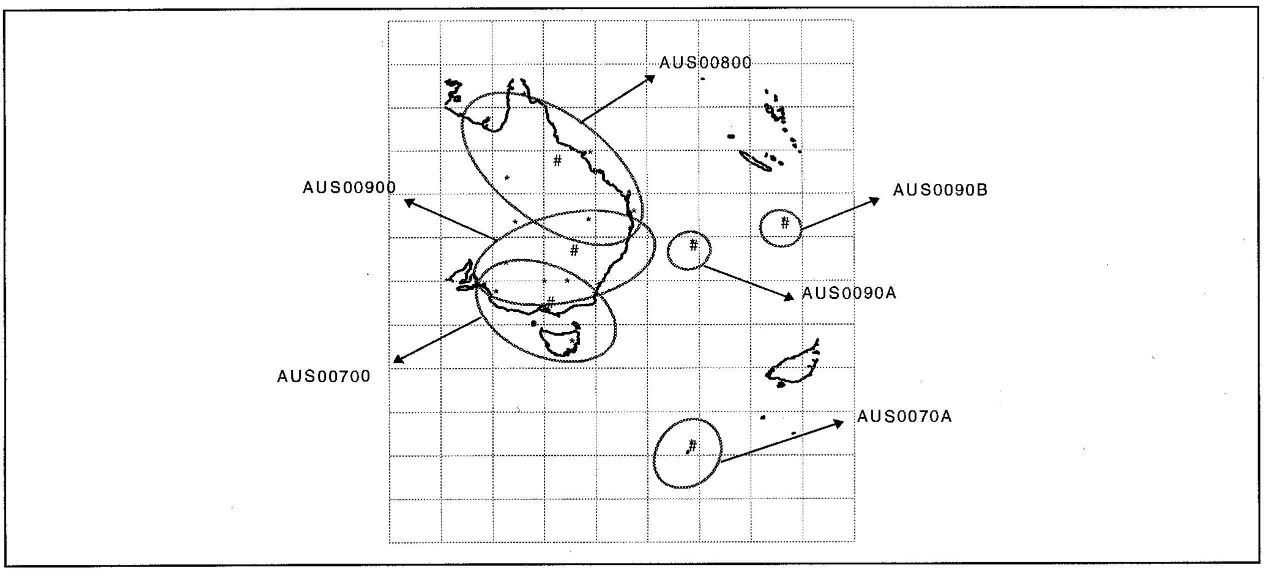
AUS (152.0 E)
ELLIPTICAL BEAMS FROM WRC-97 PLAN
FAISCEAUX ELLIPTIQUES DU PLAN DE LA CMR-97
HACES ELIPTICOS DEL PLAN CMR-97



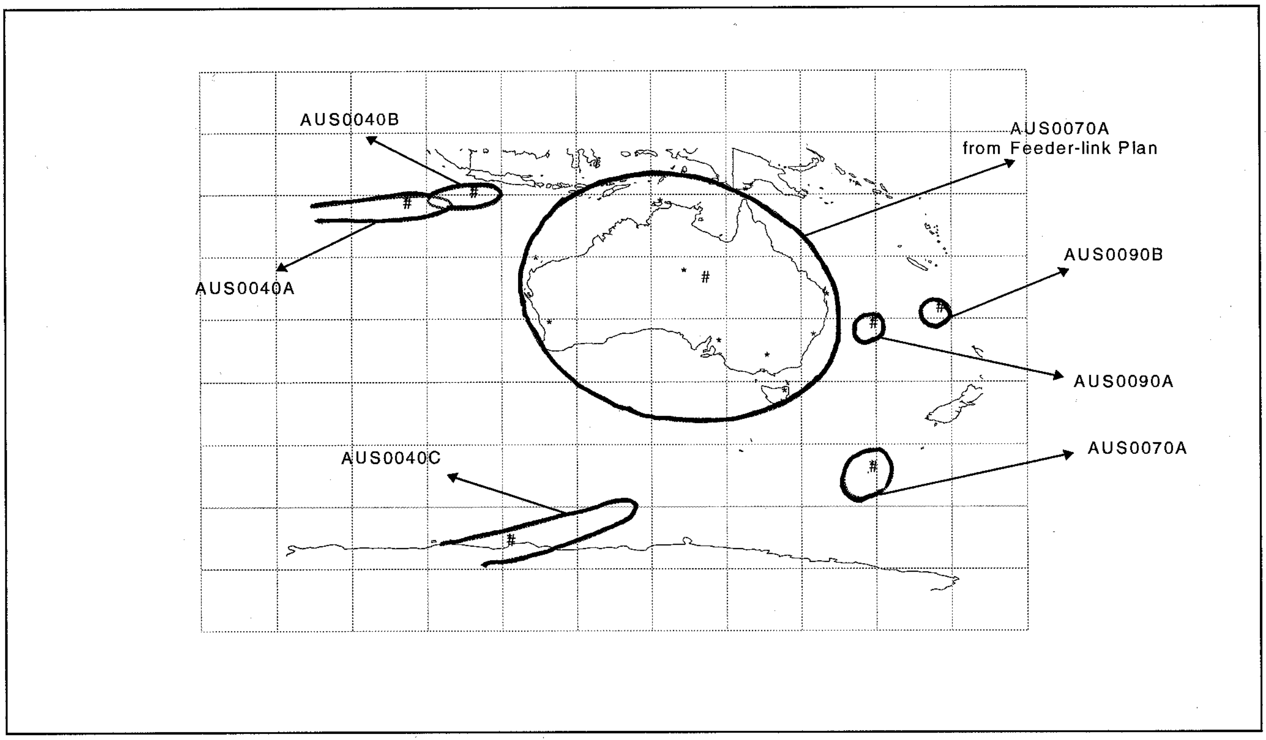
AND ADDITIONAL NEW COMPOSITE BEAM
ET NOUVEAU FAISCEAU COMPOSITE ADDITIONEL
Y HACE NUEVO ADICCIONALE COMPUESTO



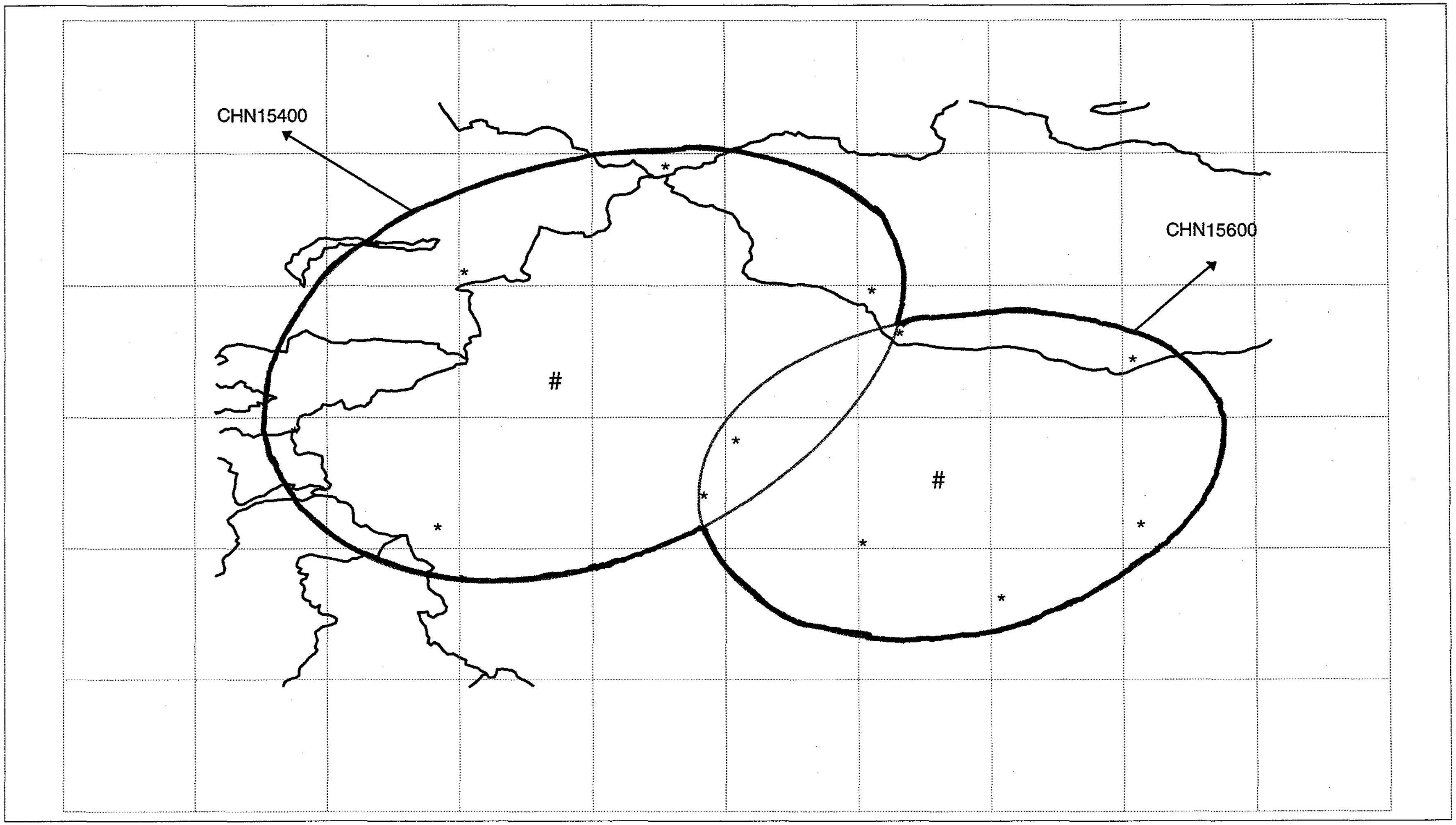
AUS (164.0 E)
ELLIPTICAL BEAMS FROM WRC-97 PLAN
FAISCEAUX ELLIPTIQUES DU PLAN DE LA CMR-97
HACES ELIPTICOS DEL PLAN CMR-97



AND ADDITIONAL NEW COMPOSITE BEAM
ET NOUVEAU FAISCEAU COMPOSITE ADDITIONEL
Y HACE NUEVO ADICCIONALE COMPUESTO



CHN (62.0 E)



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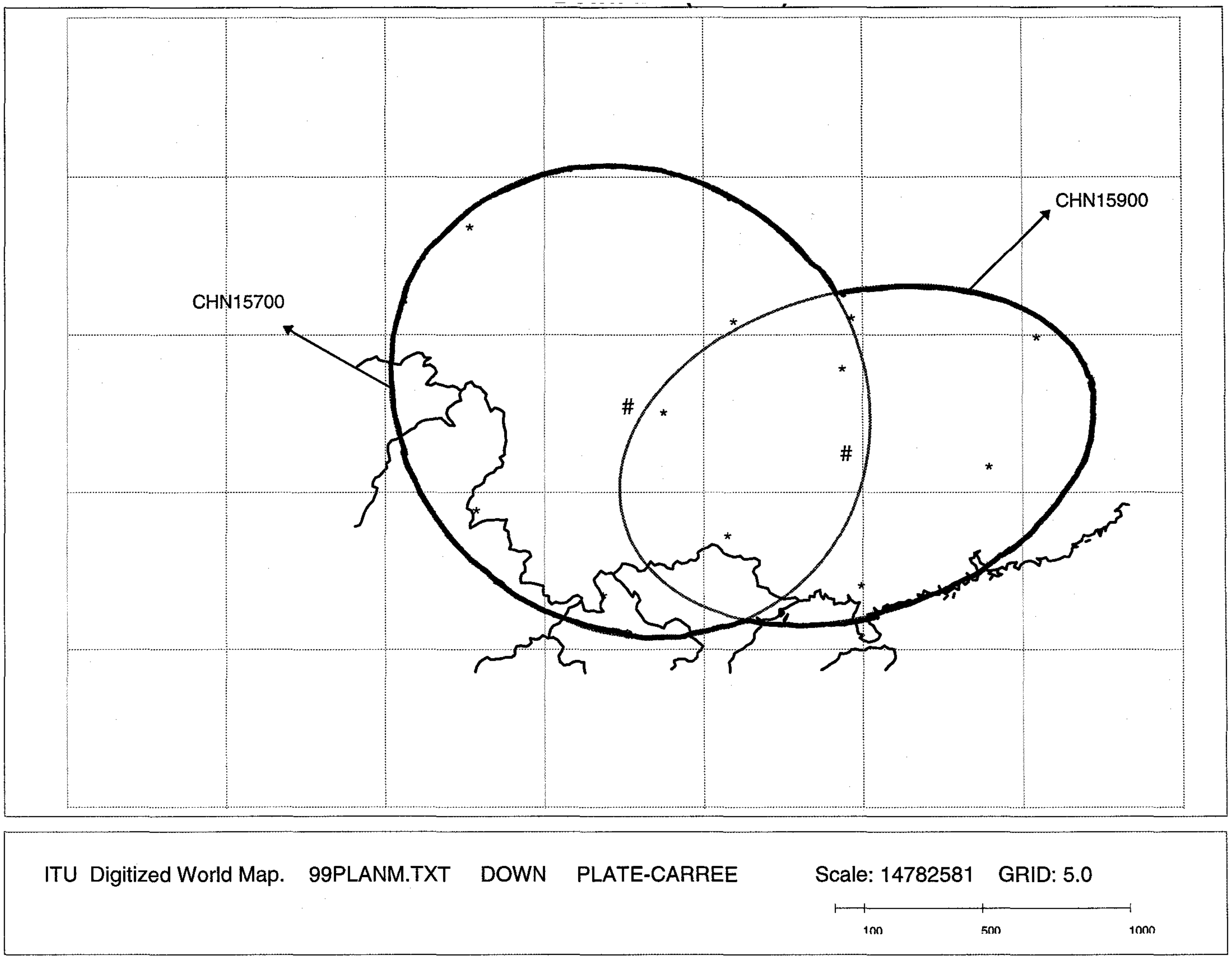
100 500 1000

CHN (79.8 E)


CHN15700
CHN15900
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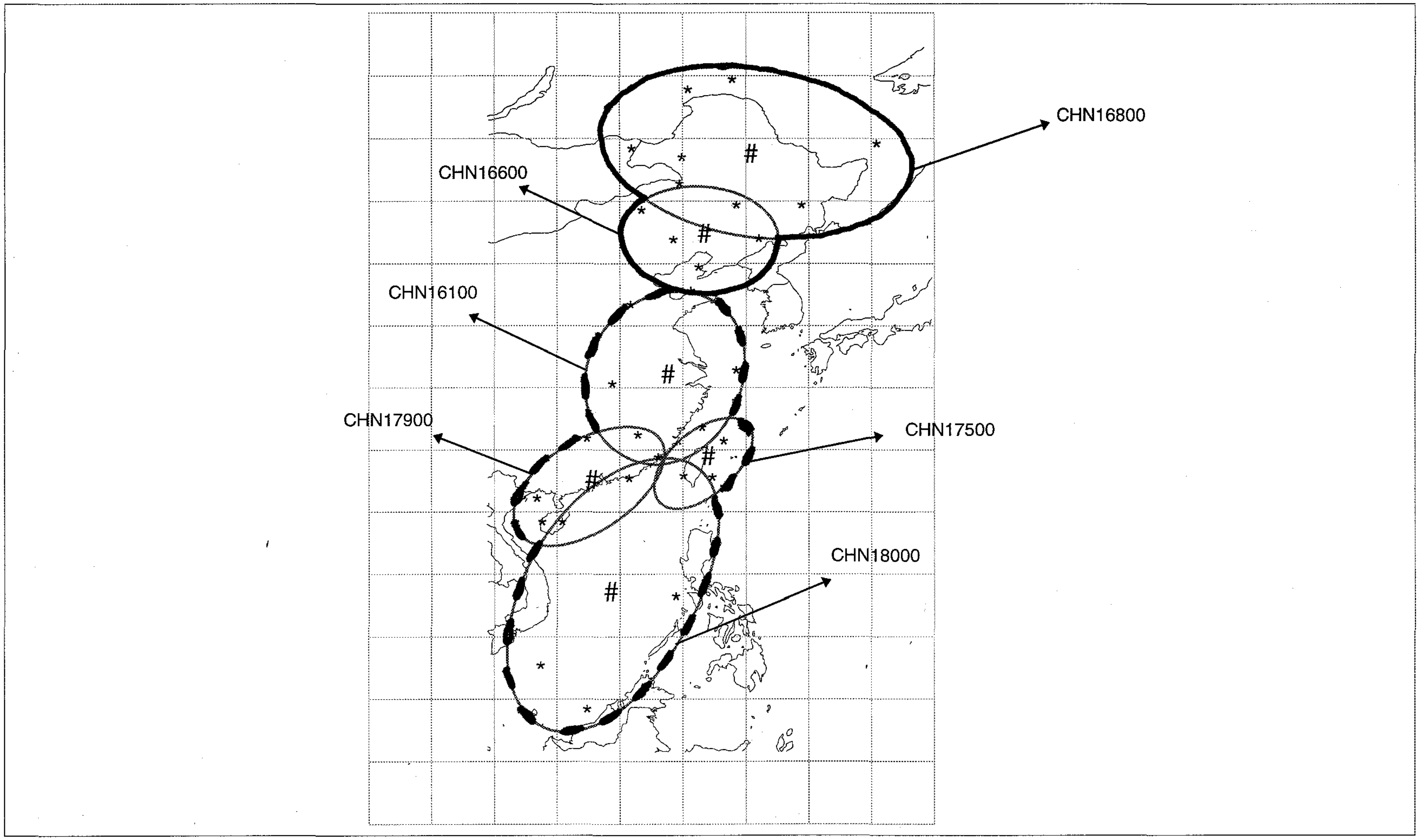
100
500
1000

CHN (92.0 E)



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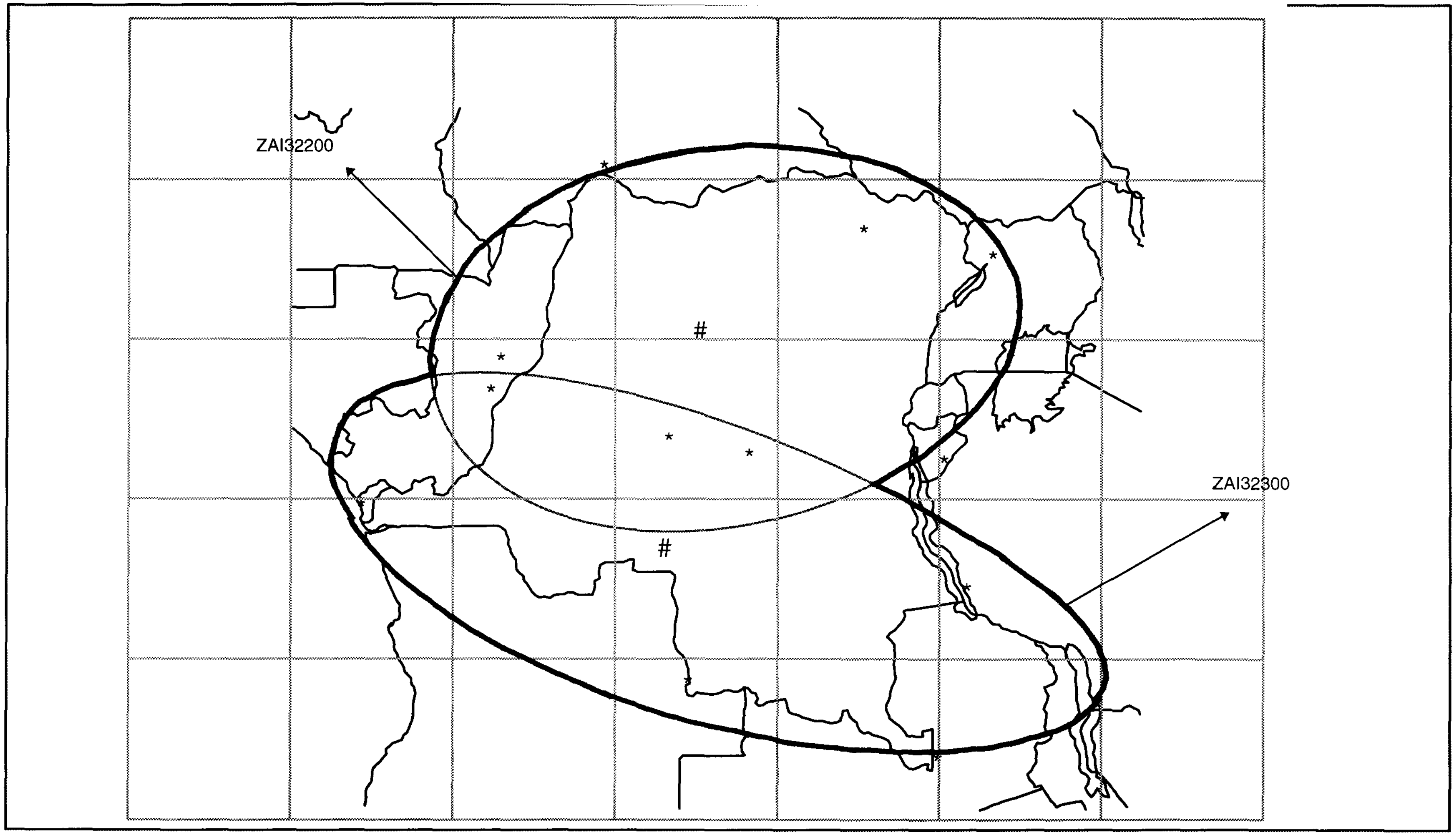
500 1000

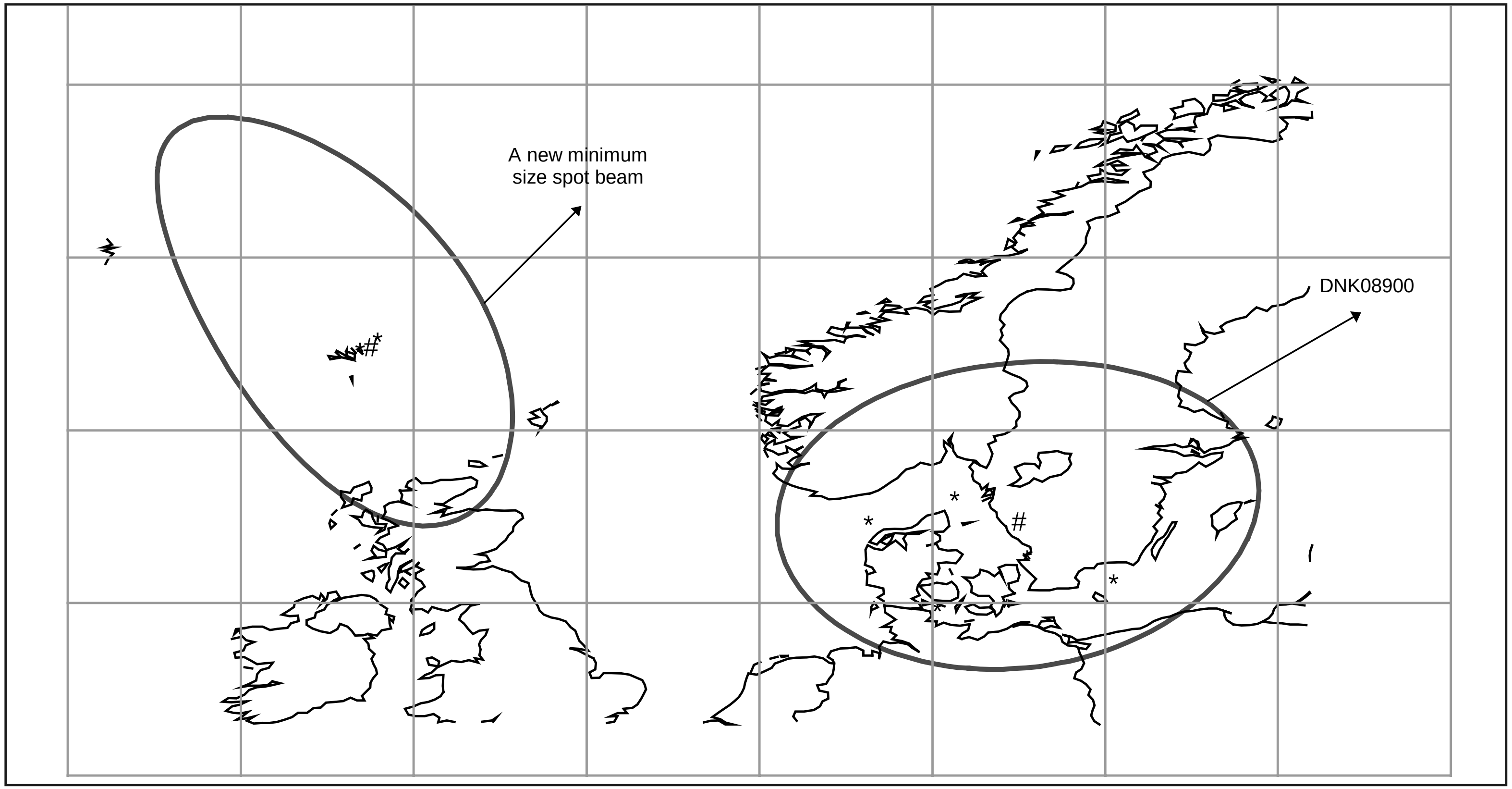
COD (19.0 W)



ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 18843526 GRID: 5.0

100 500 1000

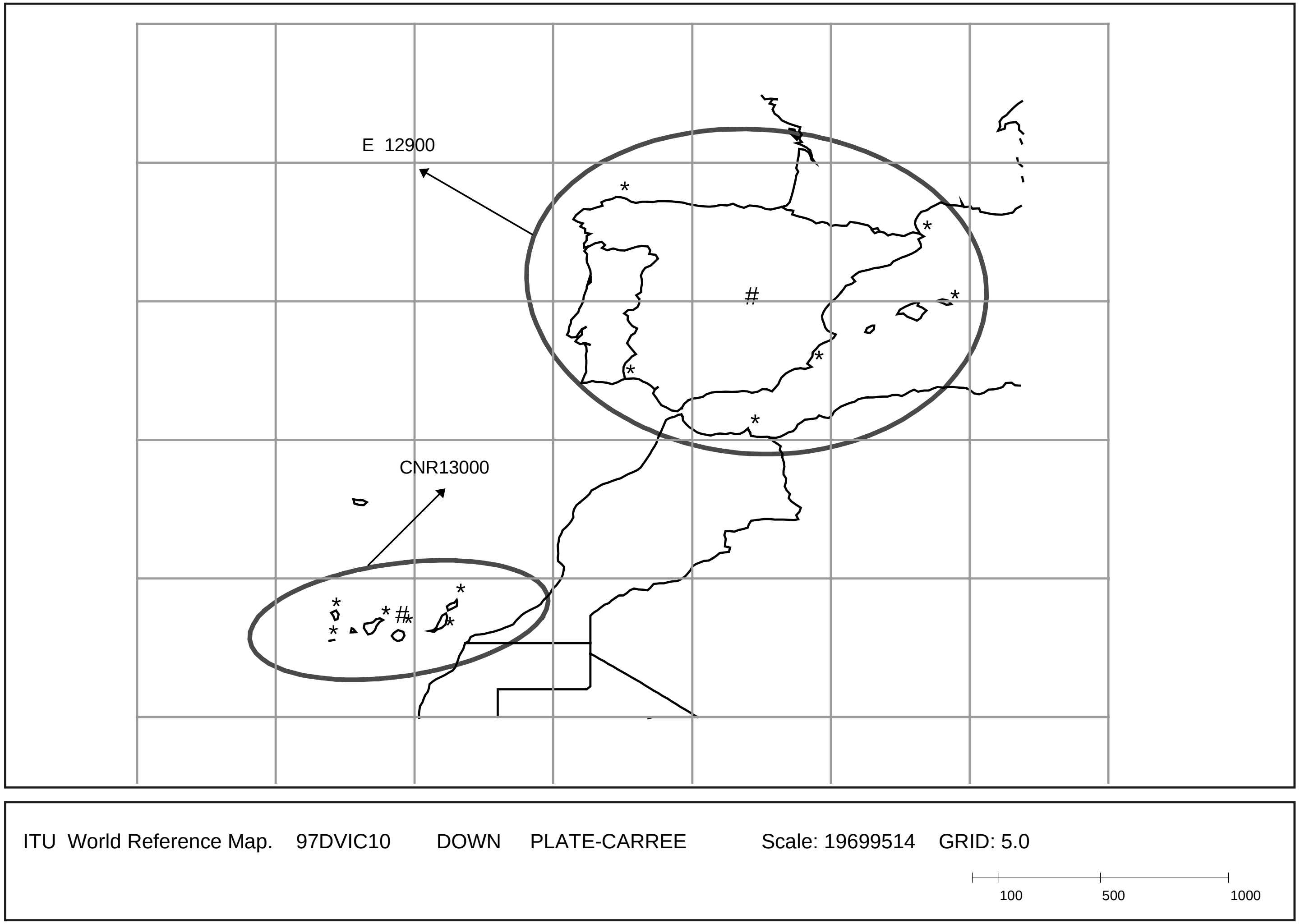
DNK (5.0 E)



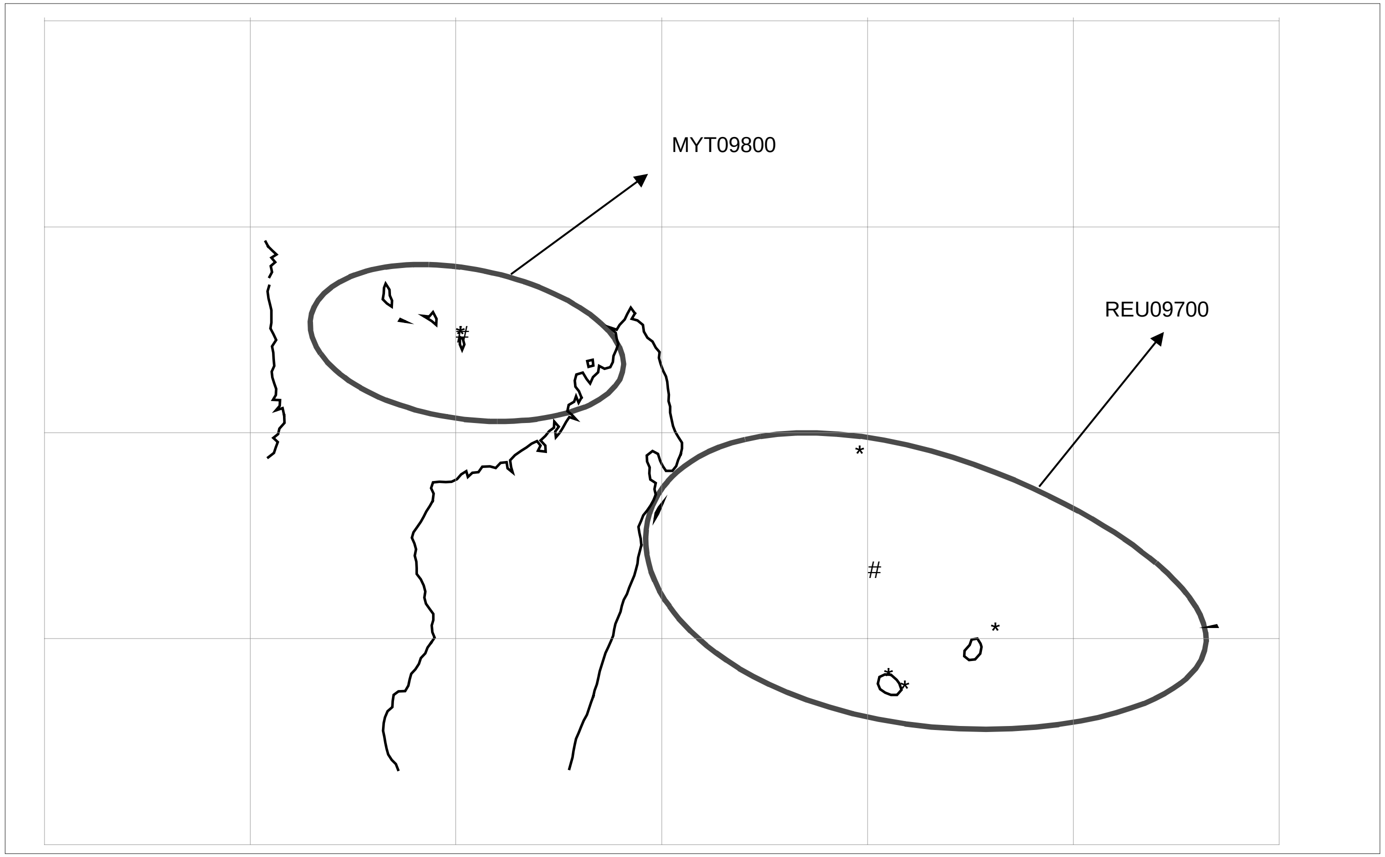
ITU World Reference Map. 97DVIC10 DOWN PLATE-CARREE Scale: 15981632 GRID: 5.0

100 500 1000

E (30 W)

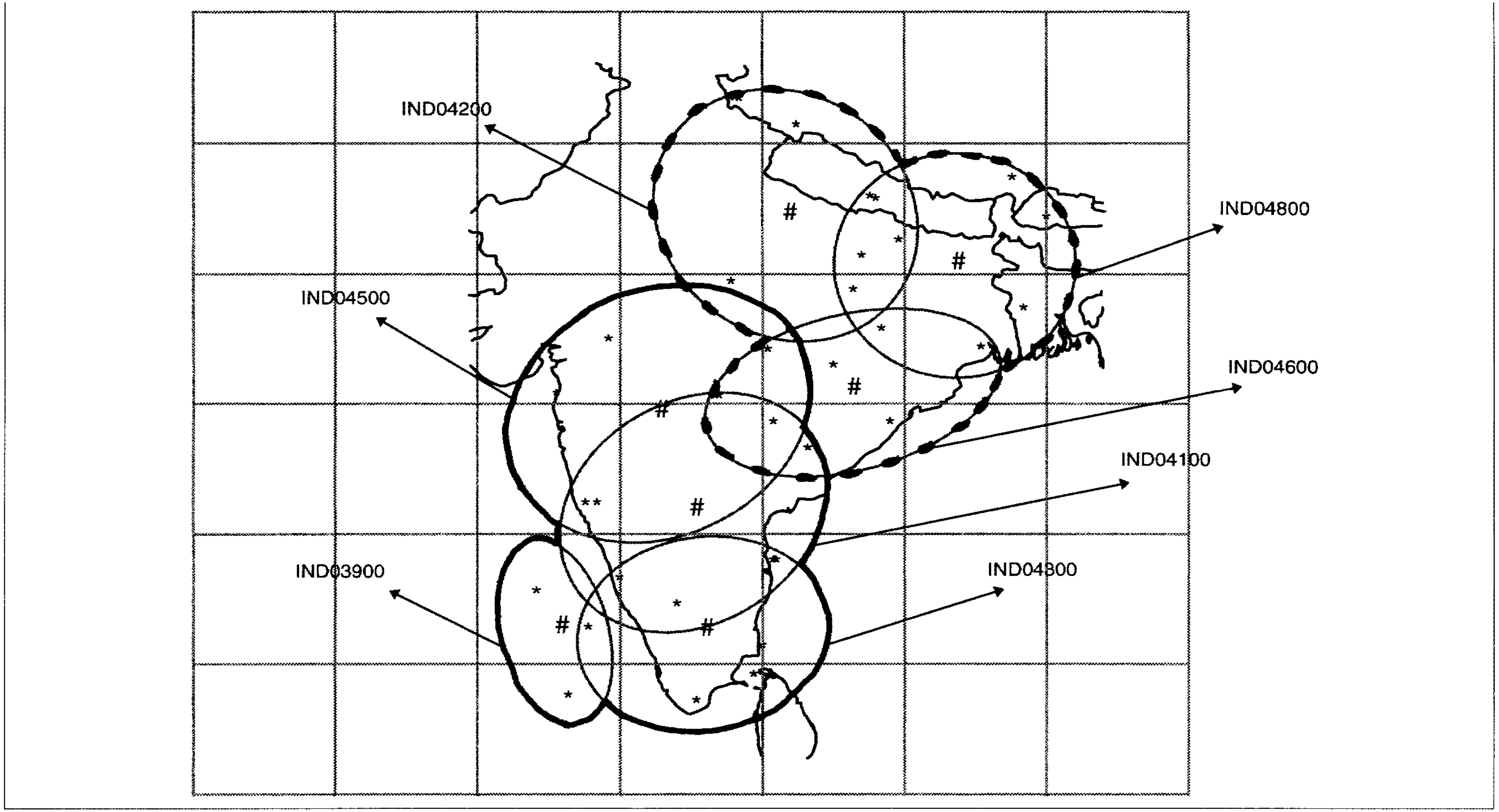

E 12900
CNR13000
ITU World Reference Map. 97DVIC10 DOWN PLATE-CARREE Scale: 19699514 GRID: 5.0
100
500
1000

F (MYT & REU) (7.0 W)



ITU Digitized World Map. 99PLANM.TXT DOWN PLATE-CARREE Scale: 12115881 GRID: 5.0

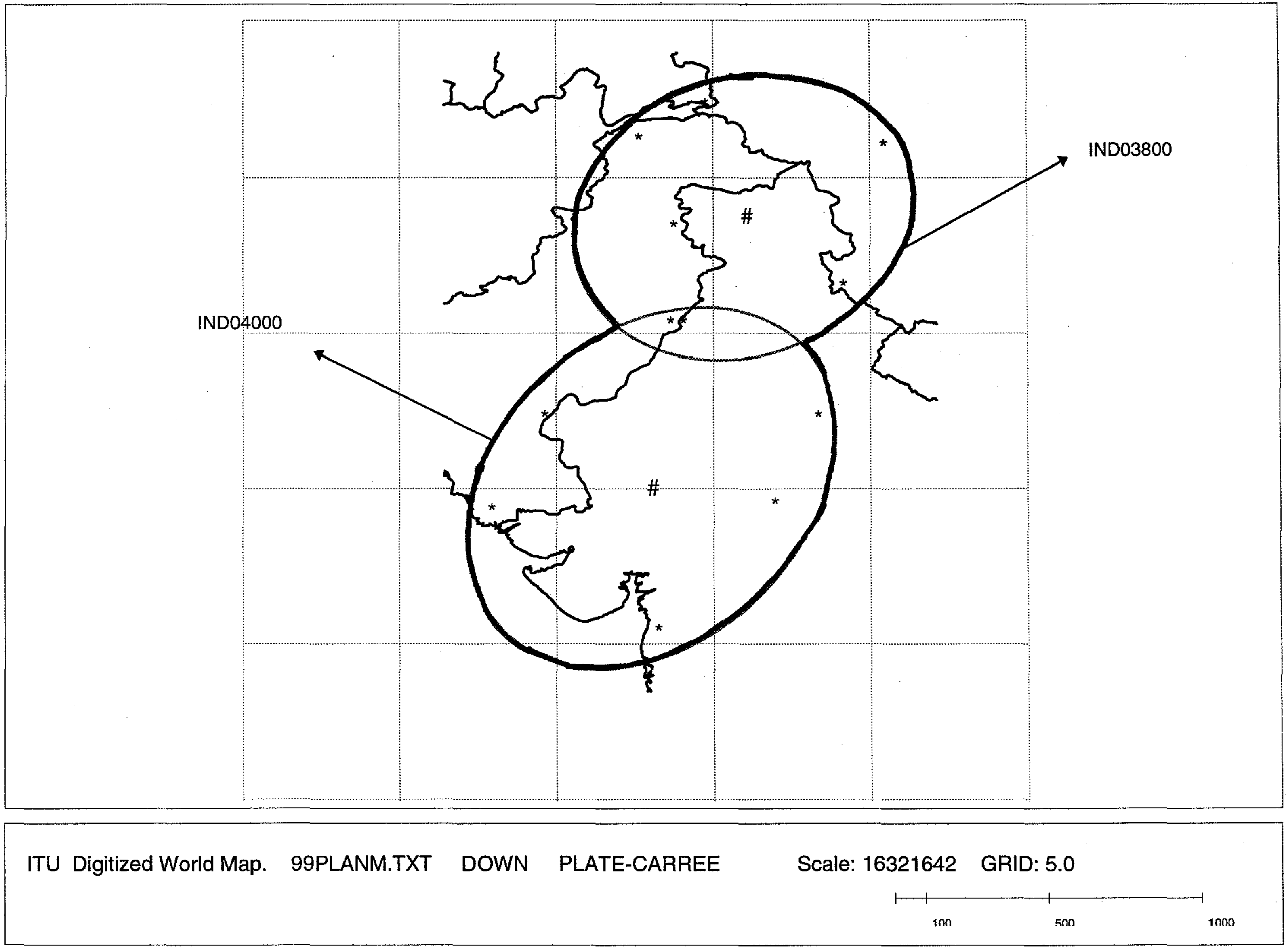
IND (56.0 E)



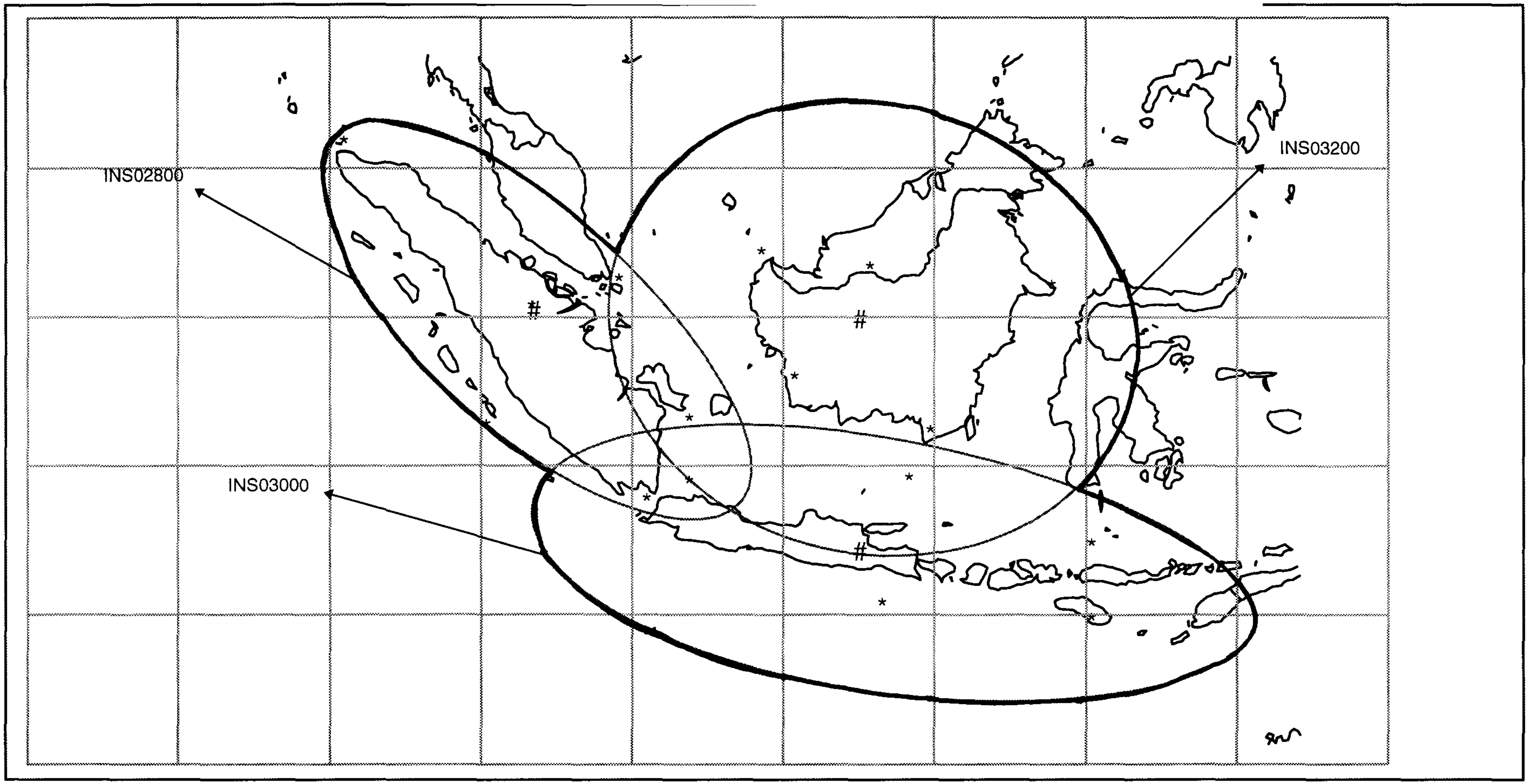
ITU Digitized World Map. 97DVXLCB.PLN DOWN PLATE-CARREE Scale: 22000526 GRID: 5.0

100 500 1000

IND (68.0 E)


IND03800
IND04000
ITU Digitized World Map. 99PLANM.TXT DOWN PLATE-CARREE Scale: 16321642 GRID: 5.0
100
500
1000

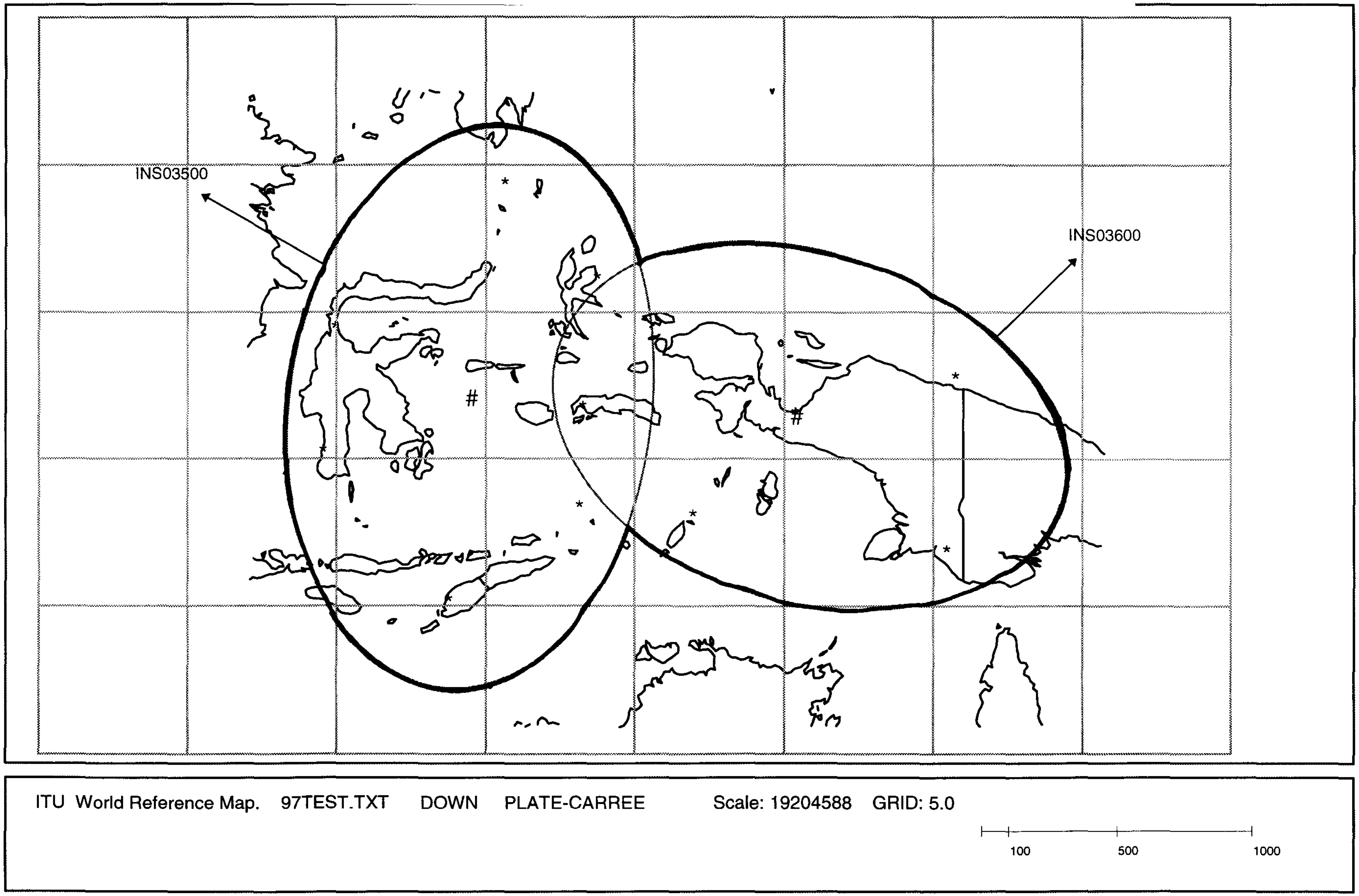
INS (80.2 E)



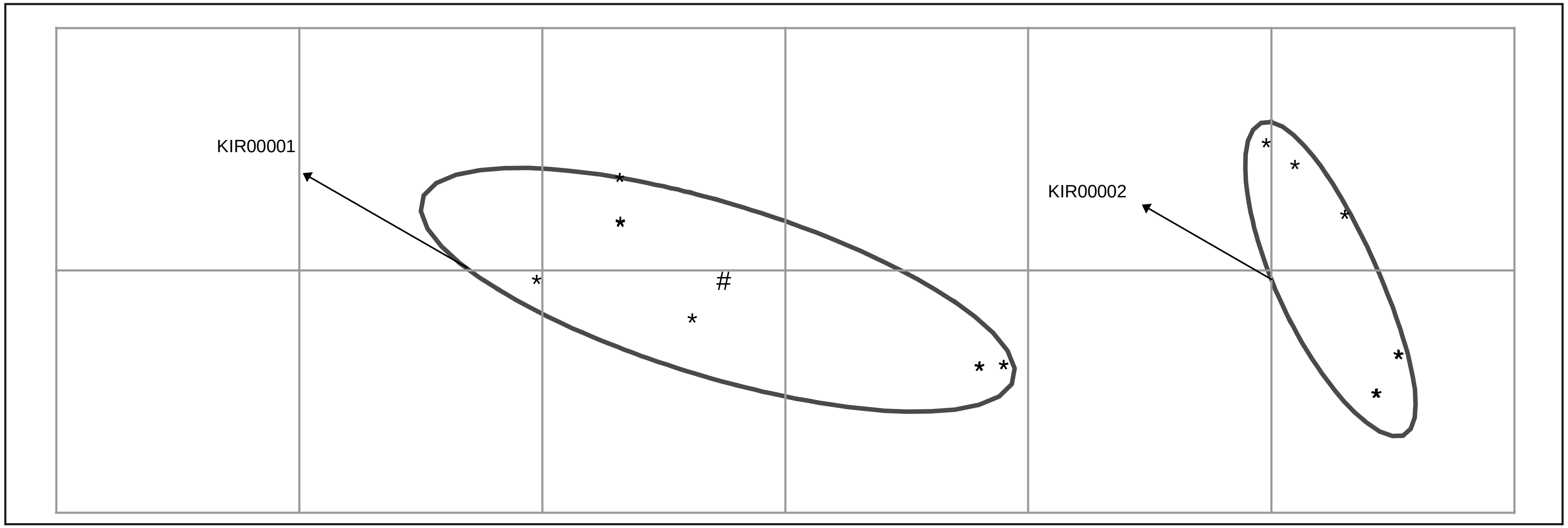
ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 19578114 GRID: 5.0

100 500 1000

INS (104.0 E)


INS03500
INS03600
ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 19204588 GRID: 5.0
100
500
1000

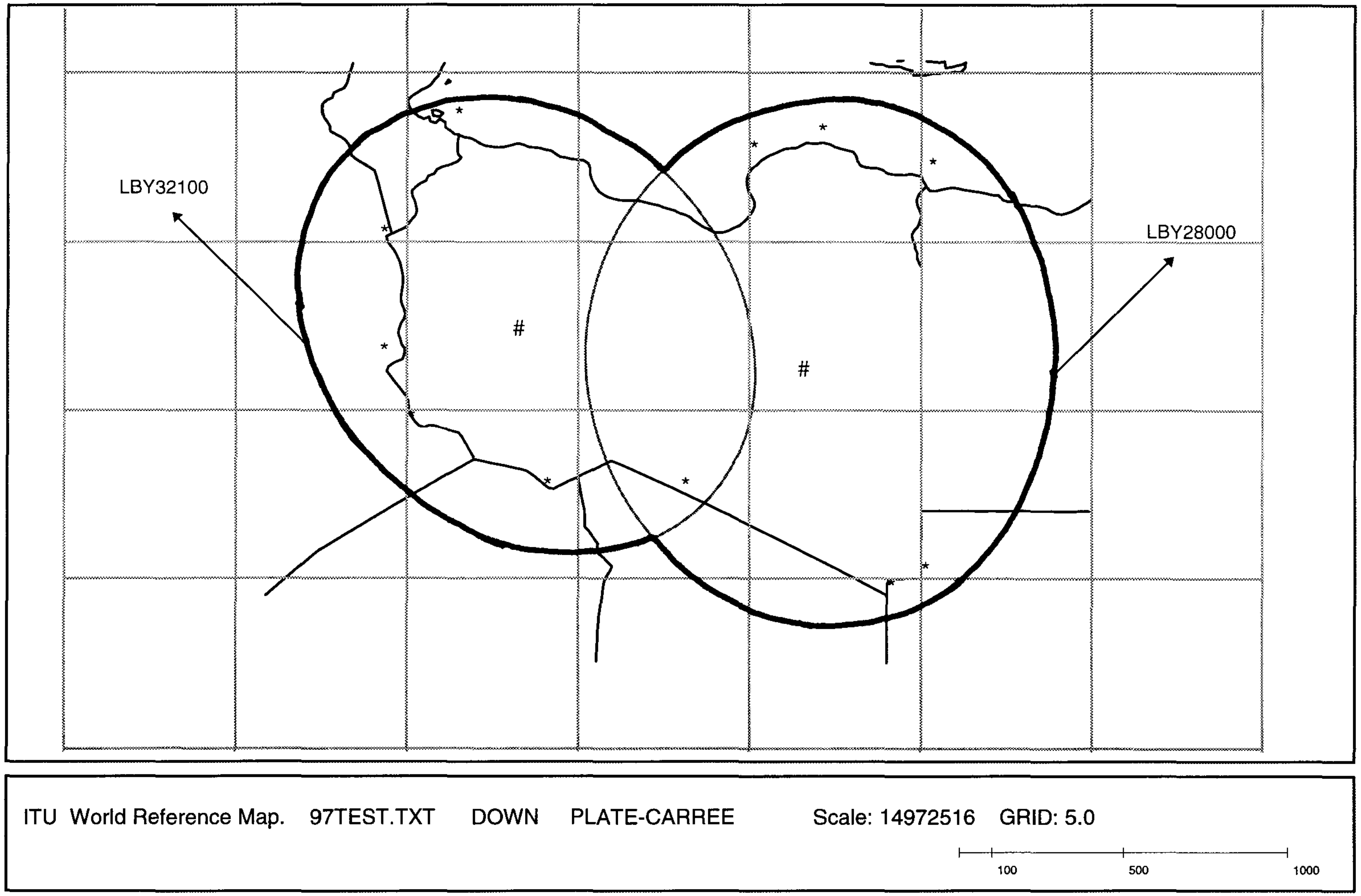
KIR (176.0 E)



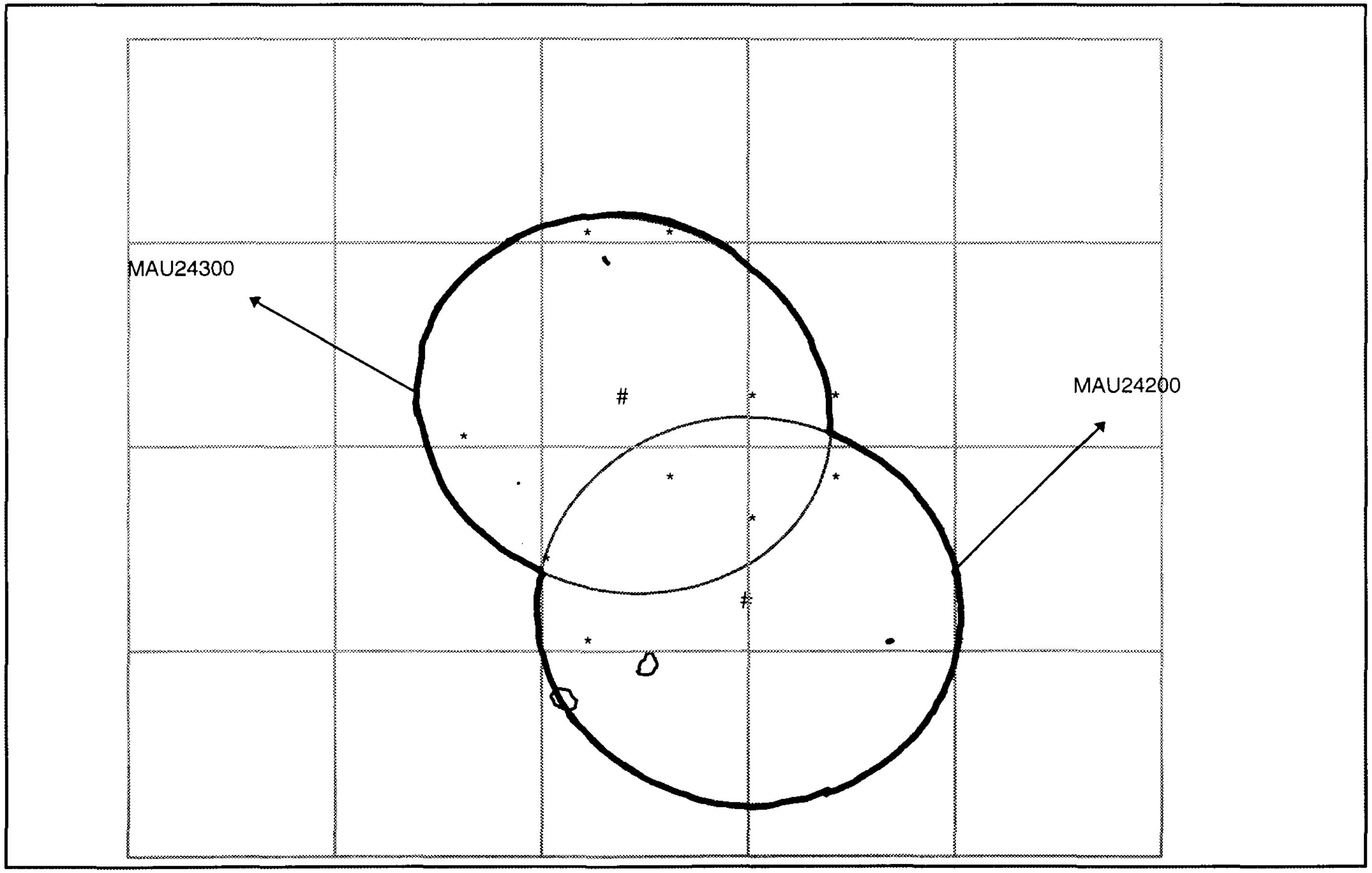
ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 19617826 GRID:10.0

100 500 1000

LBY (25.0 W)


LBY32100
LBY28000
#
#
ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 14972516 GRID: 5.0
100
500
1000

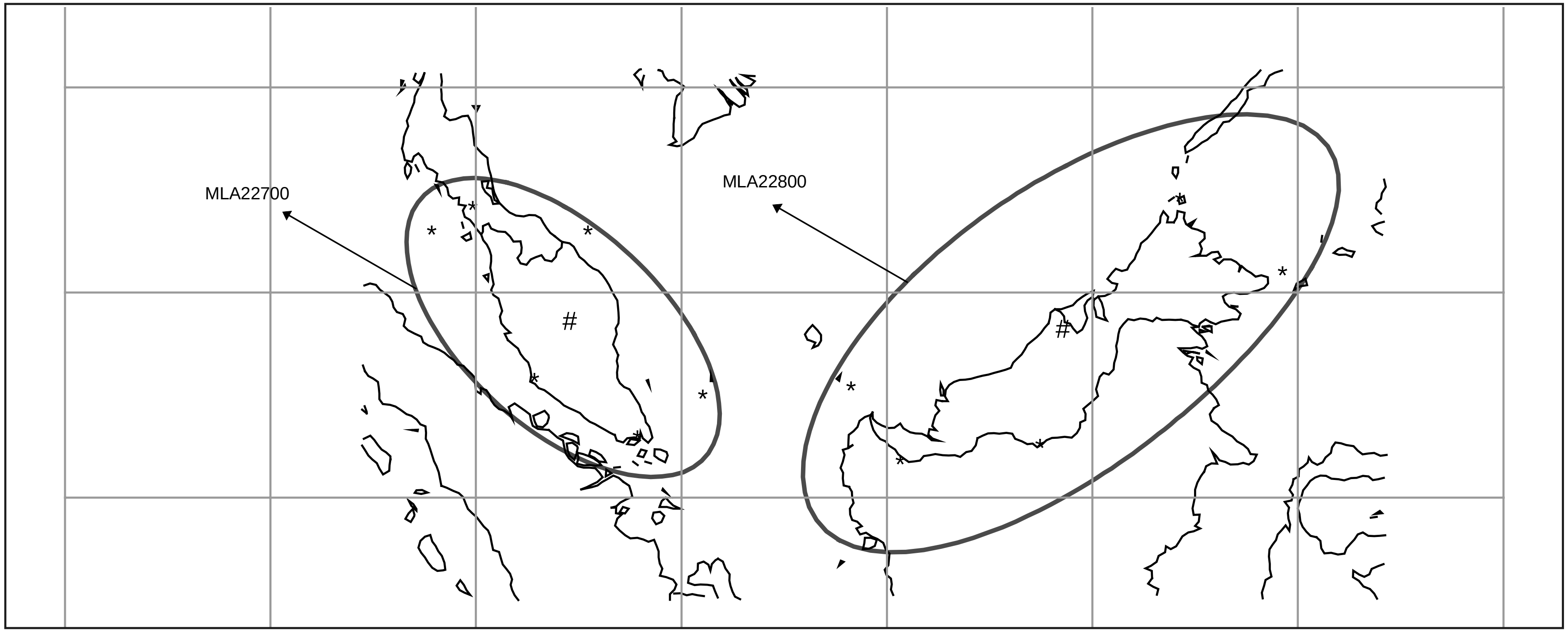
MAU (29.0 E)



ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 13831729 GRID: 5.0

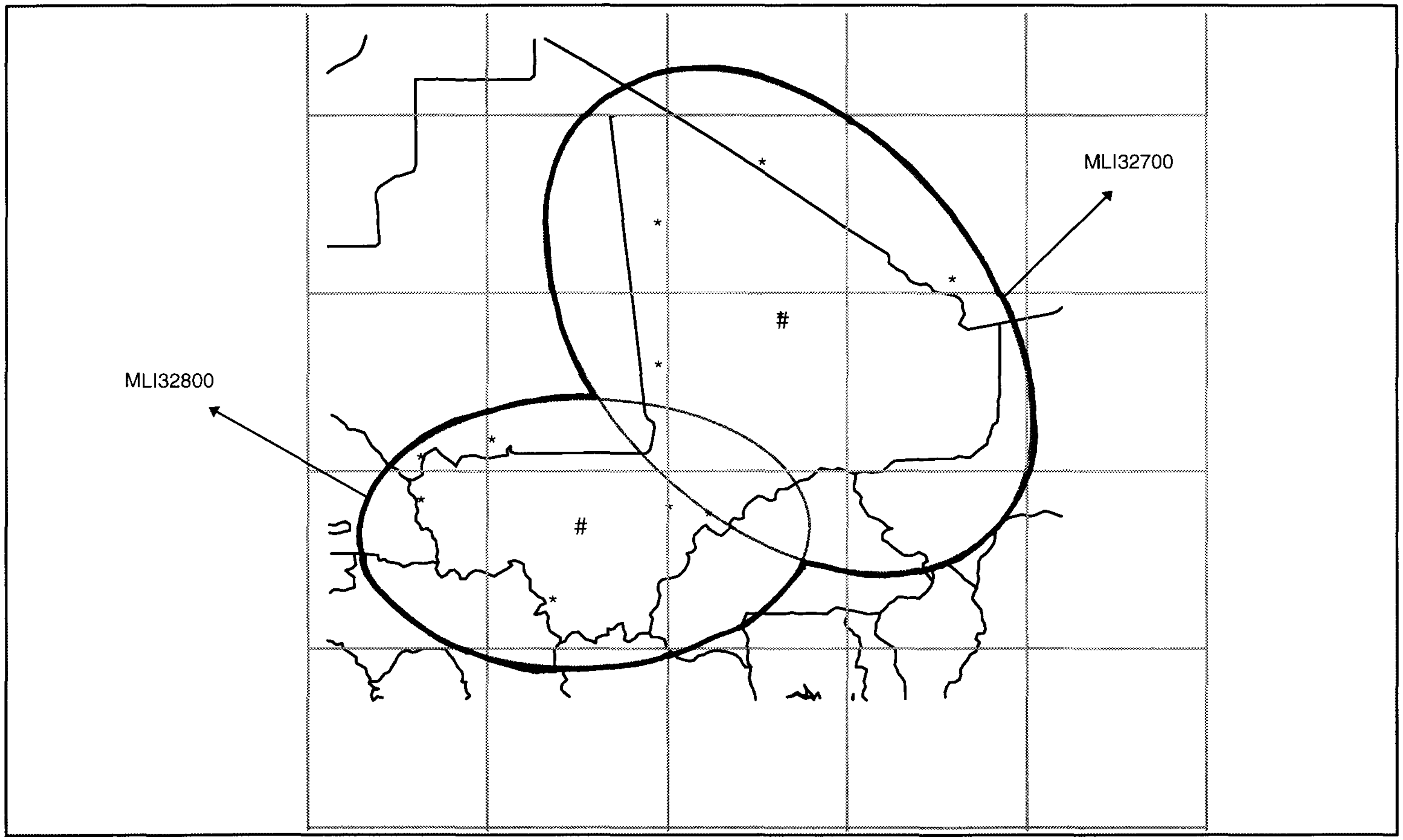
100 500 1000

MLA (86.0 E)



ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 11329235 GRID: 5.0

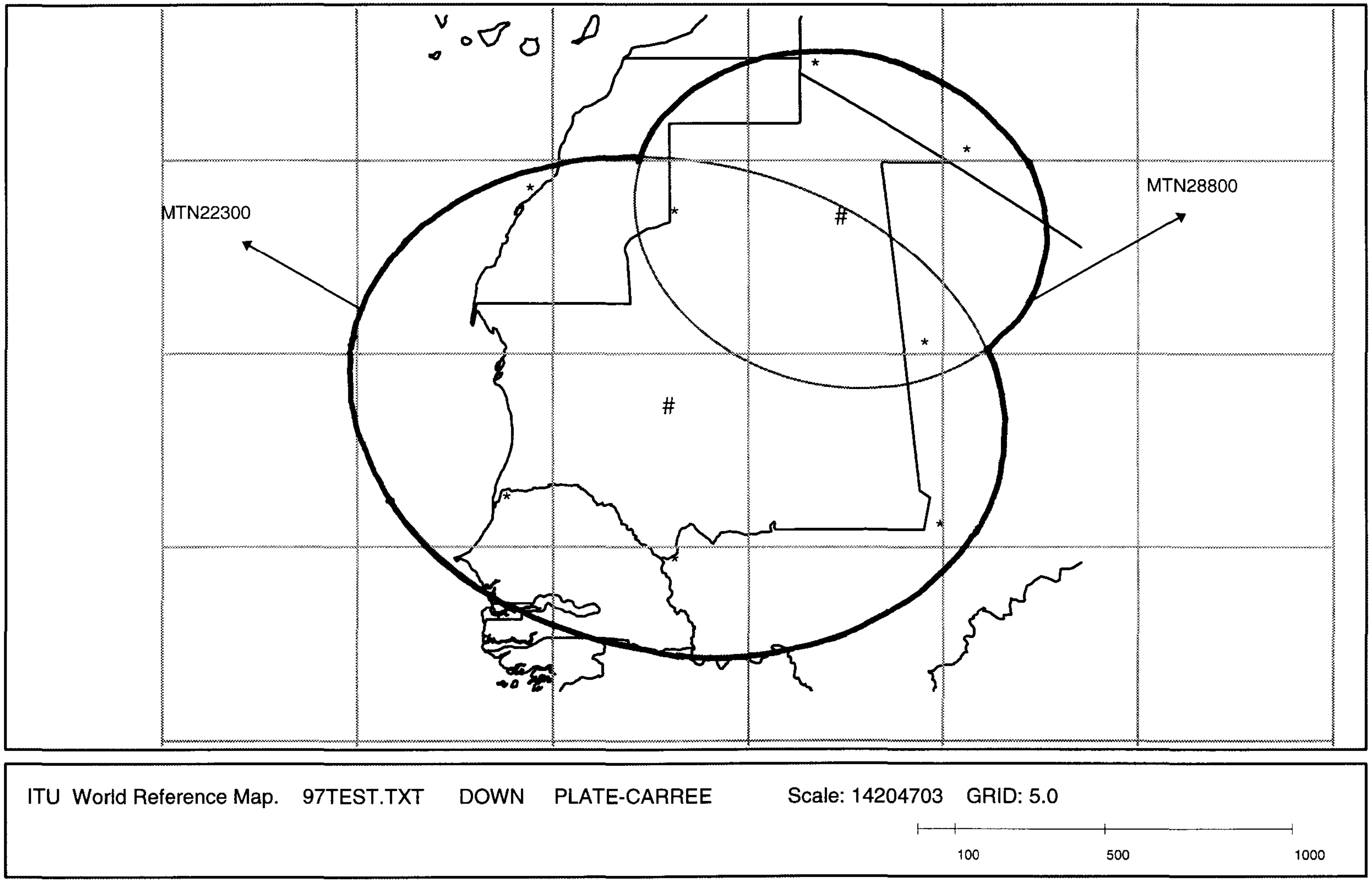
MLI (37.0 W)



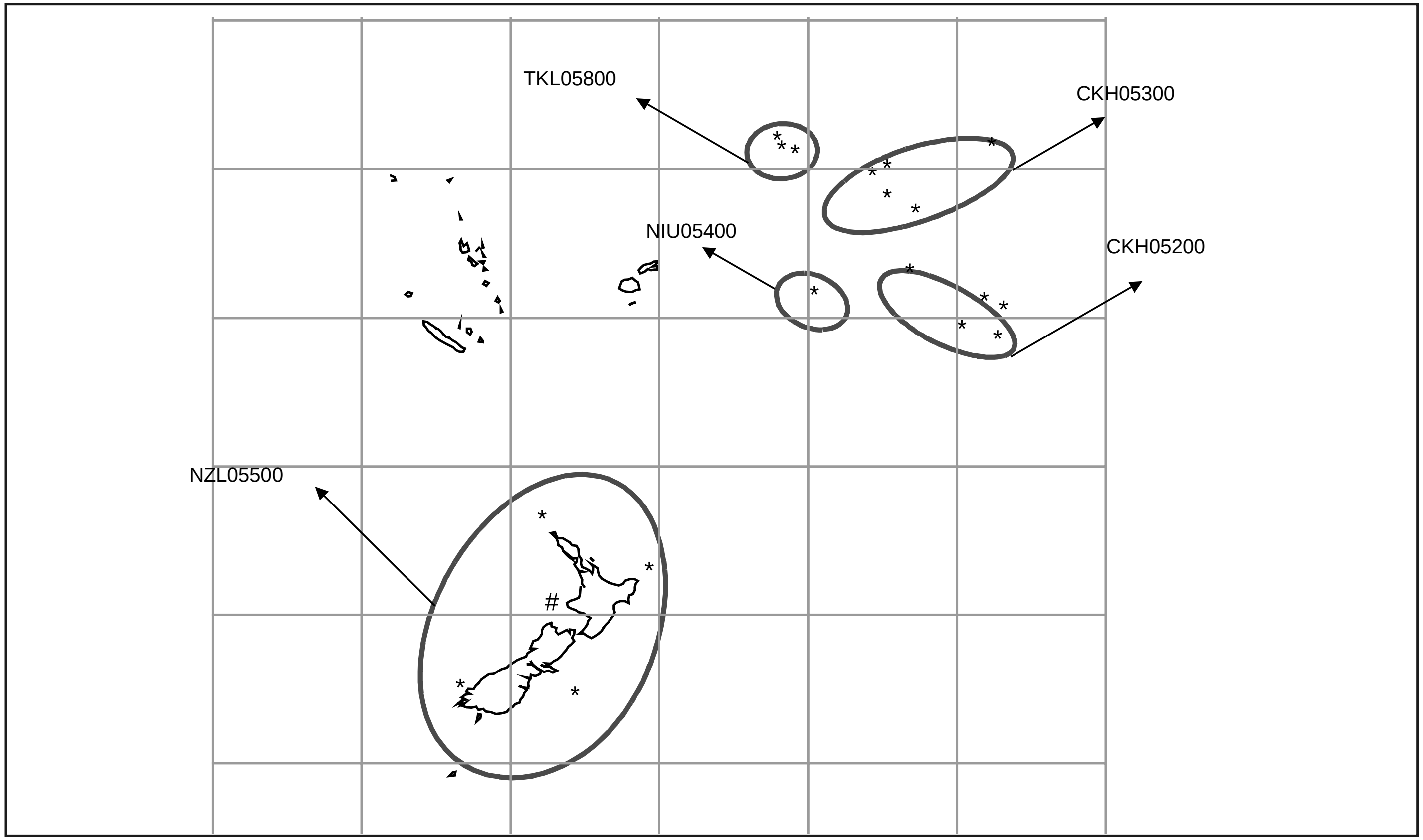
ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 15754706 GRID: 5.0

100 500 1000

MTN (37.0 W)


MTN22300
MTN28800
ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 14204703 GRID: 5.0
100
500
1000

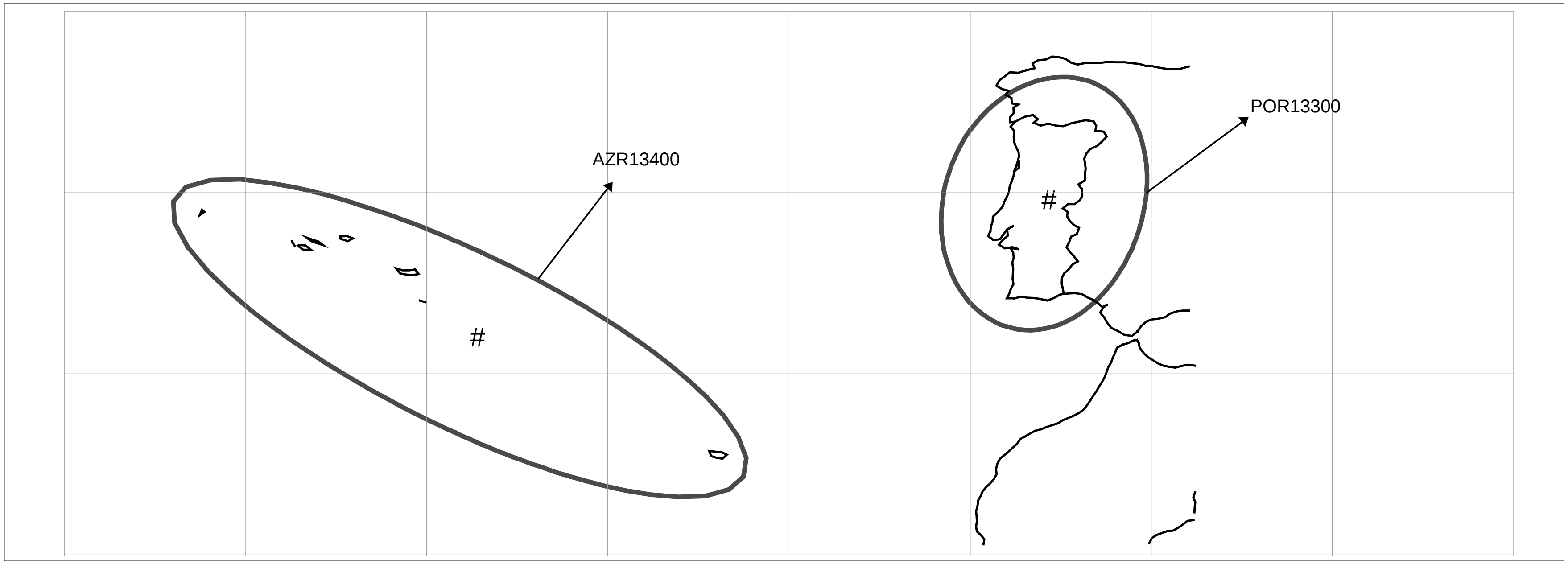
NZL (158.0 E)



ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 40383724 GRID:10.0

500 1000

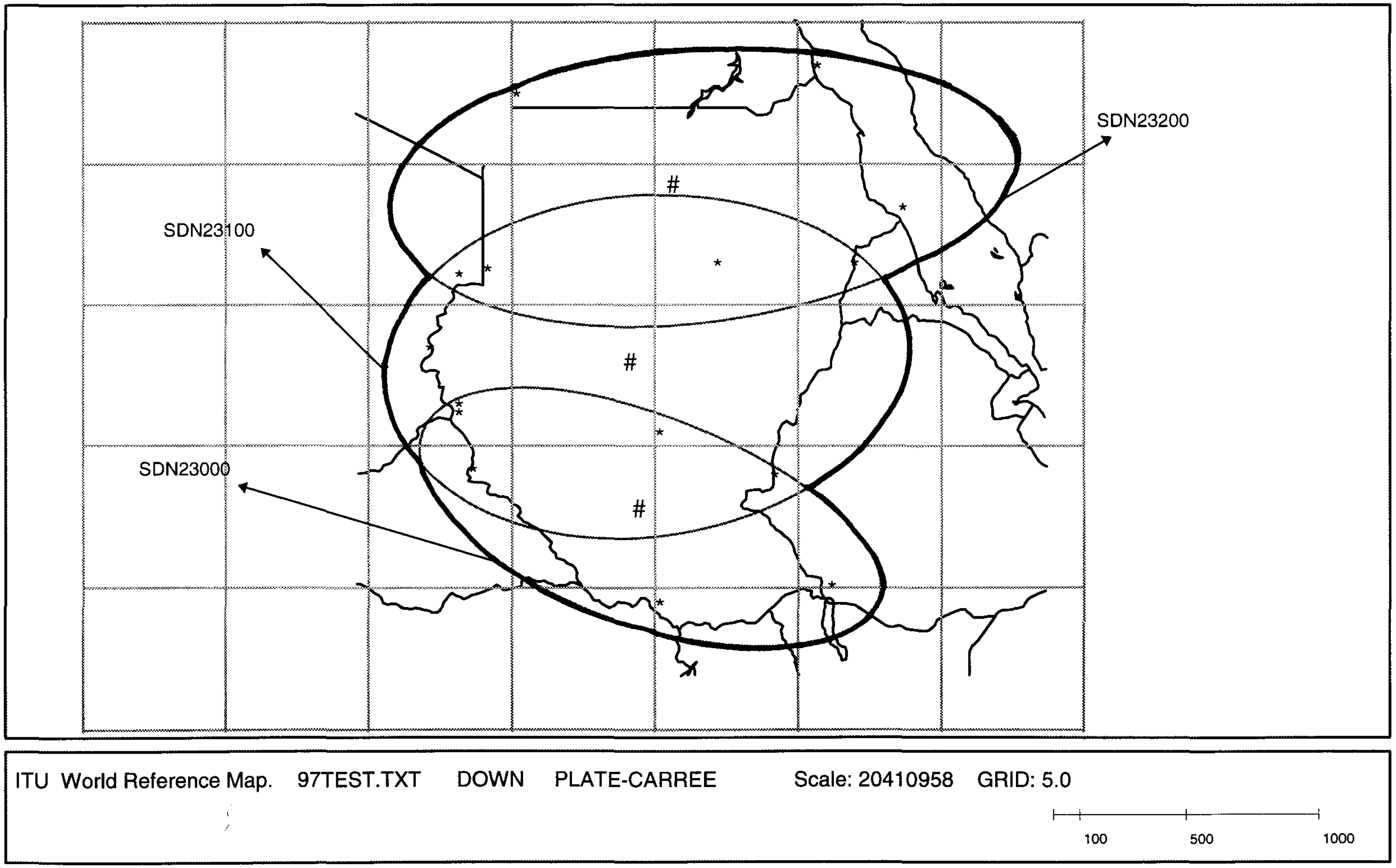
POR (37.0 W)



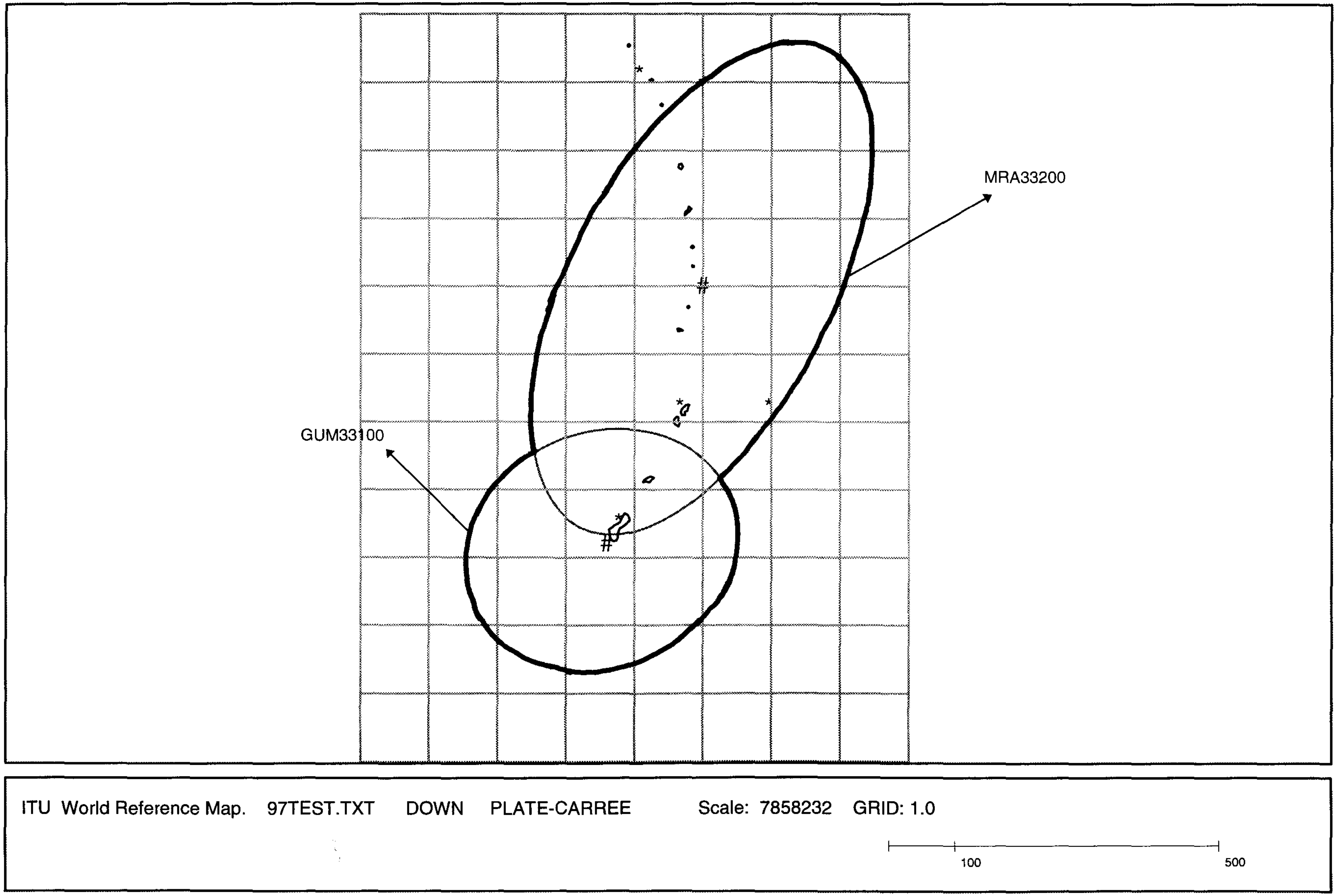
ITU Digitized World Map. None UP PLATE-CARREE Scale: 12876199 GRID: 5.0

100 500 1000

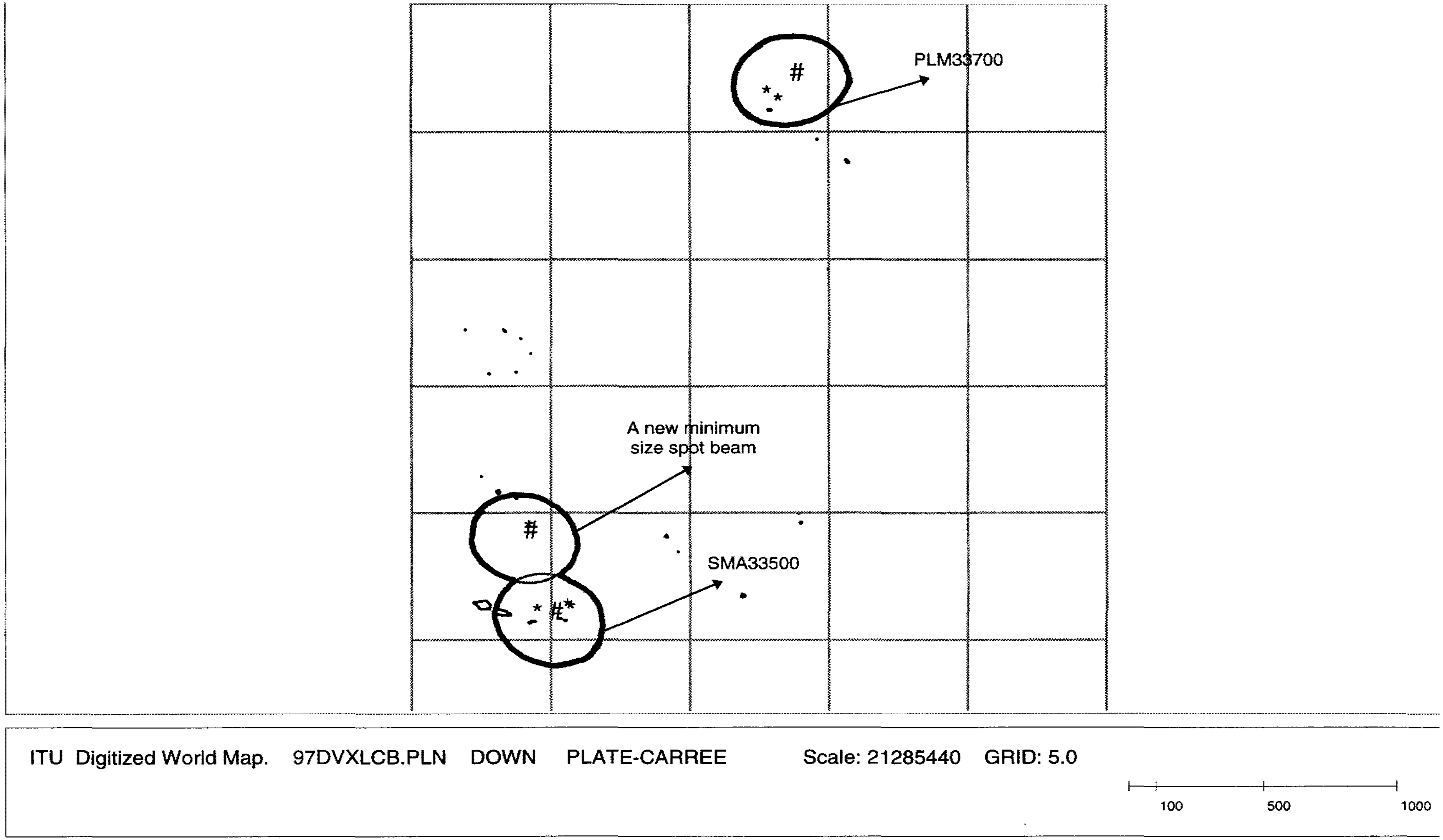
SDN (7.0 W)


SDN23200
SDN23100
SDN23000
ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 20410958 GRID: 5.0
100
500
1000

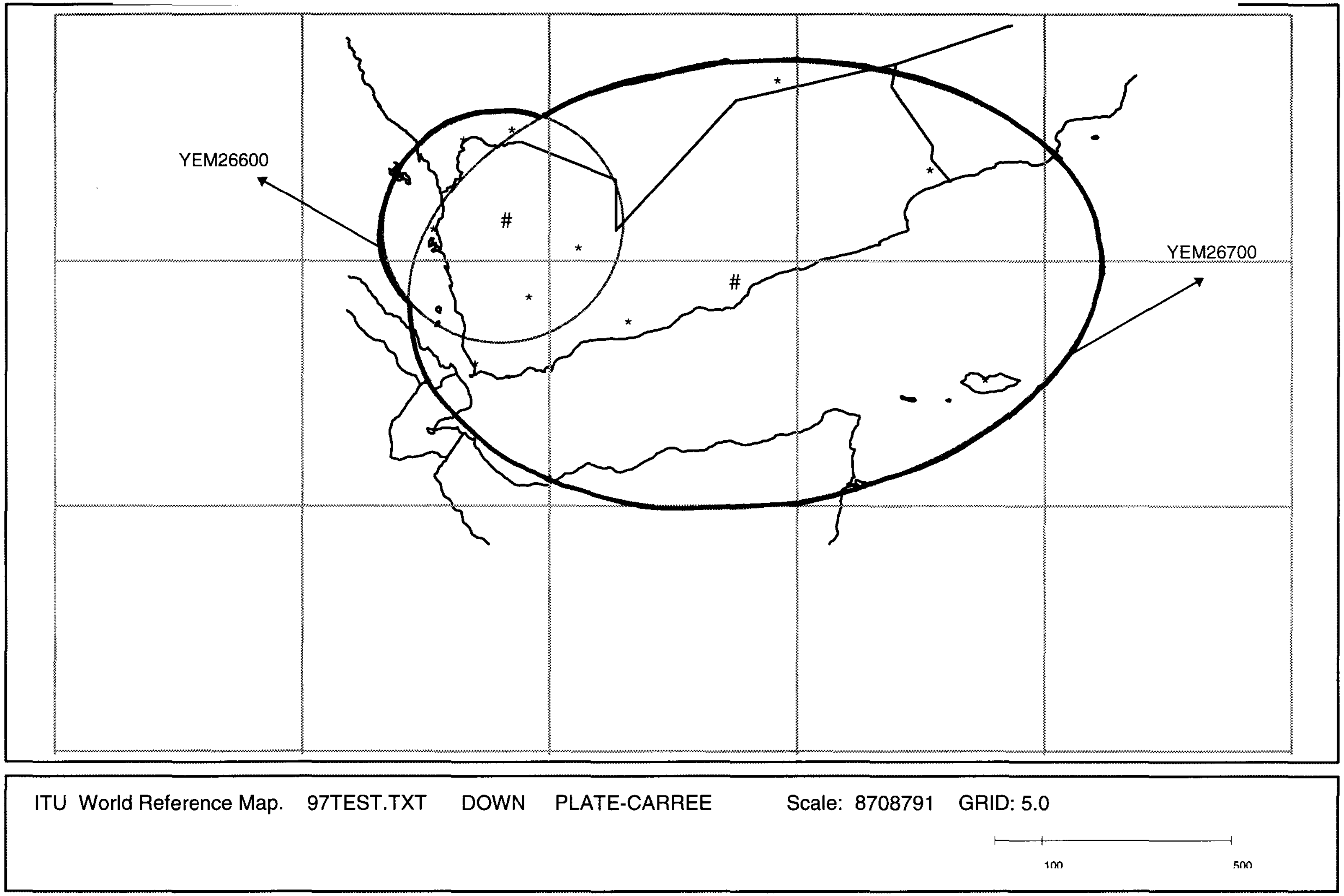
USA (GUM & MRA) (122.0 E)



USA (PLM & SMA) (170.0 E)



YEM (11.0 E)

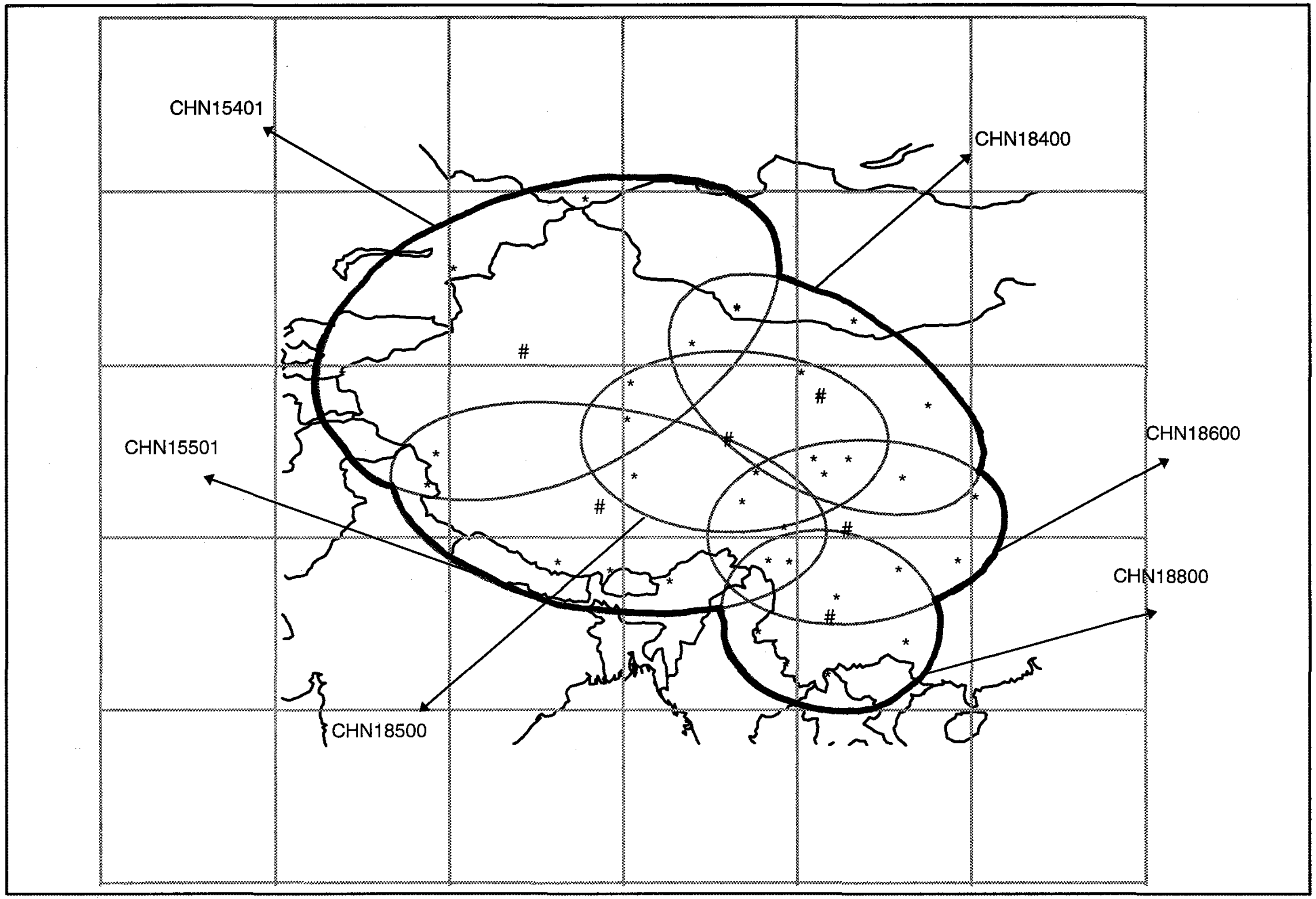

YEM26600
YEM26700
ITU World Reference Map. 97TEST.TXT DOWN PLATE-CARREE Scale: 8708791 GRID: 5.0
100
500

ANNEX D

(to Attachment 2)

The ellipses provided in this document with respect to composite beams in the draft new feeder-link Plan at 17 GHz are based on the default or preferred orbital positions, according to the case. When posting the information on the Web, the updated orbital positions and beam parameters will be provided.

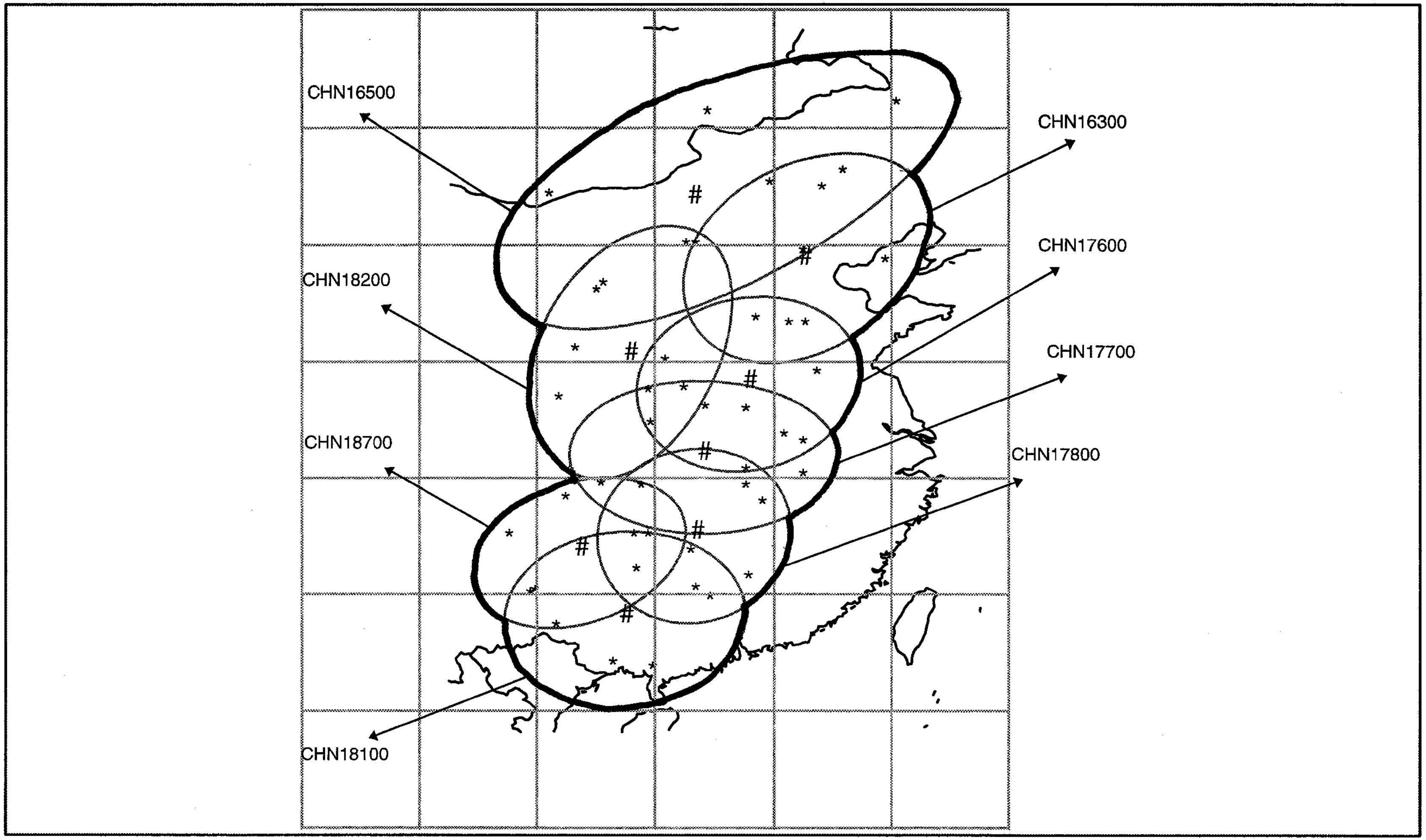
CHN (62.0 E)



ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 29138704 GRID:10.0

100 500 1000

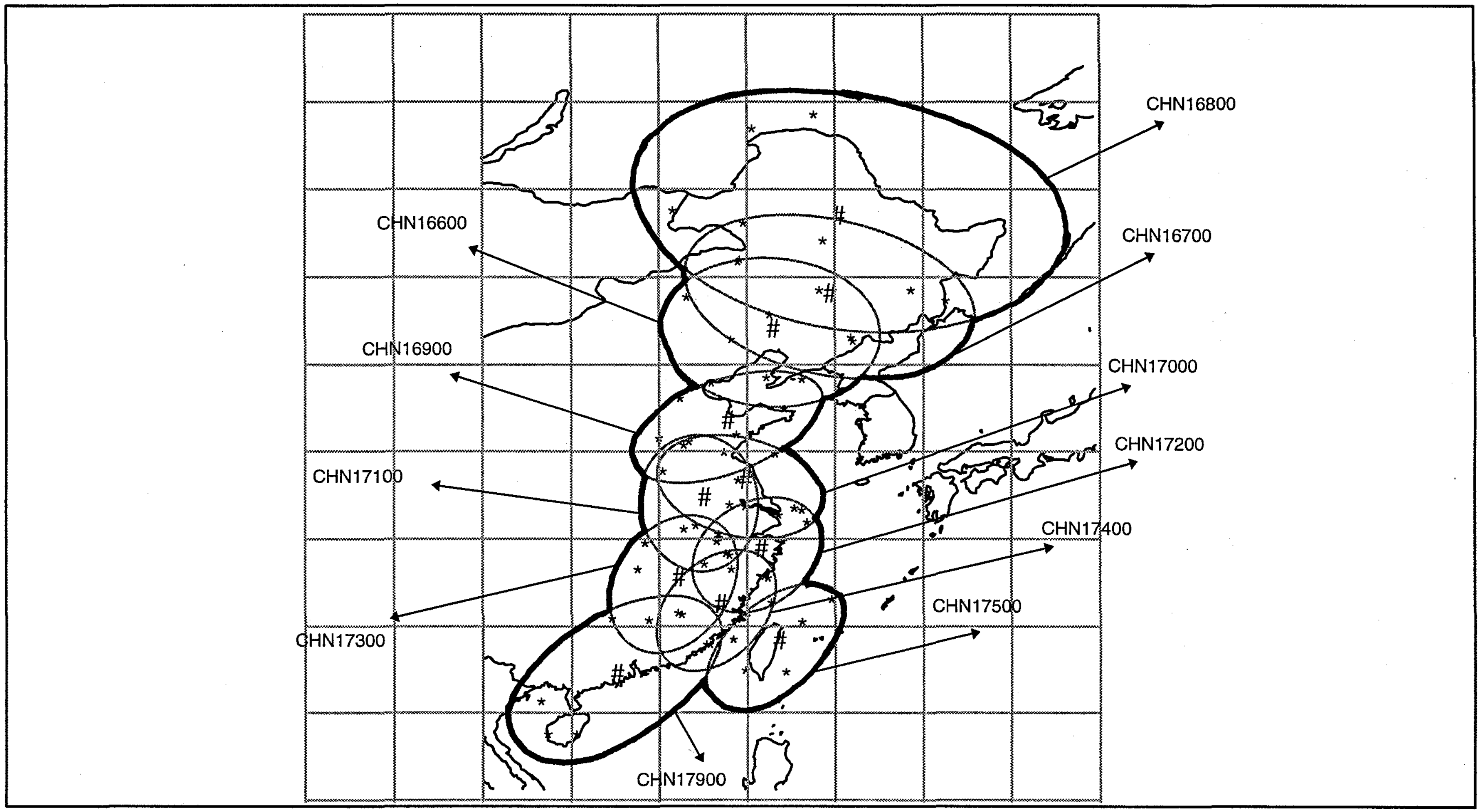
CHN (79.8 E)



ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 25719854 GRID: 5.0

100 500 1000

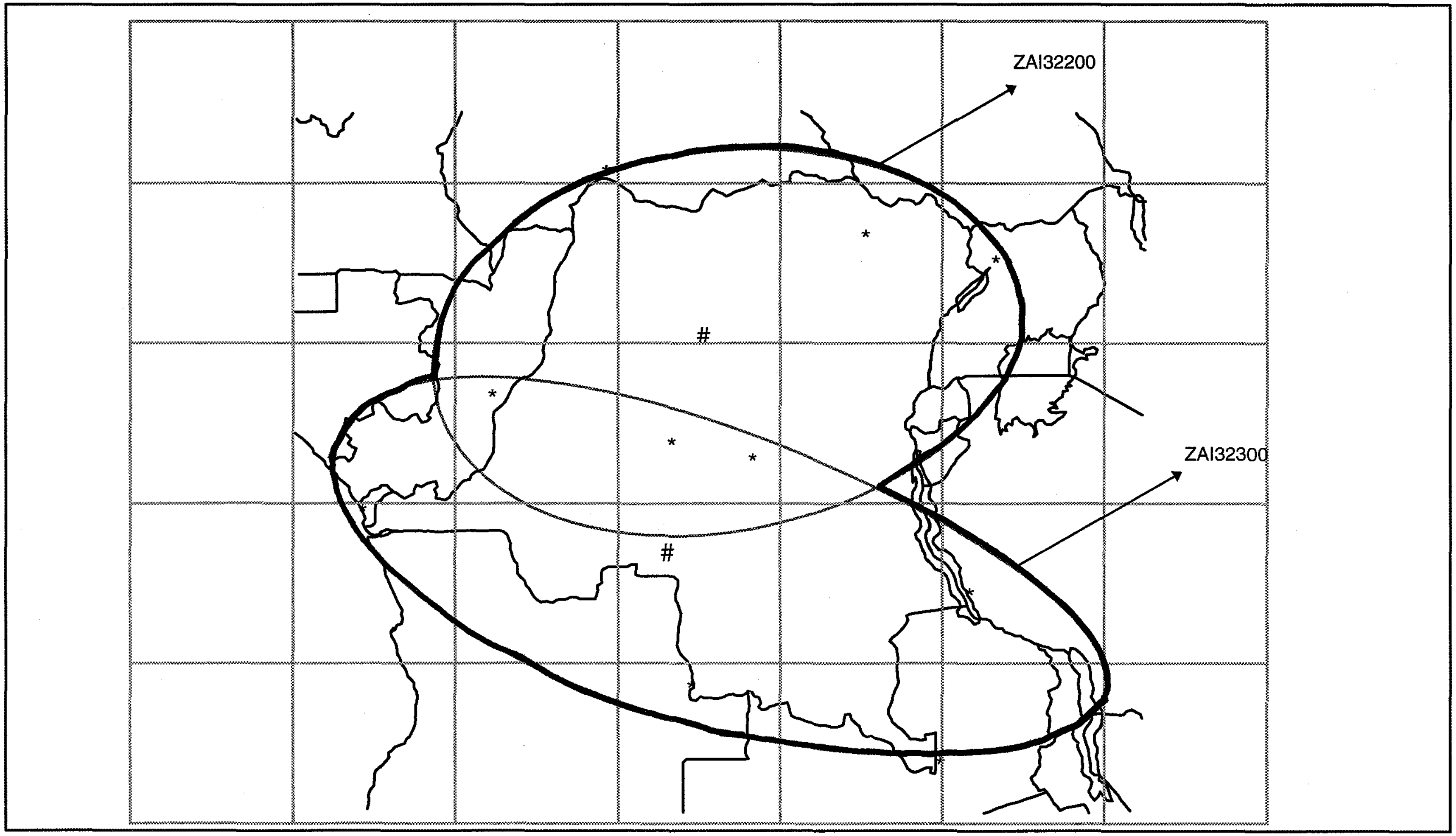
CHN (92.0 E)



ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 35078428 GRID: 5.0

500 1000

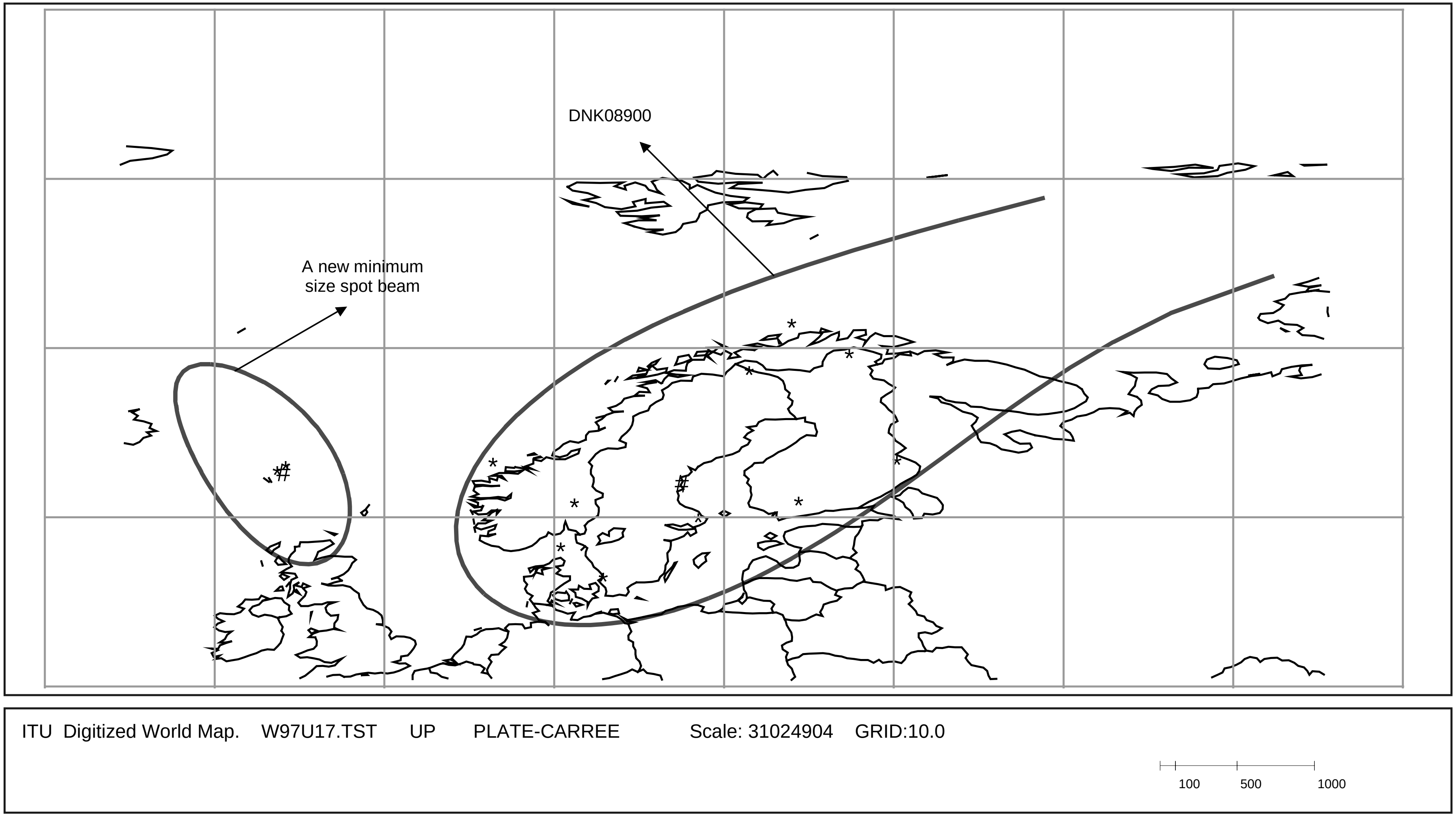
COD (19.0 W)



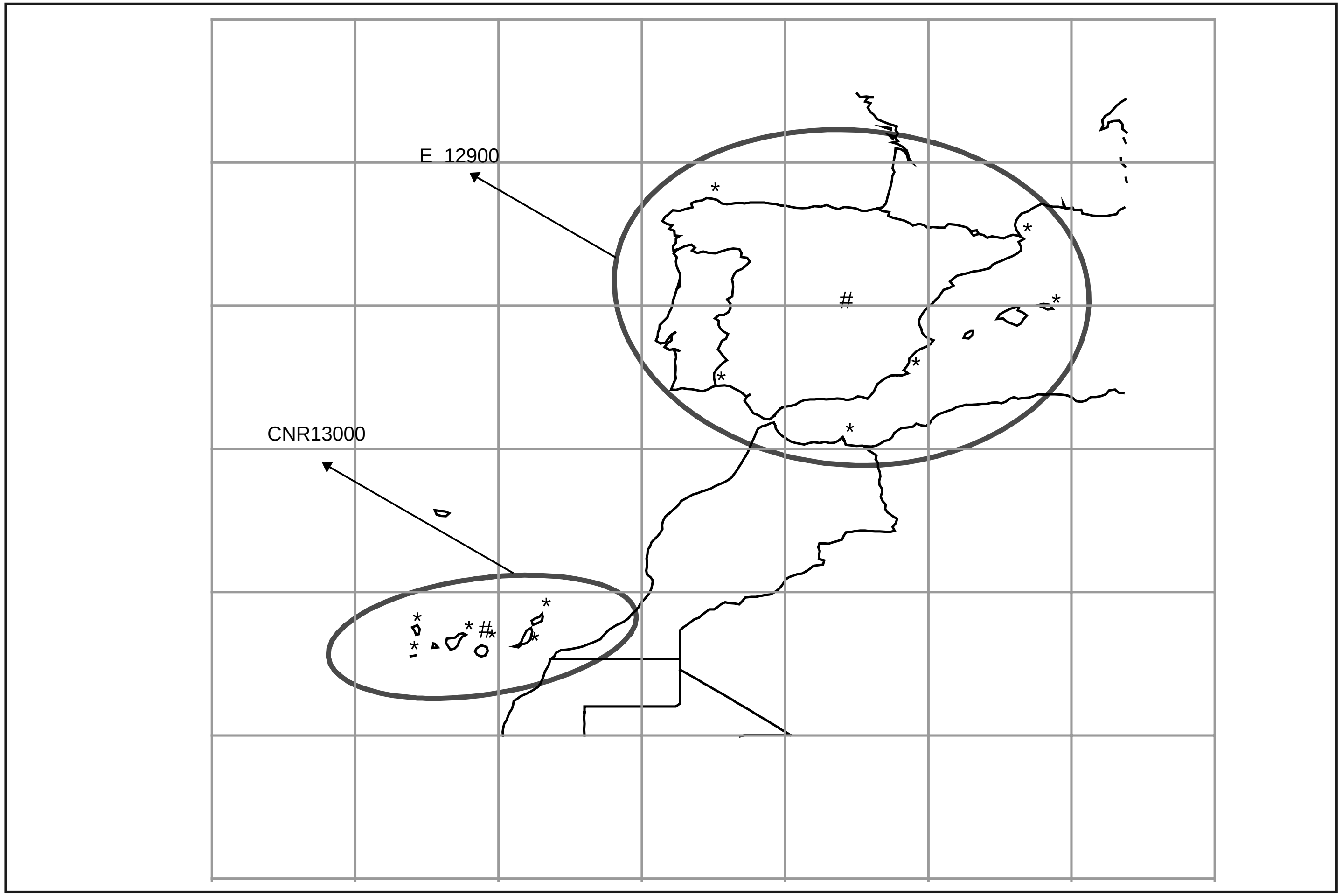
ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 18843526 GRID: 5.0

100 500 1000

DNK (5.0 E)

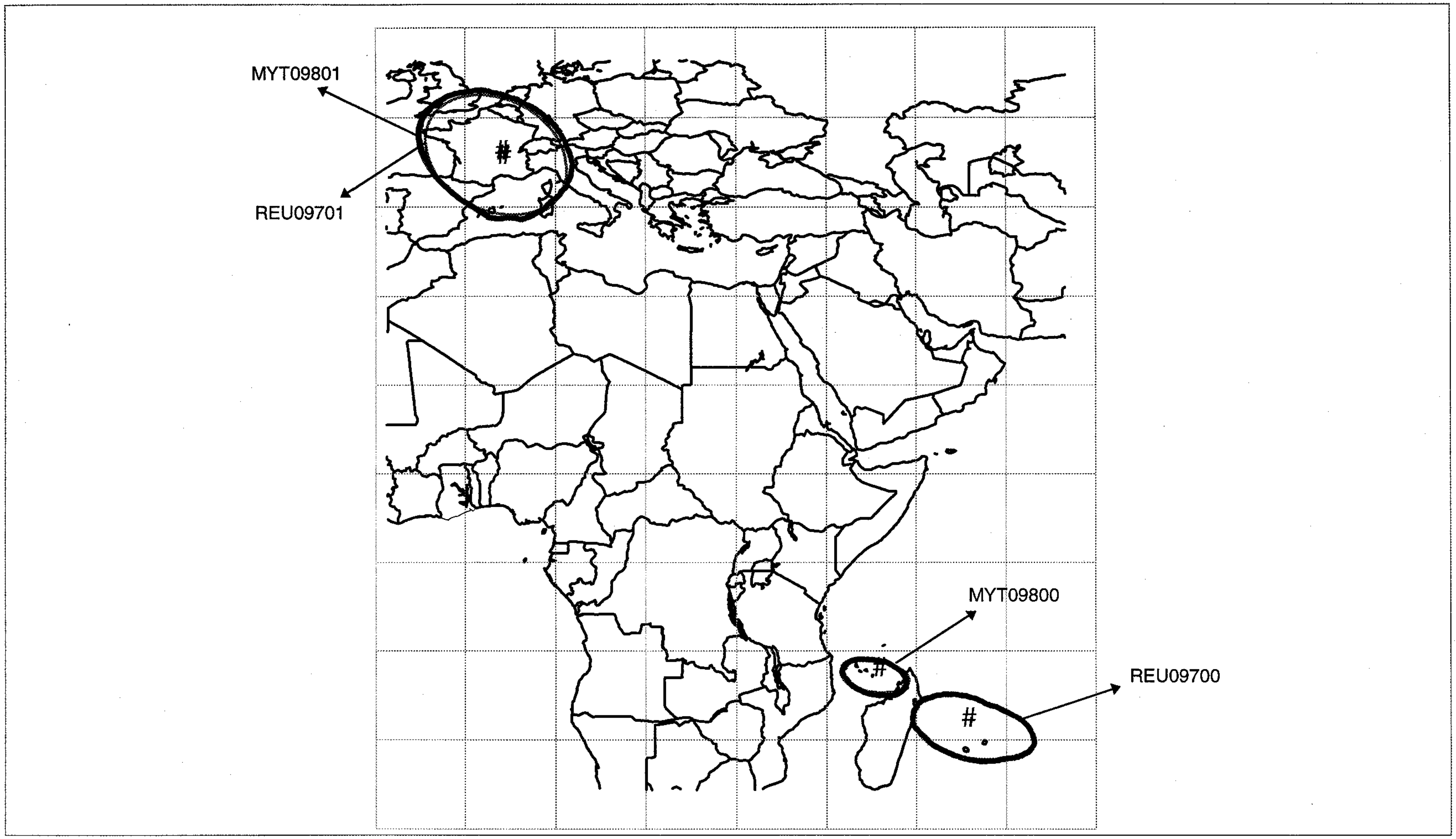

DNK08900
A new minimum
size spot beam
ITU Digitized World Map. W97U17.TST UP PLATE-CARREE Scale: 31024904 GRID:10.0
100
500
1000

E (30.0 W)



ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 19699514 GRID: 5.0

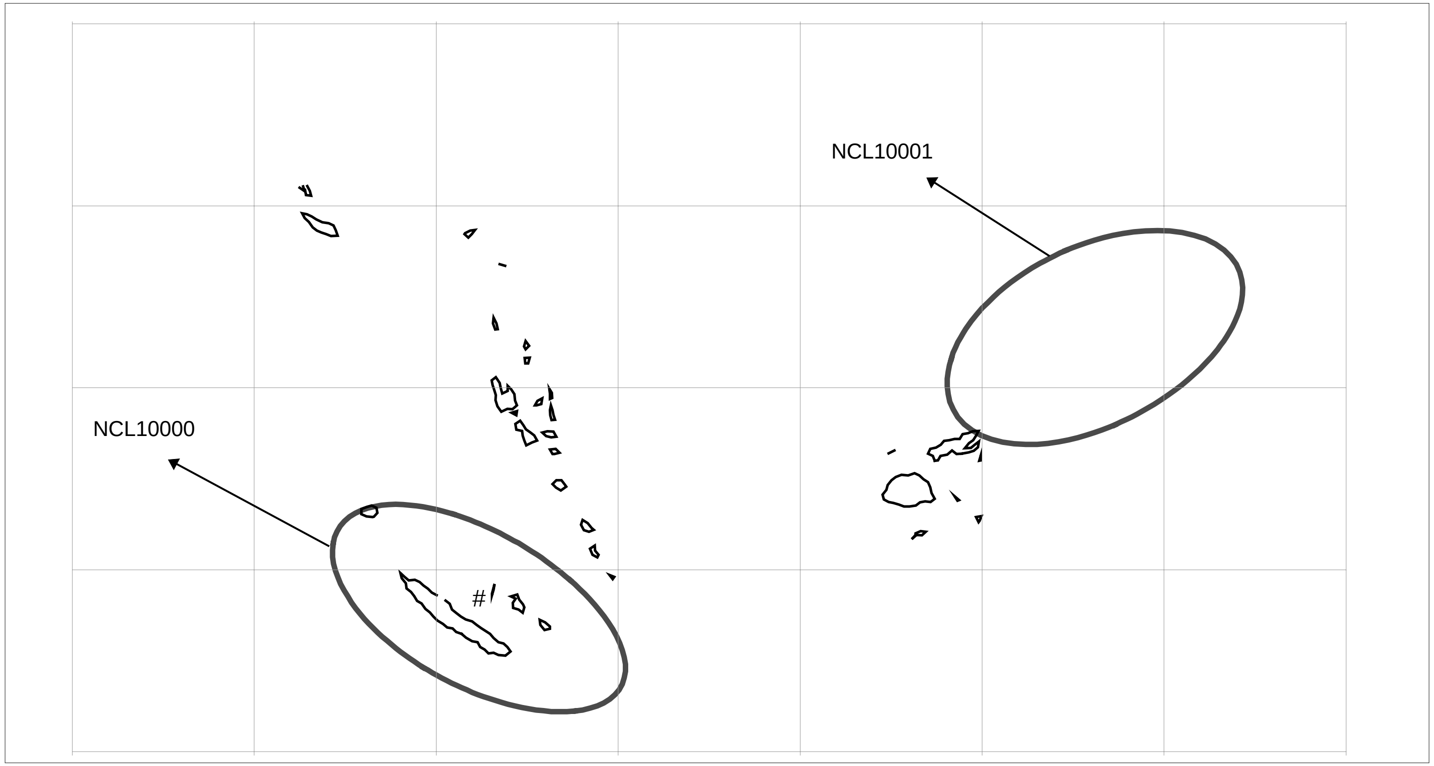
F (MYT & REU) (7.0 W)



ITU Digitized World Map. None UP PLATE-CARREE Scale: 69523088 GRID:10.0

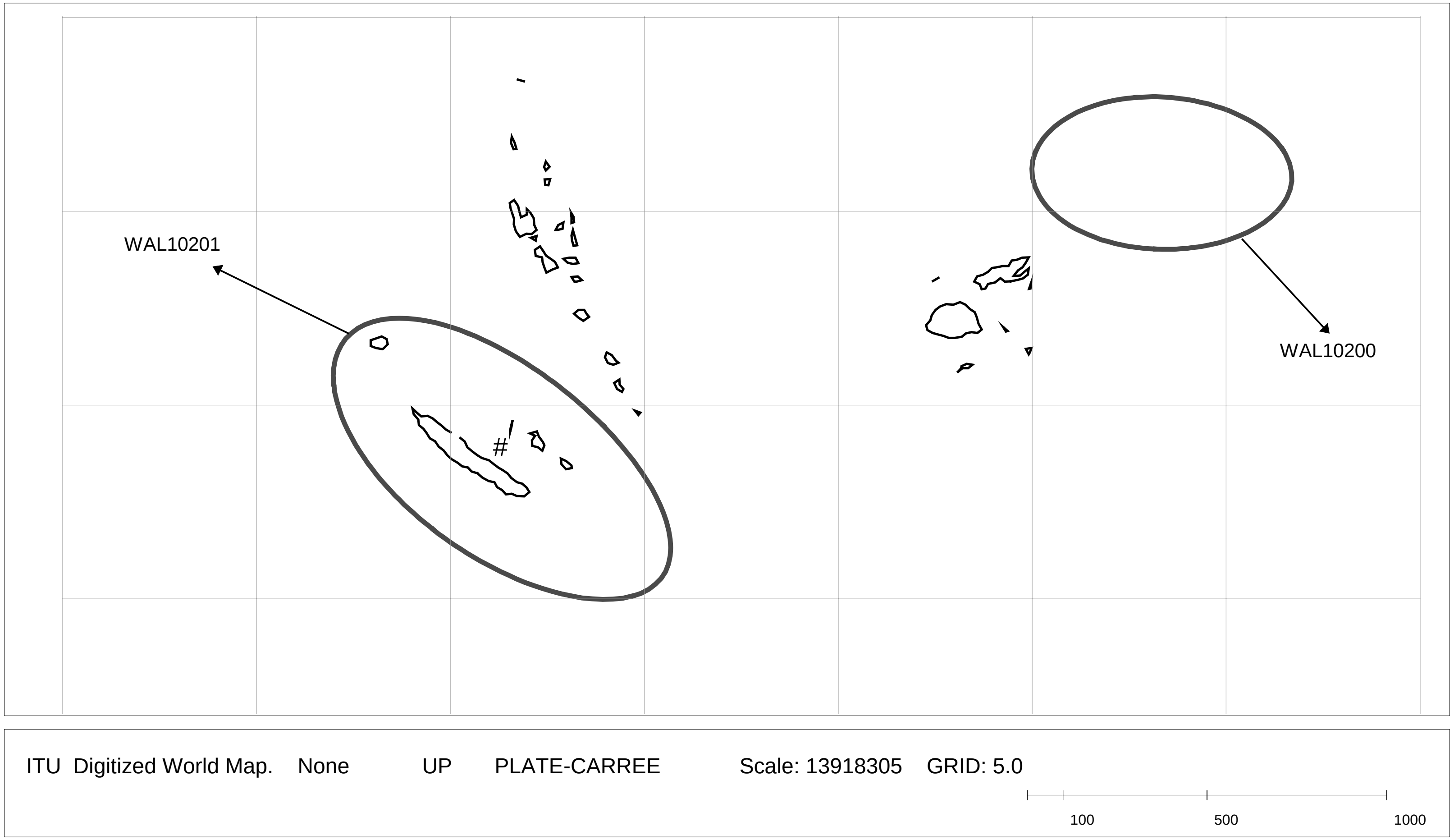
500 1000

F / NCL (140.0 E)

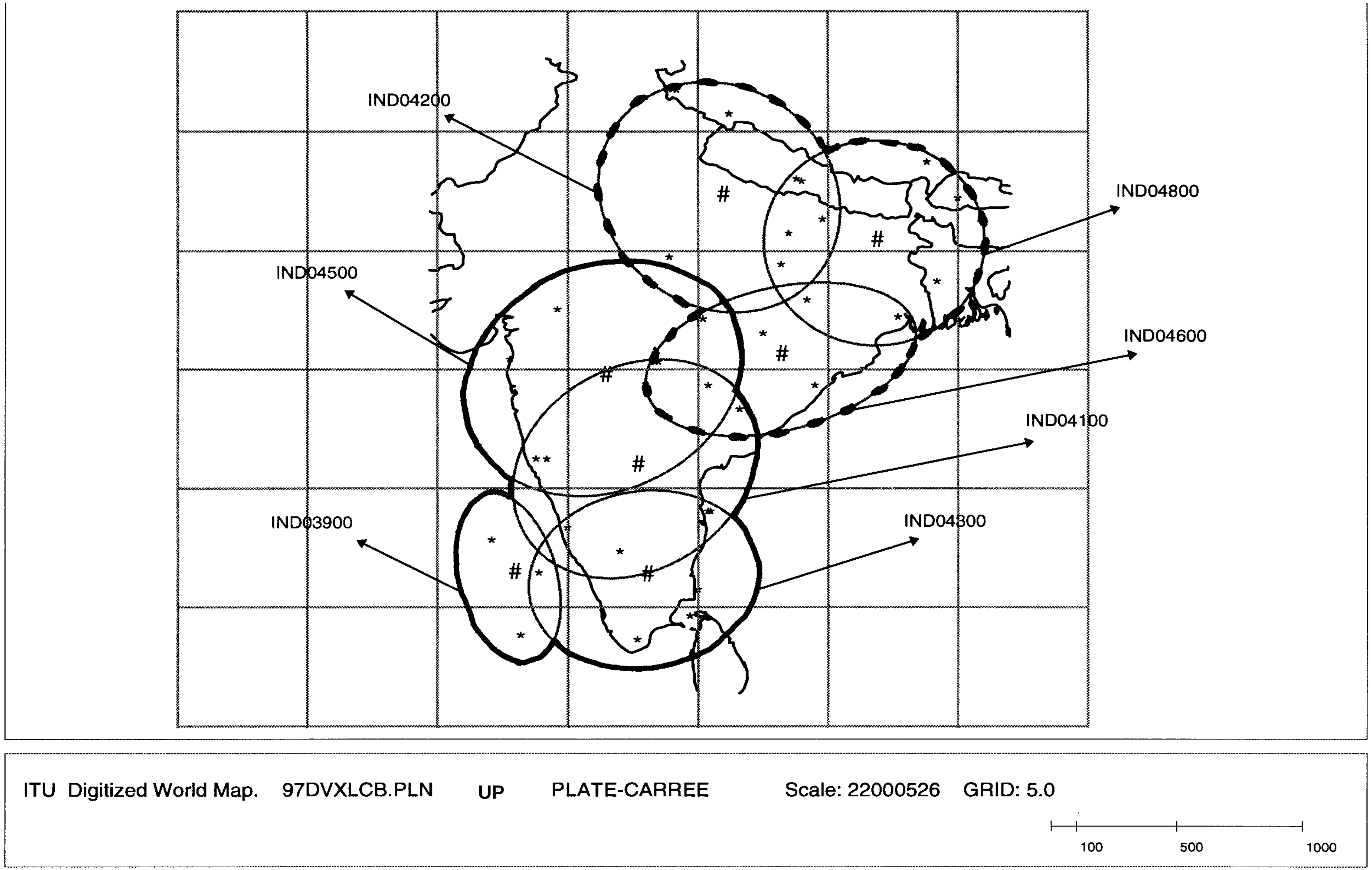


ITU Digitized World Map. None UP PLATE-CARREE Scale: 13601085 GRID: 5.0

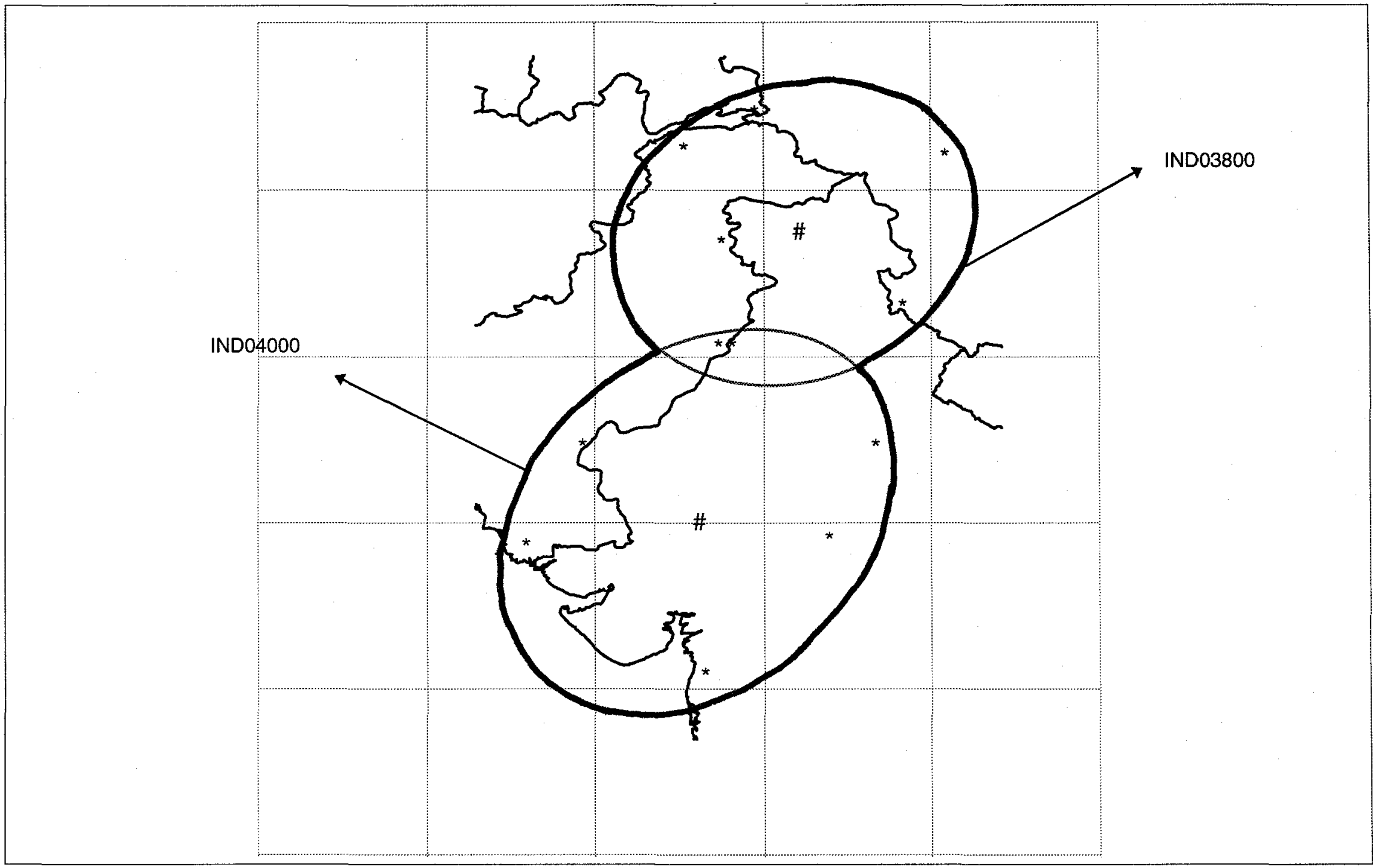
F / WAL (140.0 E)


WAL10201
#
WAL10200
ITU Digitized World Map.   None   UP   PLATE-CARREE   Scale: 13918305   GRID: 5.0
100
500
1000

IND (56.0 E)


IND04200
IND04800
IND04500
IND04600
IND04100
IND03900
IND04300
ITU Digitized World Map. 97DVXLCB.PLN UP PLATE-CARREE Scale: 22000526 GRID: 5.0
100
500
1000

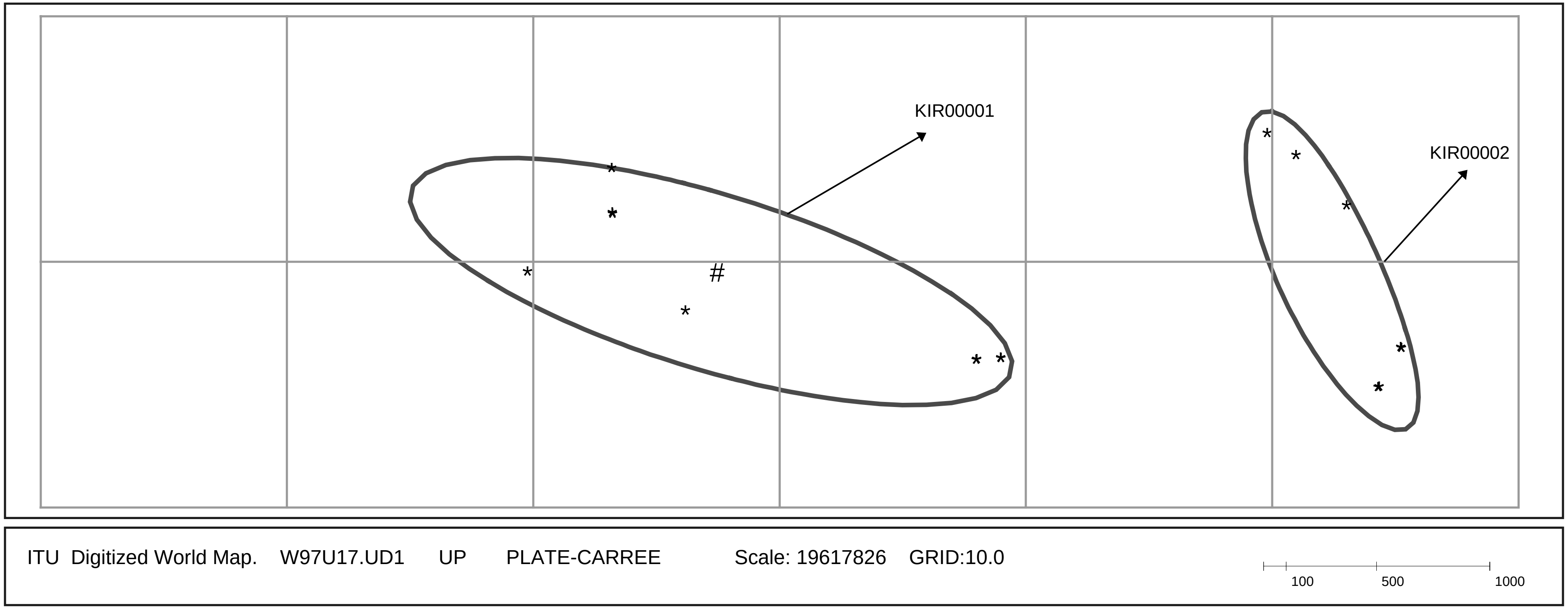
IND (68.0 E)



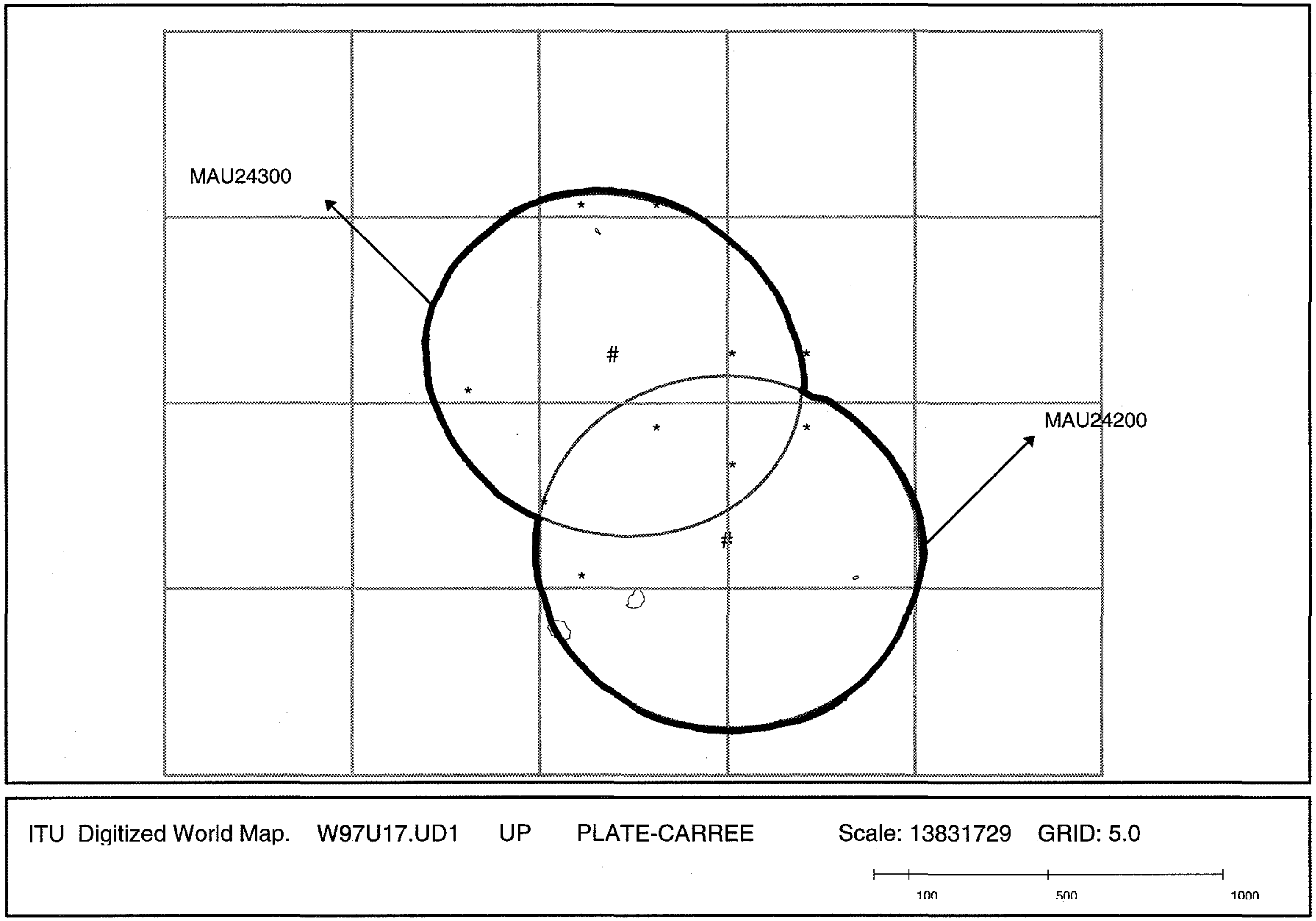
ITU Digitized World Map. 99PLANM.TXT UP PLATE-CARREE Scale: 16321642 GRID: 5.0

100 500 1000

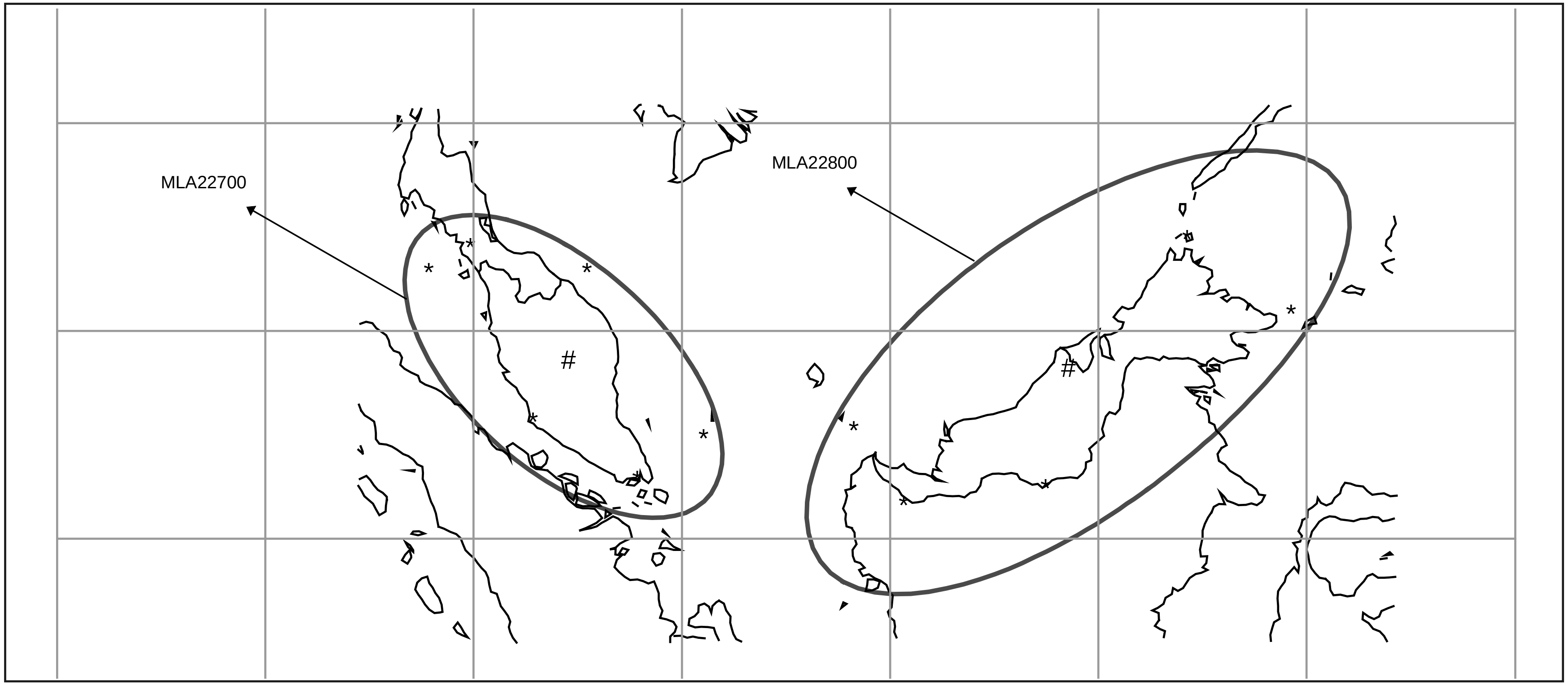
KIR (176.0 E)


KIR00001
KIR00002
#
ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 19617826 GRID:10.0
100
500
1000

MAU (29.0 E)


MAU24300
MAU24200
ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 13831729 GRID: 5.0
100
500
1000

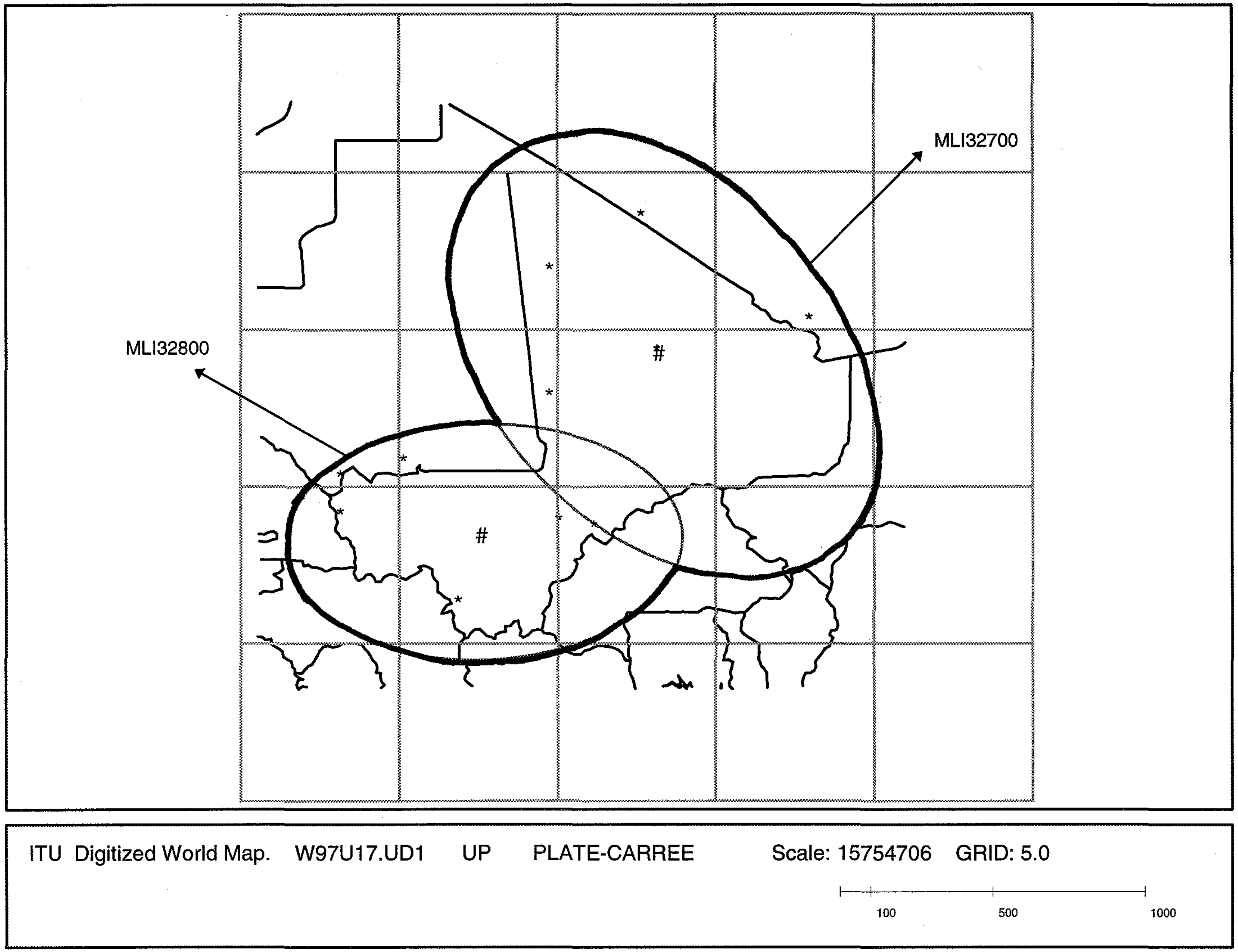
MLA (86.0 E)



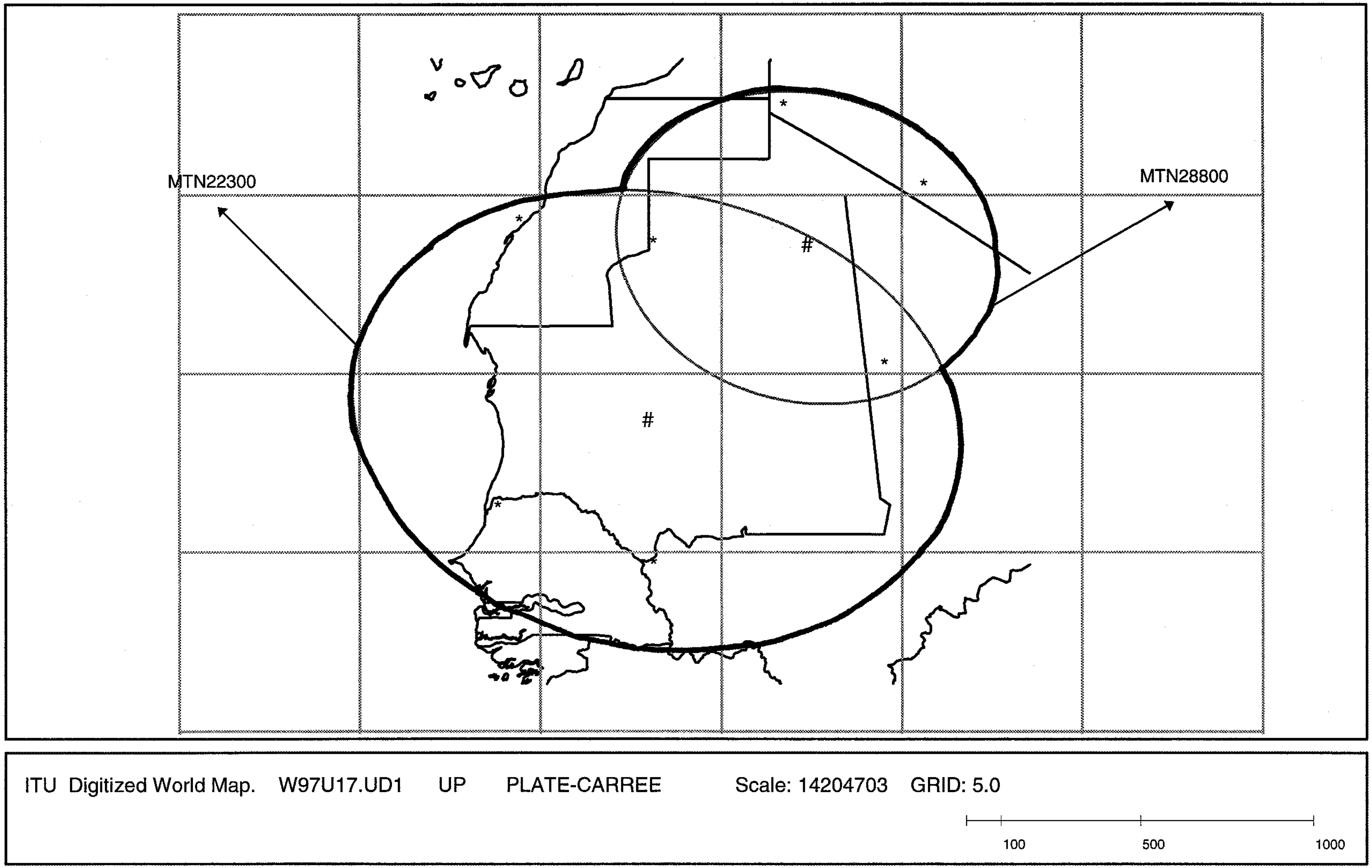
ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 11329235 GRID: 5.0

100 500

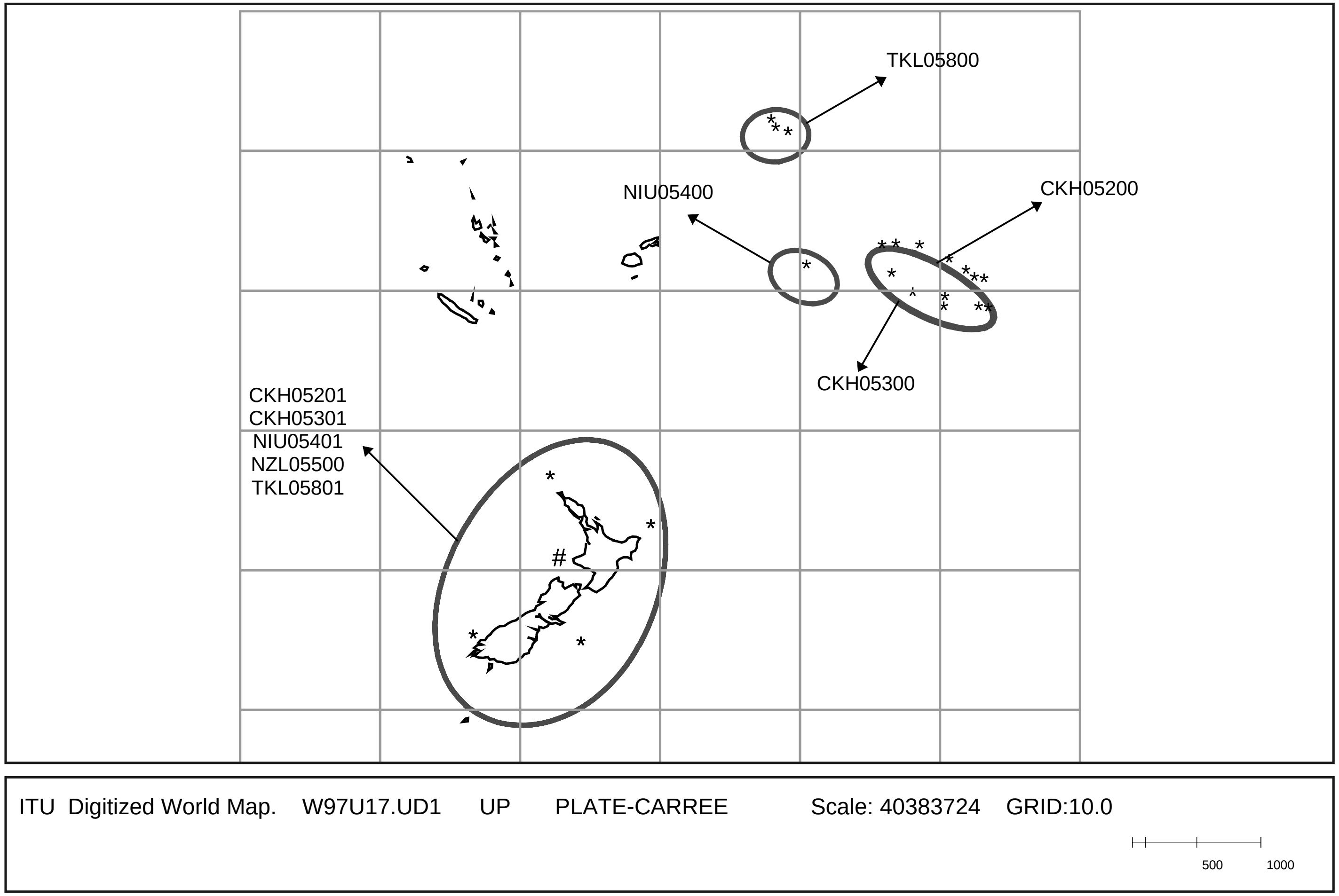
MLI (37.0 W)


MLI32700
MLI32800
ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 15754706 GRID: 5.0
100
500
1000

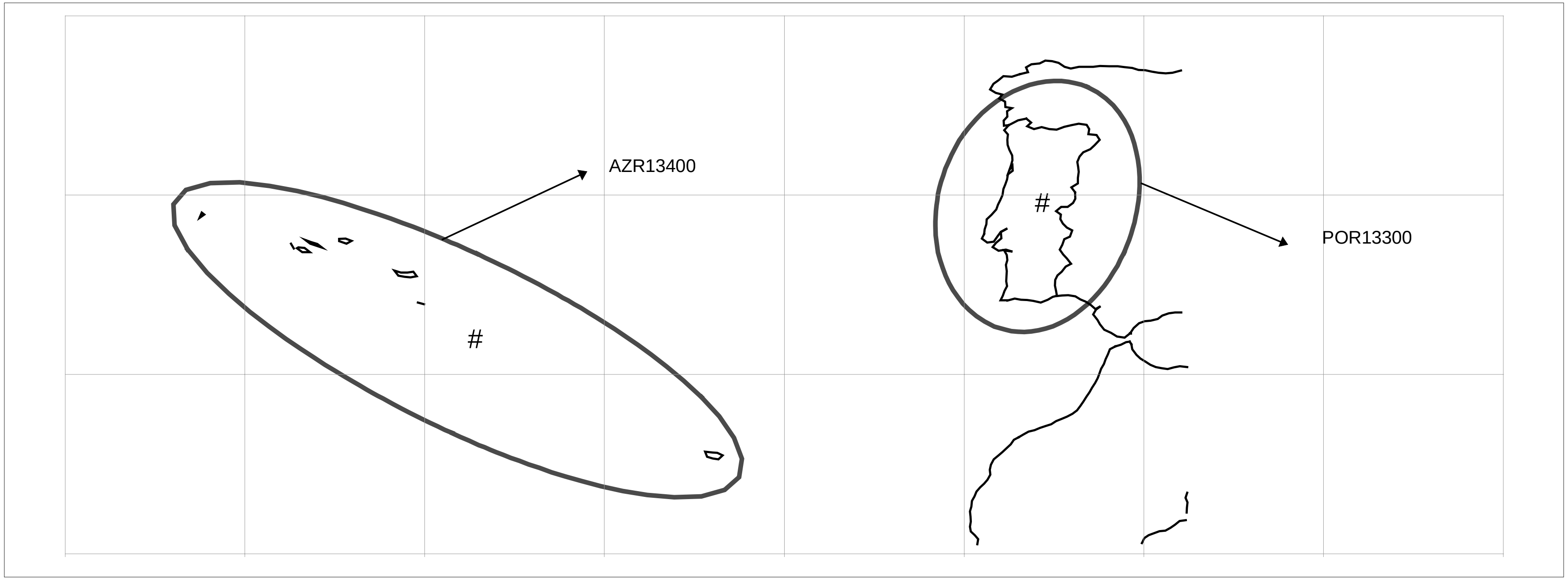
MTN (37.0 W)


MTN22300
MTN28800
ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 14204703 GRID: 5.0
100
500
1000

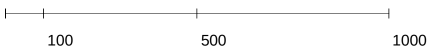
NZL (158.0 E)


TKL05800
NIU05400
CKH05200
CKH05300
CKH05201
CKH05301
NIU05401
NZL05500
TKL05801
ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 40383724 GRID:10.0
500
1000

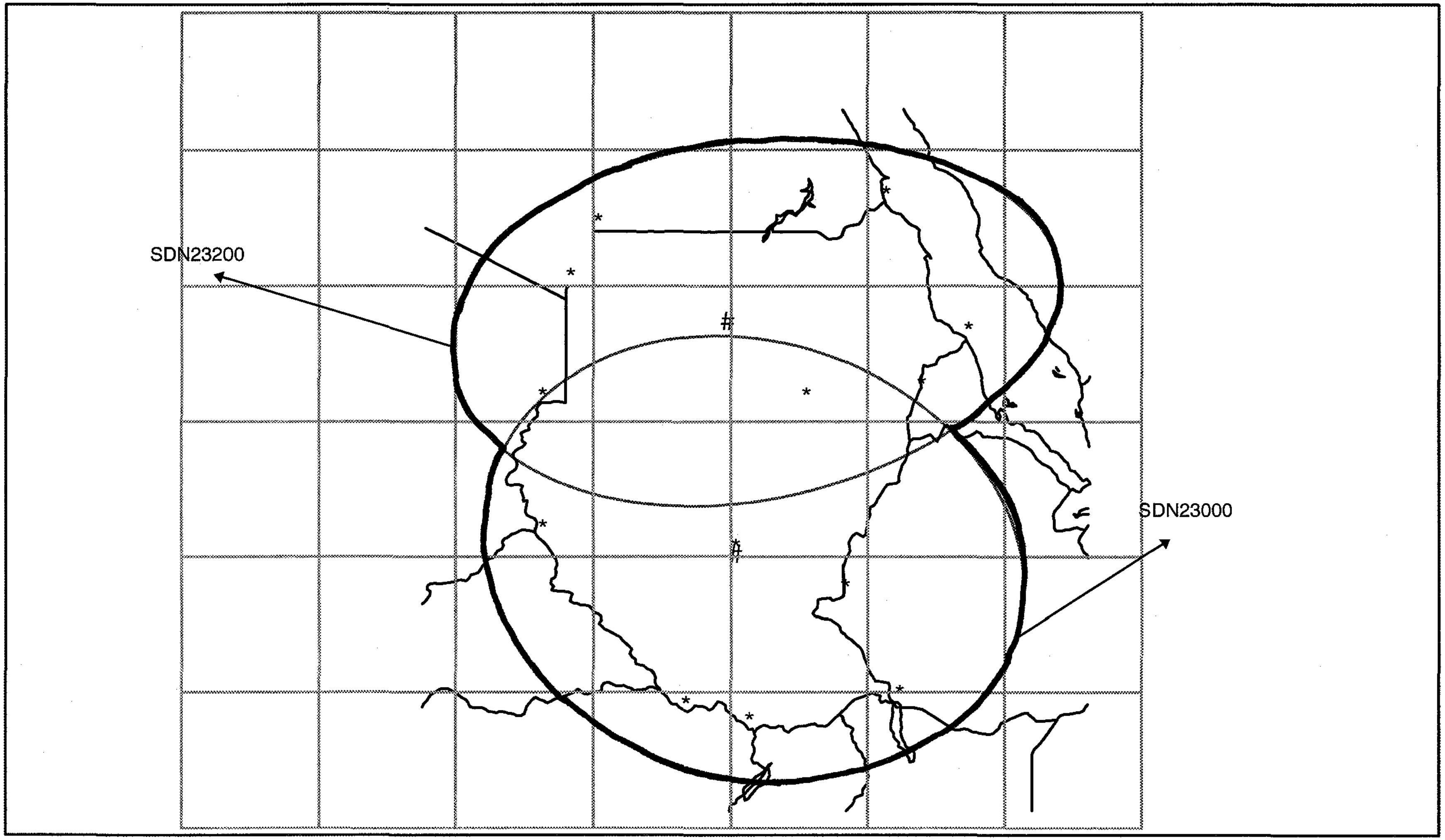
POR (37.0 W)



ITU Digitized World Map. None UP PLATE-CARREE Scale: 12876199 GRID: 5.0



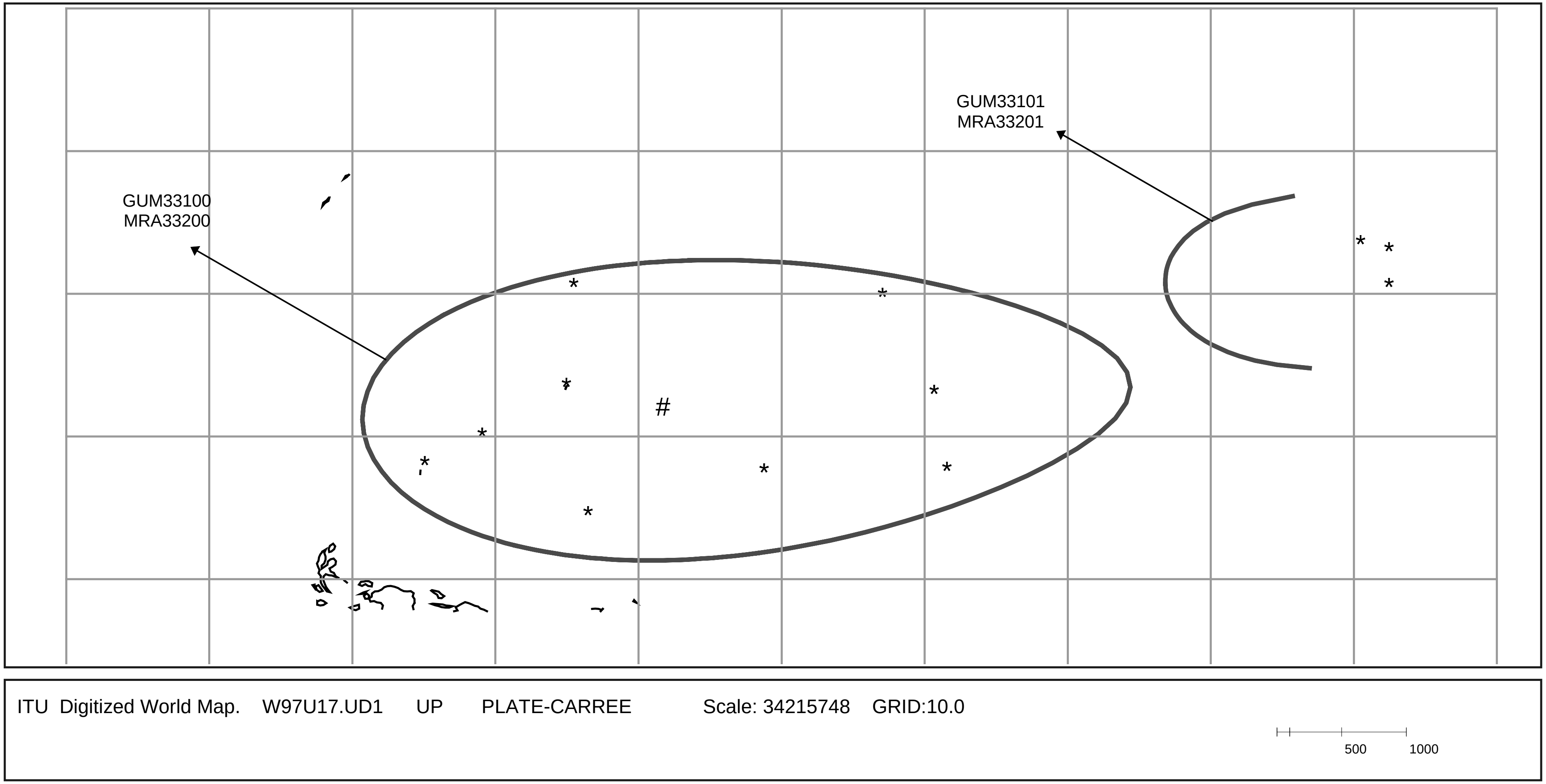
SDN (7.0 W)



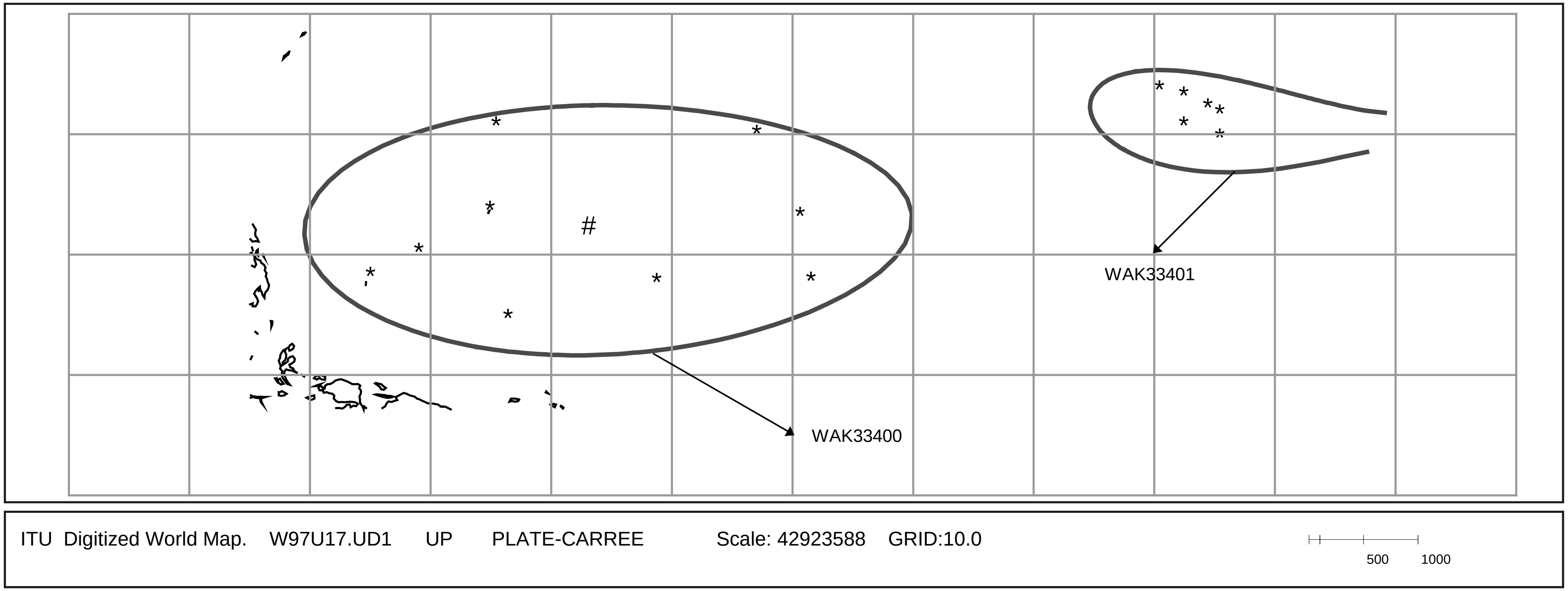
ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 21336458 GRID: 5.0

100 500 1000

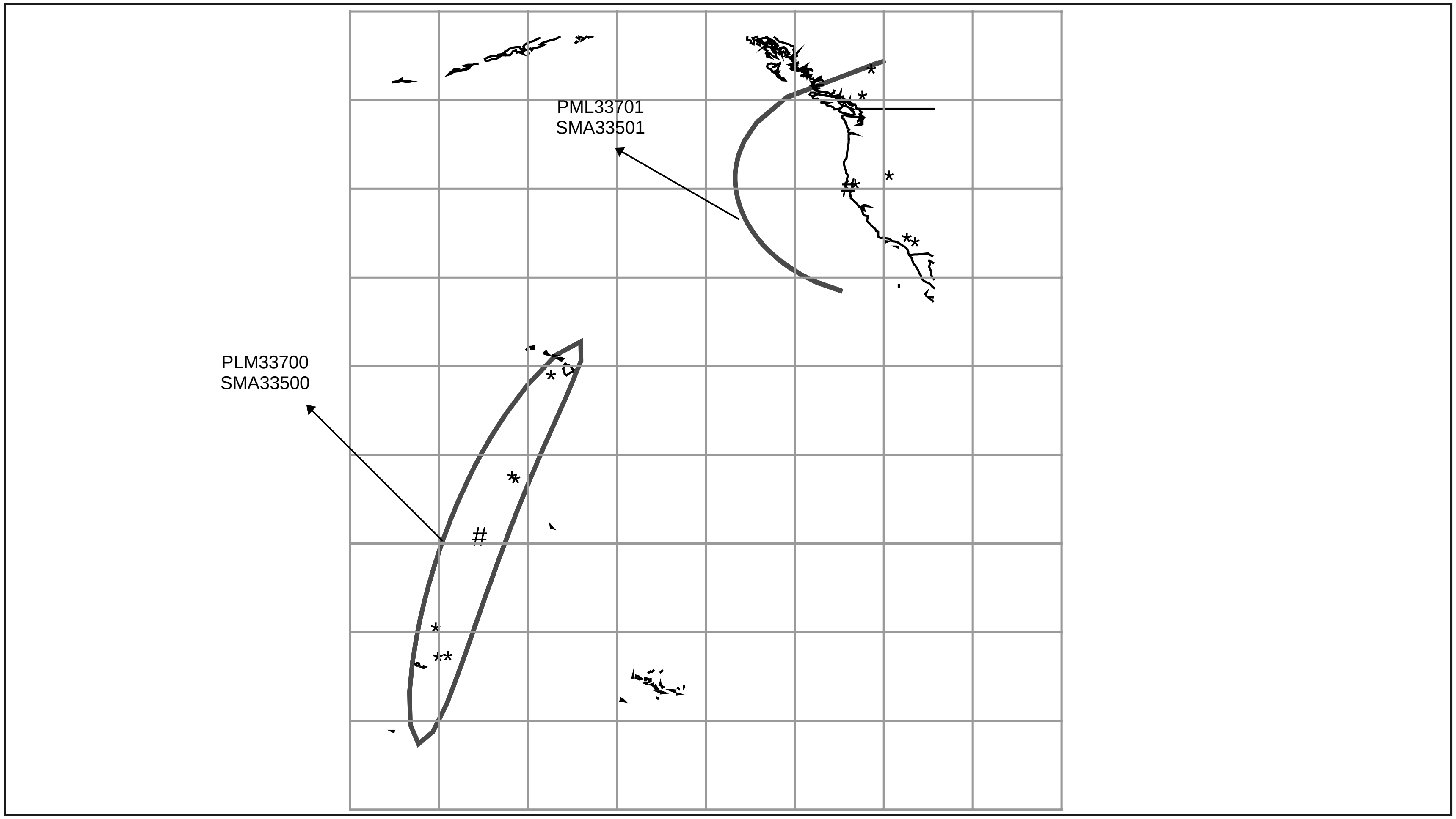
USA (GUM & MRA) (122.0 E)



USA / WAK (140.0 E)



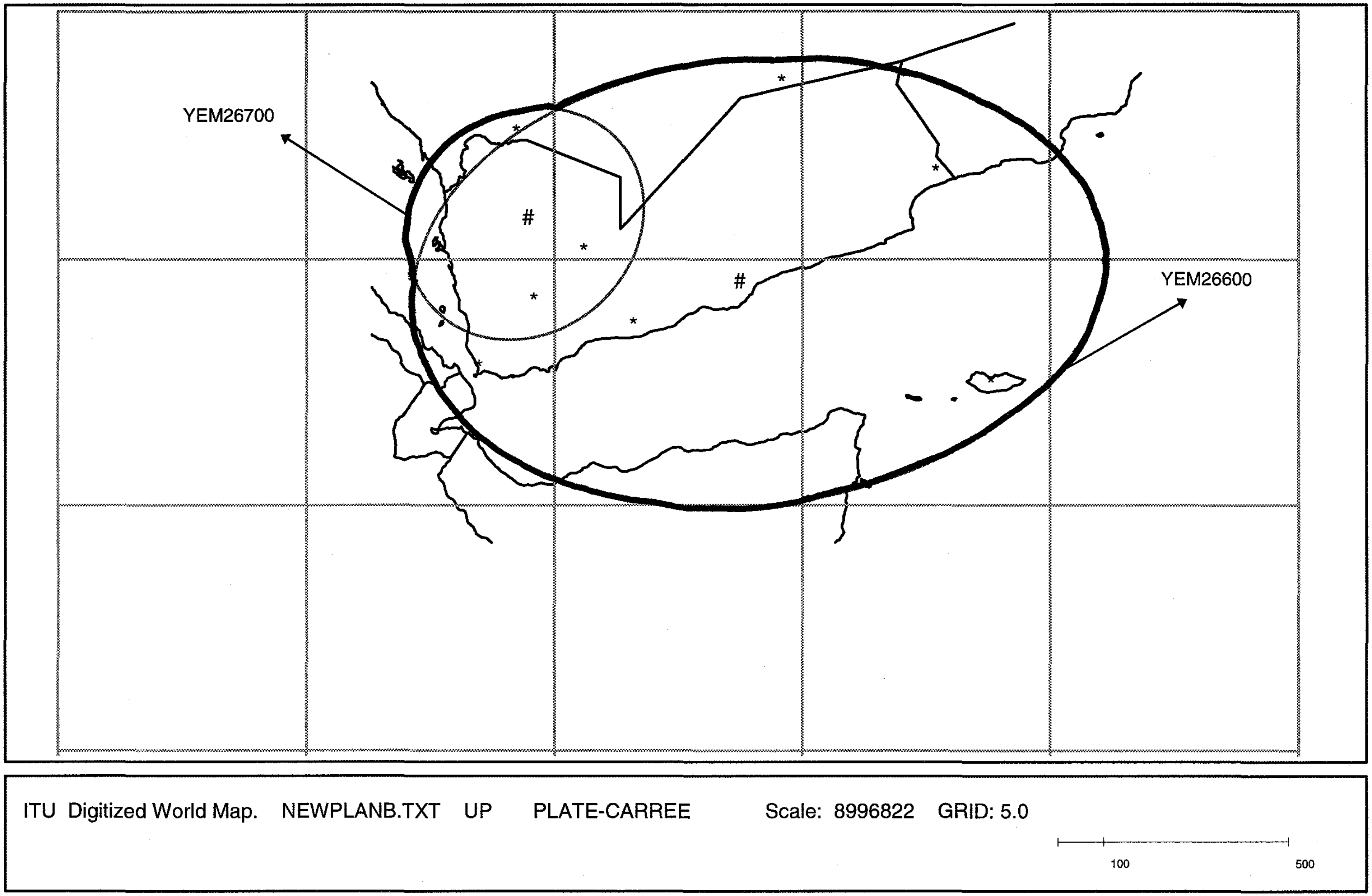
USA (PLM & SMA) (170.0 E)



ITU Digitized World Map. W97U17.UD1 UP PLATE-CARREE Scale: 69526320 GRID:10.0

500 1000

YEM (11.0 E)


YEM26700
YEM26600
ITU Digitized World Map. NEWPLANB.TXT UP PLATE-CARREE Scale: 8996822 GRID: 5.0
100
500

ATTACHMENT 3

Source: Document IRG99-5/22

METHODOLOGY FOR COMPATIBILITY STUDIES WITH OTHER SERVICES AND THE REGION 2 PLAN

1 Feeder link causing interference

1.1 Compatibility analysis for BSS feeder link into FSS (space-to-Earth) (paragraph 4.2.1.2 of Article 4 of Appendix S30A)

1.1.1 Provision

1.1.1.1 Article 4 of Appendix S30A

"4.2.1.2 having a frequency assignment in the band 17.7-18.1 GHz to an earth station in the fixed-satellite service (space-to-Earth), which is recorded in the Master Register or which has been coordinated or is being coordinated under the provisions of No. **S9.7** and which is located within the coordination area of the feeder-link fixed-satellite earth station."

1.1.1.2 Annex 1 to Appendix S30A

"**1 Limits applicable to protect a frequency assignment in the band 17.7-18.1 GHz to an earth station in the fixed-satellite service (space-to-Earth) (see §§ 4.2.1.2 and 4.2.3.2 of Article 4 of Appendix S30A)**

An administration shall be considered as being affected if, upon application of the procedures of Section 3 of Annex 4, that administration is included in the coordination area of the frequency assignment to a transmitting feeder-link earth station.

For the purpose of this calculation, the feeder-link transmitting earth station parameters notified by the administration, which may differ from those given in Annex 3, are used."

1.1.1.3 Rules of Procedure

"4.2.1.2

In determining those administrations affected in accordance with this paragraph, the limits of Annex 1 (§ 1) and Annex 4 (§ 3) will be used for those specific earth stations in the fixed-satellite service (space-to-Earth) which are either recorded in the MIFR or notified at the time of examination under Nos. **S11.2** to **S11.9**."

1.1.2 Methodology

Because this analysis is based on the worst case (i.e. horizontal elevation angle is 0 degree, feeder-link earth stations are located on the test points which are situated near the border), the coordination contours are bigger than those which will be created at the stage of implementation of the system. Therefore, for this study practical way would be not to produce coordination contours but to list all of the specific earth stations in the fixed-satellite service (space-to-Earth) in the band 17.7-18.1 GHz, which are recorded in the MIFR at the time of examination.

It should be noted that the WRC-97 concluded that:

"Before an administration notifies to the Bureau or brings into use this frequency assignment to a transmitting feeder-link earth station in the band 17.7-18.1 GHz, it shall effect coordination of this assignment, using the method described in Annex 4, in respect of a specific earth station in the fixed-satellite service (space-to-Earth) in the band 17.7-18.1 GHz:

a) either recorded in the Master Register prior to 27 October 1997 with a favourable finding; or

b) for which a notice is received by the Bureau prior to 27 October 1997 for recording in the Master Register and which subsequently receives a favourable finding based on the Plan as it existed on 27 October 1997."

1.2 Compatibility analysis for BSS feeder link into terrestrial service (paragraph 4.2.1.3 of Article 4 of Appendix S30A)

1.2.1 Provision

1.2.1.1 Article 4 of Appendix S30A

"4.2.1.3 having a frequency assignment in the bands 14.5-14.8 GHz or 17.7-18.1 GHz to a terrestrial station in use or intended to be brought into use within three years of the projected date of bringing the feeder-link modification into use, and which is located within the coordination area of the feeder-link fixed-satellite earth station"

1.2.1.2 Annex 1 to Appendix S30A

"**2 Limits applicable to protect a terrestrial station in the bands 14.5-14.8 GHz and 17.7-18.1 GHz (see §§ 4.2.1.3 and 4.2.3.3 of Article 4 of Appendix S30A)**

An administration shall be considered as being affected if, upon application of the procedures of Appendix **S7**, that administration is included in the coordination area of the frequency assignment to a transmitting feeder-link earth station[9].

For the purpose of this calculation, the feeder-link transmitting earth station parameters notified by the administration, which may differ from those given in Annex 3, are used."

1.2.1.3 Rules of Procedure

"4.2.1.3

In determining those administrations affected in accordance with this paragraph, the limits of Annex 1 (§ 2) shall be applied. Paragraphs 4.2.1.2 and 4.2.1.3 refer to "the coordination area of the feeder link fixed-satellite earth station", implying that any modification to the Plan should be limited to feeder links with fixed earth stations. The Board noted that few entries in the Plan contain fixed feeder-link earth stations. It may be concluded from this situation that nothing prevents an administration from applying the Article 4 procedure to a typical feeder link earth station the coordination area of which should be calculated as indicated in § 7 of Appendix **S7**."

1.2.2 Methodology

This analysis identifies the large number of administrations likely to be affected which are situated closed to the service area of the examined feeder link because this analysis is based on the worst case (i.e. horizontal elevation angle is 0 degree, feeder-link earth stations are located on the test points which are situated near the border). At the implementation stage the network coordination contours might be much smaller because the location of a feeder-link earth station is decided.

Therefore, for this study a practical way would be not to produce coordination contours but to list all terrestrial stations (space-to-Earth) in the bands 14.5-14.8 GHz and 17.7-18.1 GHz, which are recorded in MIFR at the time of examination.

It should be noted that WRC-97 concluded that:

"Before an administration notifies to the Bureau or brings into use this frequency assignment to a transmitting feeder-link earth station in the bands 14.5-14.8 GHz and 17.7-18.1 GHz, it shall effect coordination of this assignment with each administration whose territory lies wholly or partly within

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[9] In Regions 1 and 3, for the application of the procedures of Appendix **S7**, the e.i.r.p. for the feeder-link earth station is the sum of the values specified in columns 13 and 14 of the Plan.

the coordination area of the feeder-link earth station, using the method described in Appendix **S7**, in respect of stations of the fixed and mobile services in the bands 14.5-14.8 GHz and 17.7-18.1 GHz:

a) either recorded in the Master Register prior to 27 October 1997 with a favourable finding; or

b) for which a notice is received by the Bureau prior to 27 October 1997 for recording in the Master Register and which subsequently receives a favourable finding based on the Plan as it existed on 27 October 1997"

1.3 Compatibility analysis for BSS feeder link into Region 2 BSS Plan (paragraph 4.2.1.4 of Article 4 of Appendix S30A)

1.3.1 Provision

1.3.1.1 Article 4 of Appendix S30A

"4.2.1.4 having an assignment for feeder links in the fixed-satellite service (Earth-to-space) with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment, which is in conformity with the Region 2 feeder-link Plan, or in respect of which proposed modifications to the Plan have already been published by the Board in accordance with the provisions of paragraphs 4.2.6.1 and 4.2.7 of this Article"

1.3.1.2 Annex 1 to Appendix S30A

"5 Limits applicable to protect a frequency assignment in the bands 17.3-18.1 GHz (Regions 1 and 3) and 17.3-17.8 GHz (Region 2) to a receiving space station in the fixed-satellite service (Earth-to-space)

An administration in Region 1 or 3 shall be considered affected by a proposed modification in Region 2 or vice versa when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder-link station would cause an increase in the noise temperature of the feeder-link space station which exceeds the threshold value of $\Delta T/T$ corresponding to 3%, where $\Delta T/T$ is calculated in accordance with the method given in Appendix **S8**, except that the maximum power densities per Hertz averaged over the worst 1 MHz are replaced by power densities per Hertz averaged over the total RF bandwidth of the feeder-link carriers (24 MHz for Region 2 and 27 MHz for Regions 1 and 3).

Interim systems of Region 2 in accordance with Resolution **42 (Rev.Orb-88)** shall not be taken into consideration when applying this provision to proposed modifications to the Regions 1 and 3 Plan. However, this provision shall be applied to Region 2 interim systems with respect to the Regions 1 and 3 Plan."

1.3.1.3 Rules of Procedure

"4.2.1.4

In determining those administrations of Region 2 that may be affected, the proposed modification of the Regions 1 and 3 Plan is examined with respect to the Region 2 Plan as it exists at the date of receipt of the proposal for modification including the proposed modifications received before that date (whether the procedure of Article 4 is complete or not). The examination will consider only those administrations having assignments whose necessary bandwidth overlaps the necessary bandwidth of the proposed modification. The Region 2 administration is identified as having services which are considered to be affected when the limits specified in § 5 of Annex 1 to Appendix **S30A** are exceeded."

1.3.2 Methodology

With the criteria and the methodology prescribed in Annex 1 and the above-mentioned Rule of Procedure, the administrations likely to be affected should be identified by running the Appendix AP29 Program using the following assumptions from Annex 3 of Appendix S30A:

– Power density per Hertz averaged over the total RF bandwidth:

  For Regions 1 and 3 assignments: Power -10 log (27 MHz) = Power -74.31 dB(W/Hz)

– Satellite system noise temperature for Region 2 assignments = 1 500 K

2 Downlink causing interference

2.1 Compatibility analysis for BSS downlink into Region 2 Plan (paragraph 4.3.1.2 of Article 4 of Appendix S30)

2.1.1 Provision

2.1.1.1 Article 4 of Appendix S30

"4.3.1.2 of Region 2 having a frequency assignment to a space station in the broadcasting-satellite service with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment, which is in conformity with the Region 2 Plan, or in respect of which proposed modifications to that Plan have already been published by the Bureau in accordance with the provisions of §§ 4.3.5.1 or 4.3.6 of this Article"

2.1.1.2 Annex 1 to Appendix S30

"3 Limits to the change in the power flux-density to protect the broadcasting-satellite service in Regions 1 and 2 in the band 12.2-12.5 GHz and in Region 3 in the band 12.5-12.7 GHz

With respect to § 4.3.1.2 of Article 4, an administration in Region 2 shall be considered as being affected if the proposed modification to the Regions 1 and 3 Plan would result in exceeding the power flux-densities given below, at any point in the service area affected.

With respect to §§ 4.3.3.2 or 4.3.3.6 of Article 4, as appropriate, an administration in Region 1 or 3 shall be considered as being affected if the proposed modification to the Region 2 Plan would result in exceeding the power flux-densities given below, at any point in the service area affected.

-147 dB(W/m^2/27 MHz)	for $0° \leq \theta < 0.44°$;
$-138 + 25 \log \theta$ dB(W/m^2/27 MHz)	for $0.44° \leq \theta < 19.1°$;
-106 dB(W/m^2/27 MHz)	for $\theta \geq 19.1°$;

where θ is:

– the difference in degrees between the longitudes of the broadcasting-satellite space station in Region 1 or 3 and the broadcasting-satellite space station affected in Region 2, *or*

– the difference in degrees between the longitudes of the broadcasting-satellite space station in Region 2 and the broadcasting-satellite space station affected in Region 1 or 3."

2.1.1.3 Rules of Procedure

"**4.3.1.2**

In determining those administrations of Region 2 that might be affected, the proposed modification of the Regions 1 and 3 Plan is examined with respect to the Region 2 Plan as it exists at the date of receipt of the proposal for modification including the proposed modifications received before that date (whether the procedure of Article 4 is complete or not). The examination will consider only those administrations having assignments whose necessary bandwidth overlaps the necessary bandwidth of the proposed modification. The Region 2 administration is identified as having services which are considered to be affected when the power flux-density over any part of its territory which lies within the service area of the Region 2 assignment under examination exceeds the limits specified in § 3 of Annex 1 to Appendix **S30**. In the absence of a defined service area contour, the area on the surface of the Earth within the −3 dB contour shall be considered as the service area of that Region 2 assignment in this examination."

2.1.2 Methodology

With the criteria and the methodology prescribed in Annex 1 and the above-mentioned Rule of Procedure, the administrations likely to be affected should be identified.

2.2 Compatibility analysis for BSS downlink into terrestrial service (paragraph 4.3.1.4 of Article 4 of Appendix S30)

2.2.1 Provision

2.2.1.1 Article 4 of Appendix S30

"4.3.1.4 having no frequency assignment in the broadcasting-satellite service in the channel concerned but in whose territory the power flux-density value exceeds the prescribed limit as a result of the proposed modification or having an assignment whose associated service area does not cover the whole of the territory of the administration, and in whose territory outside that service area the power flux-density from the broadcasting-satellite space station subject to this modification exceeds the prescribed limit as a result of the proposed modification"

2.2.1.2 Annex 1 to Appendix S30

"**8 Limits to the change in the power flux-density to protect the terrestrial services of other administrations**

a) In Region 1 or 3:

With respect to § 4.3.1.4 of Article 4, an administration in Region 1 or 3 shall be considered as being affected if the consequence of the proposed modification of an existing assignment in the Regions 1 and 3 Plan is to increase the power flux-density arriving on any part of the territory of that administration by more than 0.25 dB over that resulting from that frequency assignment in the Regions 1 and 3 Plan at the time of entry into force of the Final Acts (1977 Conference, in force on 1 January 1979). The same administration shall be considered as not being affected if the value of the power flux-density anywhere in its territory does not exceed the limits expressed in §§ 5 *a)* and 5 *b)* of this Annex applied to the frequency range 11.7-12.5 GHz.

With respect to § 4.3.1.4 of Article 4, in the case of an addition of a new assignment to the Regions 1 and 3 Plan, an administration in Region 1 or 3 is considered as being affected if the power flux-density on any part of its territory exceeds the limit expressed in § 5 *a)* and 5 *b)* of this Annex applied to the frequency range 11.7-12.5 GHz.

5 Limits to the change in the power flux-density to protect the terrestrial services of administrations in Regions 1 and 3[16]

With respect to § 4.3.3.4 of Article 4, an administration in Region 1 or 3 shall be considered as being affected if the proposed modification to the Region 2 Plan would result in the following power flux-density limits being exceeded:

a) in the frequency band 12.2-12.7 GHz for all the territories of administrations in Regions 1[17] and 3 and for any arrival angle γ:

-125 dB(W/m^2/4 kHz) for broadcasting-satellite space stations using circular polarization;

-128 dB(W/m^2/4 kHz) for broadcasting-satellite space stations using linear polarization;

b) in the frequency band 12.2-12.5 GHz for territories of administrations in Region 3 and those in the western part of Region 1, west of longitude 30° E[18]:

-132 dB(W/m^2/5 MHz)	for $0° \leq \gamma < 10°$;
$-132 + 4.2 (\gamma - 10)$ dB(W/m^2/5 MHz)	for $10° \leq \gamma < 15°$;
-111 dB(W/m^2/5 MHz)	for $15° \leq \gamma < 90°$;

4 Limits to the change in the power flux-density to protect the terrestrial services of administrations in Region 2

With respect to § 4.3.1.4 of Article 4, an administration in Region 2 shall be considered as being affected if the proposed modification to the Regions 1 and 3 Plan would result in exceeding a power flux-density, for any angle of arrival, at any point on its territories, of:

-125 dB(W/m^2/4 kHz)	when the broadcasting-satellite station uses circular polarization, *and,*
-128 dB(W/m^2/4 kHz)	when the broadcasting-satellite station uses linear polarization."

2.2.1.3 Rules of Procedure

"4.3.1.4

This paragraph is understood by the Board as being intended to protect terrestrial services in any territory or part of a territory in the three Regions where this territory or part of a territory is not covered by a broadcasting-satellite assignment in a given channel. Therefore the modification to the Regions 1 and 3 Plan should take account of:

– terrestrial stations in Regions 1 and 3; and

– terrestrial stations in Region 2.

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[16] See § 3.18 of Annex 5.

[17] In the band 12.5-12.7 GHz in Region 1, these limits are applicable only to the territory of administrations mentioned in Nos. **S5.494** and **S5.496**.

[18] See Resolution **34**.

In the case of terrestrial stations in Regions 1 and 3 the limit for the power flux-density not to be exceeded by a broadcasting-satellite space station in the same Regions is specified in section 8 *a)* of Annex 1. In the case of terrestrial stations in Region 2, the limit for the power flux-density not to be exceeded by a broadcasting-satellite space station in Regions 1 and 3 is that specified in § 4 of Annex 1 to Appendix **S30**. The agreement of an administration is required when a pfd excess exists over some part of its territory, unless the assigned bandwidth of the examined assignment is completely within the assigned bandwidth(s) of one or more assignments[1] of the potentially affected administration in the Appendix **S30** Plan and the area of pfd excess is inside the service area(s) of those Appendix **S30** assignments. In the absence of a defined service area contour, the area on the surface of the Earth within the -3 dB contour shall be considered as the service area of those Appendix **S30** assignments in this examination."

2.2.2 Methodology

With the criteria and the methodology prescribed in Annex 1 and the above-mentioned Rule of Procedure, the administrations likely to be affected should be identified.

Comparison between a corresponding former assignment (on the same channel) of the WRC-97 Plan is made (see Annex A to this Attachment). The pending coordination from WRC-97 Plan is incorporated in the list of the identification.

It is checked whether or not the administrations identified have frequency assignments in the broadcasting-satellite service for the channel concerned.

2.3 Compatibility analysis for BSS downlink into FSS (space-to-Earth) (paragraph 4.3.1.5 of Article 4 of Appendix S30)

2.3.1 Provision

2.3.1.1 Article 4 of Appendix S30

"4.3.1.5 having a frequency assignment in the band 11.7-12.2 GHz in Region 2 or 12.2-12.5 GHz in Region 3 to a space station in the fixed-satellite service which is recorded in the Master International Frequency Register (Master Register) or which has been coordinated or is being coordinated under the provisions of No. **S9.7**, or those of § 7.2.1 of this Appendix"

2.3.1.2 Annex 1 to Appendix S30

"**6 Limits to the change in the power flux-density of assignments in the Regions 1 and 3 Plan to protect the fixed-satellite service (space-to-Earth) in the band 11.7-12.2 GHz in Region 2, and of assignments in the Region 2 Plan to protect the fixed-satellite service (space-to-Earth) in the band 12.5-12.7 GHz in Region 1 and in the band 12.2-12.7 GHz in Region 3**

With respect to § 4.3.1.5 of Article 4, an administration in Region 2 shall be considered as being affected if the proposed modification to the Regions 1 and 3 Plan would result in an increase in the power flux-density on its territory of 0.25 dB or more above that resulting from the frequency assignments in the Regions 1 and 3 Plan at the time of entry into force of the Final Acts (1977 Conference, in force on 1 January 1979).

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[1] Assignments to satellite networks of international organizations should not be considered as being national assignments of administrations which notify them on behalf of international satellite organizations.

With respect to § 4.3.3.5 of Article 4, an administration in Region 1 or 3 shall be considered as being affected if the proposed modification to the Region 2 Plan would result in an increase in the power flux-density on its territory of 0.25 dB or more above that resulting from the frequency assignments in the Region 2 Plan at the time of entry into force of the Final Acts (1985 Conference).

However, where an assignment in the Regions 1 and 3 Plan or its subsequent modification gives a power flux-density of less than -138 dB(W/m^2/27 MHz) anywhere in the territory of an administration of Region 2, that administration shall be considered as not being affected; where an assignment in the Region 2 Plan or its subsequent modification gives a power flux-density of less than -160 dB(W/m^2/4 kHz) anywhere in the territory of an administration of Region 1 or 3, that administration shall be considered as not being affected."

2.3.1.3 Rules of Procedure

"4.3.1.5

1 The bands 11.7-12.2 GHz in Region 2 and 12.2-12.5 GHz in Region 3 are allocated to the fixed-satellite service (FSS). See comments made under the Rules of Procedure concerning Nos. **S5.488** and **S5.491**.

2 An administration in Region 2 is identified among those whose agreement is required under this paragraph when the following conditions are fulfilled:

a) it has assignment to fixed-satellite service space stations in the band 11.7-12.2 GHz whose assigned bandwidth overlaps the necessary bandwidth of the proposed assignment and which is:

– recorded in the MIFR, with a favourable Finding under No. **S11.31**; or

– published or received for publication for coordination under provision **S9.7**; or

– published or received for publication under § 7.2.1 of Article 7 of Appendix **S30/No. S9.8**; and

b) the power flux-density over any portion of the service area of the above-mentioned Region 2 FSS assignment resulting from the proposed Regions 1 and 3 BSS assignment exceeds the limits prescribed in §§ 1 and 3 of section 6 of Annex 1 to Appendix **S30**.

c) See also the comments made under the Rules of Procedure concerning Annex 7.

3 An administration of Region 3 is identified among those whose agreement is required under this paragraph when the following conditions are fulfilled:

a) it has assignment to fixed-satellite service space stations in the band 12.2-12.5 GHz whose assigned bandwidth overlaps the necessary bandwidth of the proposed assignment and which is:

– recorded in the MIFR, with a favourable Finding under No. **S11.31**; or

– published or received for publication for coordination under provision **S9.7**; or

– published or received for publication under § 7.2.1 of Article 7 of Appendix **S30/No. S9.8**; and

b) the power flux-density over any portion of the service area of the above-mentioned Region 3 FSS assignment resulting from the proposed Region 1 BSS assignment exceeds the limits prescribed in §§ 1 and 3 of section 6 of Annex 1 to Appendix **S30**.

c) See also the comments made under the Rules of Procedure concerning § 6 of Annex 1.

In the case of inclusion of a new assignment to the Regions 1 and 3 Plan, the limit prescribed in § 3 of section 6 of Annex 1 shall be applied with the same conditions as those mentioned in §§ 2 and 3 above (see also Rules relating to §§ 4.1 *a)* and 4.1 *b)* above)."

2.3.2 Methodology

With the criteria and the methodology prescribed in Annex 1[1] and the above-mentioned Rule of Procedure, the administrations likely to be affected should be identified.

Comparison between a corresponding former assignment (on the same channel) of the WRC-97 Plan is made (see Annex A to this Attachment). The pending coordination from WRC-97 Plan is incorporated in the list of the identification.

3 Feeder link receiving interference

3.1 Compatibility analysis for Region 2 Plan into BSS feeder link (paragraph 4.2.3.4 of Article 4 of Appendix S30)

3.1.1 Provision

3.1.1.1 Article 4 of Appendix S30A

"4.2.3.4 having an assignment for feeder-links in the fixed-satellite service (Earth-to-space) with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment, which is in conformity with the Regions 1 and 3 feeder-link Plan, or in respect of which proposed modifications to the Plan have already been published by the Bureau in accordance with the provisions of §§ 4.2.6.1 and 4.2.7 of this Article"

3.1.1.2 Annex 1 to Appendix S30A

"5 Limits applicable to protect a frequency assignment in the bands 17.3-18.1 GHz (Regions 1 and 3) and 17.3-17.8 GHz (Region 2) to a receiving space station in the fixed-satellite service (Earth-to-space)

An administration in Region 1 or 3 shall be considered affected by a proposed modification in Region 2 or vice versa when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder-link station would cause an increase in the noise temperature of the feeder-link space station which exceeds the threshold value of $\Delta T/T$ corresponding to 3%, where $\Delta T/T$ is calculated in accordance with the method given in Appendix **S8**, except that the maximum power densities per Hertz averaged over the worst 1 MHz are replaced by power densities per Hertz averaged over the total RF bandwidth of the feeder-link carriers (24 MHz for Region 2 and 27 MHz for Regions 1 and 3).

Interim systems of Region 2 in accordance with Resolution **42 (Rev.Orb-88)** shall not be taken into consideration when applying this provision to proposed modifications to the Regions 1 and 3 Plan. However, this provision shall be applied to Region 2 interim systems with respect to the Regions 1 and 3 Plan."

[1] This pfd limit will be applied in conjunction with Annex 7 to Appendix S30.

3.1.1.3 Rules of Procedure

"4.2.3.4

In determining the administrations of Regions 1 and 3 that might be affected, the proposed modification of the Region 2 Plan is examined with respect to the Regions 1 and 3 Plan as it exists at the date of receipt of the modification including all proposed modifications received before that date (whether the procedure of Article 4 is complete or not). The examination will identify only those administrations having assignments whose necessary bandwidth overlaps the necessary bandwidth of the proposed modification. An administration is identified as having services which may be affected when the limits specified in § 5 of Annex 1 to Appendix **S30A** are exceeded."

3.1.2 Methodology

With the criteria and the methodology prescribed in Annex 1 and the above-mentioned Rule of Procedure, the administrations likely to be affected should be identified by running the Appendix AP29 Program using the following assumptions:

– Power density per Hertz averaged over the total RF bandwidth:

For Region 2 assignments: Power -10 log (24 MHz) = Power -73.80 dB(W/Hz)

– Satellite system noise temperature for "existing" Regions 1 and 3 assignments before 27 October 1997 (These are default values unless other values were notified.)

= 1 800 K (for 17 GHz)

– Satellite system noise temperature for other Regions 1 and 3 assignments

= 600 K (for 17 GHz)

3.2 Compatibility analysis for FSS (space-to-Earth) into BSS feeder link (paragraph 7.1 of Article 7 of Appendix S30A)

3.2.1 Provision

3.2.1.1 Article 7 of Appendix S30A

"7.1 The provisions of Articles **S9** and **S11** and Appendix **S8** are applicable to transmitting space stations in the fixed-satellite service in the band 17.7-18.1 GHz, and the provisions of Resolution **33** are applicable to space stations in the broadcasting-satellite service in Region 2 in the band 17.3-17.8 GHz together with the provisions of Annex 4, except that in relation to feeder-link stations, the relevant criteria mentioned in Appendix **S8** are replaced by those given in Section 1 of Annex 4"

3.2.1.2 Annex 4 to Appendix S30A

"**1 Threshold values for determining when coordination is required between transmitting space stations in the fixed-satellite service or the broadcasting-satellite service and a receiving space station in the feeder-link Plans in the frequency bands 17.3-18.1 GHz (Regions 1 and 3) and 17.3-17.8 GHz (Region 2)**

With respect to § 7.1, Article 7 of this Appendix, coordination of a transmitting space station in the fixed-satellite service or in the broadcasting-satellite service with a receiving space station in a broadcasting-satellite feeder link in the Regions 1 and 3 Plan or the Region 2 Plan is required, for inter-satellite geocentric angular separations of less than 3° or greater than 150°, when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder-link station of another administration would cause an increase in the noise temperature of the feeder-link space station which exceeds a threshold value of $\Delta T_S/T_S$ corresponding to 4%. $\Delta T_S/T_S$ is calculated in accordance with Case II of the method given in Appendix **S8**.

The above provision does not apply when the geocentric angular separation between a transmitting space station in the fixed-satellite service or in the broadcasting-satellite service and a receiving space station in the feeder-link Plan, exceeds 150° of arc and the free-space power flux-density of the transmitting space station in the fixed-satellite service does not exceed a value of -137 dB(W/m^2/MHz) on the Earth's surface at the equatorial Earth limb."

3.2.2 Methodology

The fixed-satellite service networks which have transmitting space stations in the frequency band 17.7-18.1 GHz should be identified.

Then for each identified network, the AP29 program will be run with a threshold value of $\Delta T_S/T_S$ corresponding to 6% and the following assumptions.

– Power density per Hertz averaged over the total RF bandwidth:

  For Region 2 assignments: Power -10 log (24 MHz) = Power -73.80 dB(W/Hz)

– Satellite system noise temperature for "existing" Regions 1 and 3 assignments before 27 October 1997 (These are default values unless other values were notified.)

  = 1 800 K (for 17 GHz)

– Satellite system noise temperature for other Regions 1 and 3 assignments

  = 600 K (for 17 GHz)

3.3 Compatibility analysis for Region 2 unplanned BSS into BSS feeder link (paragraph 7.1 of Article 7 of Appendix S30A)

3.3.1 Provision

3.3.1.1 Article 7 of Appendix S30A

"7.1 The provisions of Articles **S9** and **S11** and Appendix **S8** are applicable to transmitting space stations in the fixed-satellite service in the band 17.7-18.1 GHz, and the provisions of Resolution **33** are applicable to space stations in the broadcasting-satellite service in Region 2 in the band 17.3-17.8 GHz together with the provisions of Annex 4, except that in relation to feeder-link stations, the relevant criteria mentioned in Appendix **S8** are replaced by those given in Section 1 of Annex 4"

3.3.1.2 Annex 4 to Appendix S30A

"**1 Threshold values for determining when coordination is required between transmitting space stations in the fixed-satellite service or the broadcasting-satellite service and a receiving space station in the feeder-link Plans in the frequency bands 17.3-18.1 GHz (Regions 1 and 3) and 17.3-17.8 GHz (Region 2)**

With respect to § 7.1, Article 7 of this Appendix, coordination of a transmitting space station in the fixed-satellite service or in the broadcasting-satellite service with a receiving space station in a broadcasting-satellite feeder link in the Regions 1 and 3 Plan or the Region 2 Plan is required, for inter-satellite geocentric angular separations of less than 3° or greater than 150°, when the power flux-density arriving at the receiving space station of a broadcasting-satellite feeder-link station of another administration would cause an increase in the noise temperature of the feeder-link space station which exceeds a threshold value of $\Delta T_S/T_S$ corresponding to 4%. $\Delta T_S/T_S$ is calculated in accordance with Case II of the method given in Appendix **S8**.

The above provision does not apply when the geocentric angular separation between a transmitting space station in the fixed-satellite service or in the broadcasting-satellite service and a receiving space station in the feeder-link Plan, exceeds 150° of arc and the free-space power flux-density of the transmitting space station in the fixed-satellite service does not exceed a value of -137 dB(W/m^2/MHz) on the Earth's surface at the equatorial Earth limb."

3.3.1.3 Resolution 33 (Rev.WRC-97)

See *resolves* 1 and 2 and Section B

"Section B. Coordination Procedure Between Space Stations in the Broadcasting-Satellite Service and Space Systems of Other Administrations

3. An administration intending to bring into use a space station in the broadcasting-satellite service shall, for the purpose of coordination with space systems of other administrations, apply the following provisions of Article **11** of the Radio Regulations:

3.1 Nos. **1041** to **1058** inclusive.

3.2.1 Nos. **1060** to **1065**[1].

3.2.2 No coordination under paragraph 3.2.1 is required when an administration proposes to change the characteristics of an existing assignment in such a way as not to increase the probability of harmful interference to stations in the space radiocommunication service of other administrations.

3.2.3 Nos. **1074** to **1105** inclusive."

3.3.2 Methodology

The Region 2 unplanned BSS networks which have transmitting space stations in the frequency band 17.3-17.8 GHz should be identified.

Then for each identified network, the AP29 program will be run with a threshold value of $\Delta T_S/T_S$ corresponding to 6% and the following assumptions.

– Power density per Hertz averaged over the total RF bandwidth:

For Region 2 assignments: Power -10 log (24 MHz) = Power -73.80 dB(W/Hz)

– Satellite system noise temperature for "existing" Regions 1 and 3 assignments before 27 October 1997 (These are default values unless other values were notified.)

= 1 800 K (for 17 GHz)

– Satellite system noise temperature for other Regions 1 and 3 assignments

= 600 K (for 17 GHz)

4 Downlink receiving interference

4.1 Compatibility analysis for Region 2 Plan into BSS downlink (paragraph 4.3.3.2 of Article 4 of Appendix S30)

4.1.1 Provision

[1] The calculation methods and the interference criteria to be employed in evaluating the interference should be based upon relevant CCIR Recommendations agreed by the administrations concerned either as a result of Resolution **703** or otherwise. In the event of disagreement on a CCIR Recommendation or in the absence of such Recommendations, the methods and criteria shall be agreed between the administrations concerned. Such agreements shall be concluded without prejudice to other administrations.

4.1.1.1 Article 4 of Appendix S30

"4.3.3.2 of Regions 1 and 3 having a frequency assignment to a space station in the broadcasting-satellite service with the necessary bandwidth, any portion of which falls within the necessary bandwidth of the proposed assignment, which is in conformity with the Regions 1 and 3 Plan, or in respect of which proposed modifications to that Plan have already been published by the Bureau in accordance with the provisions of §§ 4.3.5.1 or 4.3.6 of this Article"

4.1.1.2 Annex 1 to Appendix S30

"**3 Limits to the change in the power flux-density to protect the broadcasting-satellite service in Regions 1 and 2 in the band 12.2-12.5 GHz and in Region 3 in the band 12.5-12.7 GHz**

With respect to § 4.3.1.2 of Article 4, an administration in Region 2 shall be considered as being affected if the proposed modification to the Regions 1 and 3 Plan would result in exceeding the power flux-densities given below, at any point in the service area affected.

With respect to §§ 4.3.3.2 or 4.3.3.6 of Article 4, as appropriate, an administration in Region 1 or 3 shall be considered as being affected if the proposed modification to the Region 2 Plan would result in exceeding the power flux-densities given below, at any point in the service area affected.

-147 dB(W/m^2/27 MHz)	for 0° ≤ θ < 0.44°;
-138 + 25 log θ dB(W/m^2/27 MHz)	for 0.44° ≤ θ < 19.1°;
-106 dB(W/m^2/27 MHz)	for θ ≥ 19.1°;

where θ is:

– the difference in degrees between the longitudes of the broadcasting-satellite space station in Region 1 or 3 and the broadcasting-satellite space station affected in Region 2, *or*

– the difference in degrees between the longitudes of the broadcasting-satellite space station in Region 2 and the broadcasting-satellite space station affected in Region 1 or 3"

4.1.1.3 Rules of Procedure

"4.3.3.2

In determining the administrations of Region 1 that might be affected, the proposed modification of the Region 2 Plan is examined with respect to the Regions 1 and 3 Plan as it exists at the date of receipt of the modification including all proposed modifications received before that date (whether the procedure of Article 4 is complete or not). The examination will identify only those administrations having assignments whose necessary bandwidth overlaps the necessary bandwidth of the proposed modification. An administration of Region 1 is identified as having services which might be affected when the power flux-density over any part of its territory which lies within the service area of the Region 1 assignment under examination exceeds the limits specified in § 3 of Annex 1 to Appendix **S30**. In the absence of a defined service area contour, the area on the surface of the Earth within the -3 dB contour shall be considered as the service area of that Region 1 assignment in this examination."

4.1.2 Methodology

With the criteria and the methodology prescribed in Annex 1 and the above-mentioned Rule of Procedure, the administrations likely to be affected should be identified.

The frequency overlap and the geographical overlap (on the basis of BSS test points) between the BSS service area and the pfd excess area will be checked.

4.2 Compatibility analysis for terrestrial stations into BSS downlink (paragraph 6.1.1 of Article 6 of Appendix S30)

4.2.1 Provision

4.2.1.1 Article 6 of Appendix S30

"6.1.1 Before notifying to the Bureau a frequency assignment to a terrestrial transmitting station, an administration shall initiate coordination with any other administration having a frequency assignment to a broadcasting-satellite station in conformity with the appropriate Regional Plan if:

– the necessary bandwidths of the two transmissions overlap; *and*

– the power flux-density which would be produced by the proposed terrestrial transmitting station exceeds the value derived in accordance with Annex 3 at one or more points on the edge of the service area which is within the coverage area of the broadcasting-satellite station of that administration."

4.2.1.2 Annex 3 to Appendix S30

"2.3 Protection ratio (R)

2.3.1 The single entry protection ratio against all types of terrestrial transmissions, with the exception of amplitude-modulation multichannel television systems, is 35 dB for carrier frequency differences between the wanted and interfering signals of up to ±10 MHz, decreasing linearly from 35 dB to 0 dB for carrier frequency differences between 10 MHz and 35 MHz, and is 0 dB for frequency differences in excess of 35 MHz (see Figure 1).

2.3.2 The carrier frequency difference should be determined by reference to the frequency assignments in the broadcasting-satellite Plan or, in the case of assignments not contained within a plan, by reference to the characteristics of the proposed or operational system. For amplitude-modulation multichannel television systems which produce high peaks of power flux-density spread over a wide range of their necessary bandwidth, the protection ratio *R* is 35 dB and is independent of the carrier frequency difference.

2.3.3 A signal from a terrestrial station should be considered only if its necessary bandwidth overlaps the necessary bandwidth of the broadcasting-satellite assignment."

4.2.2 Methodology

The transmitting terrestrial stations in the frequency band 11.7-12.5 GHz should be identified.

Then C/I with the criteria of Annex 3 with respect to BSS frequency assignments (in the bands 11.7-12.5 GHz in Region 1 and 11.7-12.2 GHz in Region 3) will be calculated.

4.3 Compatibility analysis for FSS (space-to-Earth) into BSS downlink (paragraph 7.2.1 of Article 7 of Appendix S30)

4.3.1 Provision

4.3.1.1 Article 7 of Appendix S30

"7.2.1 Before an administration notifies to the Bureau or brings into use any frequency assignment to a space station in the fixed-satellite service, it shall seek the agreement of any other administration having a frequency assignment in conformity with the appropriate Regional Plan, if:

a) any portion of the necessary bandwidth proposed for the space station in the fixed-satellite service falls within the necessary bandwidth associated with the frequency assignment to the broadcasting-satellite station; *and*

b) the power flux-density which would be produced by the proposed fixed-satellite assignment exceeds the value specified in Annex 4.

For this purpose, the administration seeking agreement shall send to any other such administration the information listed in Appendix **S4**, Annexes 2A and 2B."

4.3.1.2 Annex 4 to Appendix S30

"With respect to paragraph 7.2.1 of Article 7 of this Appendix, coordination of a space station in the fixed-satellite service of Region 2 is required when, under assumed free-space propagation conditions, the power flux-density on the territory of an administration in Region 1 or Region 3 exceeds the value derived from the expressions given below.

With respect to paragraph 7.2.1 of Article 7 of this Appendix, coordination of a space station in the fixed-satellite service in Region 1 or 3 is required when, under assumed free-space propagation conditions, the power flux-density on the territory of an administration in Region 2 exceeds the value derived from the same expressions:

-147 dB(W/m^2/27 MHz)	for $0° \le \theta < 0.44°$
$-138 + 25 \log \theta$ dB(W/m^2/27 MHz)	for $0.44° \le \theta < 19.1°$
-106 dB(W/m^2/27 MHz)	for $\theta \ge 19.1°$

where θ is:

– the difference in degrees between the longitude of the interfering fixed-satellite space station in Region 2 and the longitude of the affected broadcasting-satellite space station in Regions 1 and 3, *or*

– the difference in degrees between the longitude of the interfering fixed-satellite space station in Region 1 or 3 and the longitude of the affected broadcasting-satellite space station in Region 2."

4.3.2 Methodology

The administrations likely to be affected having the fixed-satellite service transmitting space station in the frequency bands 11.7-12.2 GHz (Region 2) and 12.2-12.5 GHz (Region 3) should be identified with the criteria specified in Annex 4.

The frequency overlap and the geographical overlap (on the basis of BSS test points) between the BSS service area and the pfd excess area will be checked.

Annex: 1

ANNEX

(to Attachment 3)

Correspondence between current Region 1/3 Plan assignments and "Draft Plan "

WRC-97 Plan				**Draft Plan**			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
FJI	152.00	FJI19300	1,5,9,13	FJI	-178.00	FJI19300	1,3,5,7,9,11,13,15,17,19 (CR)
SMO	158.00	SMO05700	3,7,11,15	SMO	-178.00	SMO05700	1,3,5,7,9,11,13,15,17,19 (CR)
F	-160.00	OCE10100	4,8,12,16	F	-160.00	OCE10100	2,4,6,8,10,12,14,16,18,20 (CL)
AND	-37.00	AND34100	4,8,12,16,20	AND	-37.00	AND34100	22,24,26,28,30,32,34,36,38,40 (CR)
CVA	-37.00	CVA08300	27,31,35,39	CVA	-37.00	CVA08300	1,3,5,7,9,11,13,15,17,19 (CR)
		CVA08500	23			CVA08500	25 (CL)
GMB	-37.00	GMB30200	3,7,11,15,19	GMB	-37.00	GMB30200	1,3,5,7,9,11,13,15,17,19 (CL)
GUI	-37.00	GUI19200	1,5,9,13,17	GUI	-37.00	GUI19200	22,24,26,28,30,32,34,36,38,40 (CR)
MTN	-37.00	MTN22300	22,26,30,34,38	MTN	-37.00	MTN22300*	2,4,6,8,10,12,14,16,18,20 (CR)
		MTN28800	24,28,32,36,40			MTN28800*	
POR	-30.00	AZR13400	21,25,29,33,37	POR	-37.00	AZR13400*	1,3,5,7,9,11,13,15,17,19 (CL)
		POR13300				POR13300*	
SEN	-37.00	SEN22200	21,25,29,33,37	SEN	-37.00	SEN22200	21,23,25,27,29,31,33,35,37,39 (CL)
SMR	-37.00	SMR31100	1,5,9,13,17	SMR	-37.00	SMR31100	2,4,6,8,10,12,14,16,18,20 (CL)
G	-33.50	G 02700	4,8,12,16,20	G	-33.50	G 02700	2,4,6,8,10,12,14,16,18,20 (CR)
IRL	-33.50	IRL21100	2,6,10,14,18	IRL	-33.50	IRL21100	22,24,26,28,30,32,34,36,38,40 (CR)
ISL	-33.50	ISL04900	21,25,29,33,37	ISL	-33.50	ISL04900	21,23,25,27,29,31,33,35,37,39 (CL)
LBR	-33.50	LBR24400	3,7,11,15,19	LBR	-33.50	LBR24400	2,4,6,8,10,12,14,16,18,20 (CL)
NGR	-25.00	NGR11500	24,28,32,36,40	NGR	-33.50	NGR11500	22,24,26,28,30,32,34,36,38,40 (CL)

WRC-97 Plan				Draft Plan			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
SRL	-33.50	SRL25900	23,27,31,35,39	SRL	-33.50	SRL25900	1,3,5,7,9,11,13,15,17,19 (CR)
BFA	-30.00	BFA10700	21,25,29,33,37	BFA	-30.00	BFA10700	1,3,5,7,9,11,13,15,17,19 (CL)
CPV	-30.00	CPV30100	24,28,32,36,40	CPV	-30.00	CPV30100	1,3,5,7,9,11,13,15,17,19 (CR)
CTI	-30.00	CTI23700	22,26,30,34,38	CTI	-30.00	CTI23700	21,23,25,27,29,31,33,35,37,39 (CR)
E	-30.00	CNR13000	23,27,31,35,39	E	-30.00	CNR13000*	21,23,25,27,29,31,33,35,37,39 (CL)
		E 12900				E 12900*	
GNB	-30.00	GNB30400	2,6,10,14,18	GNB	-30.00	GNB30400	2,4,6,8,10,12,14,16,18,20 (CL)
TUN	-25.00	TUN15000	22,26,30,34	TUN	-30.00	TUN15000	2,4,6,8,10,12,14,16,18,20 (CR)
ALG	-25.00	ALG25100	2,6,10,14,18	ALG	-25.00	ALG25100*	22,24,26,28,30,32,34,36,38,40 (CR)
		ALG25200	4,8,12,16,20			ALG25200*	
BEL	-19.00	BEL01800	21,25,29,33,37	BEL	-25.00	BEL01800	21,23,25,27,29,31,33,35,37,39 (CL)
GHA	-25.00	GHA10800	23,27,31,35,39	GHA	-25.00	GHA10800	21,23,25,27,29,31,33,35,37,39 (CR)
LBY	-25.00	LBY28000	3,7,11,15,19	LBY	-25.00	LBY28000*	1,3,5,7,9,11,13,15,17,19 (CL)
		LBY32100	1,5,9,13,17			LBY32100*	
MRC	-25.00	MRC20900	21,25,29,33,37	MRC	-25.00	MRC20900	1,3,5,7,9,11,13,15,17,19 (CR)
TCD	-13.00	TCD14300	2,6,10,14,18	TCD	-25.00	TCD14300	22,24,26,28,30,32,34,36,38,40 (CL)
TGO	-25.00	TGO22600	2,6,10,14,18	TGO	-25.00	TGO22600	2,4,6,8,10,12,14,16,18,20 (CL)
AUT	-19.00	AUT01600	4,8,12,16,20	AUT	-19.00	AUT01600	21,23,25,27,29,31,33,35,37,39 (CR)
BEN	-19.00	BEN23300	3,7,11,15,19	BEN	-19.00	BEN23300	1,3,5,7,9,11,13,15,17,19 (CL)
COD	-19.00	ZAI32200	4,8,12,16,20	COD	-19.00	ZAI32200*	2,4,6,8,10,12,14,16,18,20 (CR)

WRC-97 Plan				Draft Plan			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
		ZAI32300	2,6,10,14,18			ZAI32300*	
D	-19.00	D 08700	2,6,10,14,18	D	-19.00	D 08700	2,4,6,8,10,12,14,16,18,20 (CL)
GNE	-19.00	GNE30300	23,27,31,35,39	GNE	-19.00	GNE30300	21,23,25,27,29,31,33,35,37,39 (CL)
LIE	-37.00	LIE25300	3,7,11,15,19	LIE	-19.00	LIE25300	22,24,26,28,30,32,34,36,38,40 (CL)
MLI	-37.00	MLI32700	2,6,10,14,18	MLI	-19.00	MLI32700*	1,3,5,7,9,11,13,15,17,19 (CR)
		MLI32800	4,8,12,16,20			MLI32800*	
NIG	-19.00	NIG11900	22,26,30,34,38	NIG	-19.00	NIG11900	22,24,26,28,30,32,34,36,38,40 (CR)
NMB	-19.00	NMB02500	21,25,29,33,37	NMB	-19.00	NMB02500	21,23,25,27,29,31,33,35,37,39 (CL)
SUI	-19.00	SUI14000	22,26,30,34,38	SUI	-19.00	SUI14000	1,3,5,7,9,11,13,15,17,19 (CR)
CAF	-13.00	CAF25800	24,28,32,36,40	CAF	-13.00	CAF25800	22,24,26,28,30,32,34,36,38,40 (CL)
CME	-13.00	CME30000	1,5,9,13,17	CME	-13.00	CME30000	21,23,25,27,29,31,33,35,37,39 (CR)
COG	-13.00	COG23500	22,26,30,34,38	COG	-13.00	COG23500	1,3,5,7,9,11,13,15,17,19 (CL)
CZE	17.00	CZE14400	23,27,31,35,39	CZE	-13.00	CZE14400	21,23,25,27,29,31,33,35,37,39 (CL)
GAB	-13.00	GAB26000	3,7,11,15,19	GAB	-13.00	GAB26000	1,3,5,7,9,11,13,15,17,19 (CR)
HOL	-19.00	HOL21300	23,27,31,35,39	HOL	-13.00	HOL21300	1,3,5,7,9,11,13,15,17,19 (CL)
MCO	-37.00	MCO11600	21,25,29,33,37	MCO	-13.00	MCO11600	22,24,26,28,30,32,34,36,38,40 (CR)
MLT	-13.00	MLT14700	4,8,12,16,20	MLT	-13.00	MLT14700	2,4,6,8,10,12,14,16,18,20 (CR)
SVK	17.00	SVK14400	3,7,11,15,19	SVK	-13.00	SVK14400	1,3,5,7,9,11,13,15,17,19 (CR)
AGL	-13.00	AGL29500	23,27,31,35,39	AGL	-7.00	AGL29500	22,24,26,28,30,32,34,36,38,40 (CL)
ALB	-7.00	ALB29600	22,26,30,34,38	ALB	-7.00	ALB29600	2,4,6,8,10,12,14,16,18,20 (CL)
DNK	5.00	DNK08900	12,16,20	DNK	-7.00	DNK08900*	1,3,5,7,9,11,13,15,17,19 (CL)

WRC-97 Plan				Draft Plan			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
		DNKFRO	--			DNKFRO*	
EGY	-7.00	EGY02600	4,8,12,16,20	EGY	-7.00	EGY02600	2,4,6,8,10,12,14,16,18,20 (CR)
F	-19.00	F 09300	1,5,9,13,17	F	-7.00	F 09300	1,3,5,7,9,11,13,15,17,19 (CR)
F	29.00	MYT09800	24,28,32,36,40	F	-7.00	MYT09800*	21,23,25,27,29,31,33,35,37,39 (CL)
		REU09700	22,26,30,34,38			REU09700*	
SDN	-7.00	SDN23000	23,27,31,35,39	SDN	-7.00	SDN23000*	22,24,26,28,30,32,34,36,38,40 (CR)
		SDN23100	22,26,30,34,38			SDN23100*	
		SDN23200	24,28,32,36,40			SDN23200*	
STP	-13.00	STP24100	4,8,12,16,20	STP	-7.00	STP24100	2,4,6,8,10,12,14,16,18,20 (CL)
YUG	-7.00	YUG14800	23,27,31,35,39	YUG	-7.00	YUG14800	22,24,26,28,30,32,34,36,38,40 (CL)
ISR	-13.00	ISR11000	21,25,29,33,37	ISR	-4.00	ISR11000	21,23,25,27,29,31,33,35,37,39 (CL)
BOT	-1.00	BOT29700	2,6,10,14,18	BOT	-1.00	BOT29700	21,23,25,27,29,31,33,35,37,39 (CL)
BUL	-1.00	BUL02000	4,8,12,16,20	BUL	-1.00	BUL02000	21,23,25,27,29,31,33,35,37,39 (CR)
HNG	-1.00	HNG10600	22,26,30,34,38	HNG	-1.00	HNG10600	1,3,5,7,9,11,13,15,17,19 (CL)
MOZ	-1.00	MOZ30700	4,8,12,16,20	MOZ	-1.00	MOZ30700	1,3,5,7,9,11,13,15,17,19 (CR)
ZMB	-1.00	ZMB31400	3,7,11,15,19	ZMB	-1.00	ZMB31400	1,3,5,7,9,11,13,15,17,19 (CL)
ZWE	-1.00	ZWE13500	22,26,30,34,38	ZWE	-1.00	ZWE13500	22,24,26,28,30,32,34,36,38,40 (CR)
NOR	5.00	NOR12000	14,18,38	NOR	-0.80	NOR12000	22,24,26,28,30,32,34,36,38,40 (CR)
CYP	5.00	CYP08600	21,25,29,33,37	CYP	5.00	CYP08600	21,23,25,27,29,31,33,35,37,39 (CL)
DNK	5.00	DNK09000	24,36	DNK	5.00	DNK09000	31 (CR)
		DNK09100	27,35			DNK09100	27,35 (CR)

WRC-97 Plan				Draft Plan			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
GRC	5.00	GRC10500	3,7,11,15,19	GRC	5.00	GRC10500	1,3,5,7,9,11,13,15,17,19 (CL)
ISL	5.00	ISL05000	23,31,39	ISL	5.00	ISL05000	2,6,23 (CR)
KEN	11.00	KEN24900	21,25,29,33,37	KEN	5.00	KEN24900	22,24,26,28,30,32,34,36,38,40 (CR)
LSO	5.00	LSO30500	24,28,32,36,40	LSO	5.00	LSO30500	22,24,26,28,30,32,34,36,38,40 (CR)
MWI	-1.00	MWI30800	24,28,32,36,40	MWI	5.00	MWI30800	22,24,26,28,30,32,34,36,38,40 (CL)
S	5.00	S 13800	4,8,34	S	5.00	S 13800	2,4,6,8,10,12,14,16,18,20 (CL)
SWZ	-1.00	SWZ31300	1,5,9,13,17	SWZ	5.00	SWZ31300	2,4,6,8,10,12,14,16,18,20 (CR)
AFS	5.00	AFS02100	21,25,29,33,37	AFS	11.00	AFS02100	1,3,5,7,9,11,13,15,17,19 (CL)
IRQ	11.00	IRQ25600	24,28,32,36,40	IRQ	11.00	IRQ25600	2,4,6,8,10,12,14,16,18,20 (CR)
JOR	11.00	JOR22400	23,27,31,35,39	JOR	11.00	JOR22400	21,23,25,27,29,31,33,35,37,39 (CL)
LBN	11.00	LBN27900	3,7,11,15,19	LBN	11.00	LBN27900	1,3,5,7,9,11,13,15,17,19 (CL)
ROU	-1.00	ROU13600	3,7,11,15,19	ROU	11.00	ROU13600	22,24,26,28,30,32,34,36,38,40 (CR)
RRW	11.00	RRW31000	4,8,12,16,20	RRW	11.00	RRW31000	2,4,6,8,10,12,14,16,18,20 (CL)
SYR	11.00	SYR22900	22,26,30,34	SYR	11.00	SYR22900	22,24,26,28,30,32,34,36,38,40 (CR)
TZA	11.00	TZA22500	23,27,31,35,39	TZA	11.00	TZA22500	21,23,25,27,29,31,33,35,37,39 (CR)
UGA	11.00	UGA05100	3,7,11,15,19	UGA	11.00	UGA05100	1,3,5,7,9,11,13,15,17,19 (CR)
YEM	11.00	YEM26600	2,6,10,14,18	YEM	11.00	YEM26600*	1,3,5,7,9,11,13,15,17,19 (CR)
		YEM26700	1,5,9,13,17			YEM26700*	
ARS	17.00	ARS00300	4,8,12,16,20	ARS	17.00	ARS00300*	21,23,25,27,29,31,33,35,37,39 (CL)
		ARS27500	2,6,10,14,18			ARS27500*	
BDI	11.00	BDI27000	22,26,30,34,38	BDI	17.00	BDI27000	22,24,26,28,30,32,34,36,38,40 (CR)

WRC-97 Plan				Draft Plan			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
KWT	17.00	KWT11300	22,26,30,34,38	KWT	17.00	KWT11300	1,3,5,7,9,11,13,15,17,19 (CR)
OMA	17.00	OMA12300	24,28,32,36,40	OMA	17.00	OMA12300	1,3,5,7,9,11,13,15,17,19 (CL)
PSE **	11.00	YYY00001	1,5,9,13,17	PSE**	17.00	YYY00001	2,4,6,8,10,12,14,16,18,20 (CR)
QAT	17.00	QAT24700	1,5,9,13,17	QAT	17.00	QAT24700	22,24,26,28,30,32,34,36,38,40 (CR)
LUX	-19.00	LUX11400	3,7,11,15,19	LUX	19.20	LUX11400	1,3,5,7,9,11,13,15,17,19 (CR)
ARM	23.00	ARM06400	24,28,32,36,40	ARM	23.00	ARM06400	1,3,5,7,9,11,13,15,17,19 (CR)
AZE	23.00	AZE06400	4,8,12,16,20	AZE	23.00	AZE06400	1,3,5,7,9,11,13,15,17,19 (CL)
BHR	17.00	BHR25500	23,27,31,35,39	BHR	23.00	BHR25500	2,4,6,8,10,12,14,16,18,20 (CR)
DJI	23.00	DJI09900	21,25,29,33,37	DJI	23.00	DJI09900	1,3,5,7,9,11,13,15,17,19 (CR)
ERI	23.00	ERI09200	23,27,31,35,39	ERI	23.00	ERI09200	2,4,6,8,10,12,14,16,18,20 (CL)
EST	23.00	EST06100	1,5,9,13,17	EST	23.00	EST06100	2,4,6,8,10,12,14,16,18,20 (CL)
GEO	23.00	GEO06400	22,26,30,34,38	GEO	23.00	GEO06400	21,23,25,27,29,31,33,35,37,39 (CR)
MKD	23.00	MKD14800	2,6,10,14,18	MKD	23.00	MKD14800	2,4,6,8,10,12,14,16,18,20 (CR)
SOM	23.00	SOM31200	3,7,11,15,19	SOM	23.00	SOM31200	22,24,26,28,30,32,34,36,38,40 (CR)
COM	29.00	COM20700	3,7,11,15,19	COM	29.00	COM20700	21,23,25,27,29,31,33,35,37,39 (CR)
ETH	23.00	ETH09200	22,26,30,34,38	ETH	29.00	ETH09200	21,23,25,27,29,31,33,35,37,39 (CL)
I	-19.00	I 08200	24,28,32,36,40	I	29.00	I 08200	2,4,6,8,10,12,14,16,18,20 (CL)
MAU	29.00	MAU24200	2,6,10,14,18	MAU	29.00	MAU24200*	1,3,5,7,9,11,13,15,17,19 (CR)
		MAU24300	4,8,12,16			MAU24300*	
MDG	29.00	MDG23600	1,5,9,13,17	MDG	29.00	MDG23600	1,3,5,7,9,11,13,15,17,19 (CL)
HRV	34.00	HRV14800	1,5,9,13,17	HRV	34.00	HRV14800	1,3,5,7,9,11,13,15,17,19 (CL)

WRC-97 Plan				Draft Plan			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
IRN	34.00	IRN10900	3,7,11,15,19	IRN	34.00	IRN10900	1,3,5,7,9,11,13,15,17,19 (CR)
FIN	5.00	FIN10300	2,6,10	FIN	34.50	FIN10300	2,4,6,8,10,12,14,16,18,20 (CL)
RUS	36.00	RST-1	25,27,29,31,33,35,37,39 26,28,30,32,34,36,38,40	RUS	36.00	RST-1	25,27,29,31,33,35,37,39 (CL) 26,28,30,32,34,36,38,40 (CR)
BLR	38.00	BLR06200	1,5,9,13,17	BLR	38.00	BLR06200	1,3,5,7,9,11,13,15,17,19 (CL)
PAK	38.00	PAK12700	2,6,10	PAK	38.00	PAK12700	2,4,6,8,10,12,14,16,18,20 (CR)
UKR	38.00	UKR06300	3,7,11,15,19	UKR	38.00	UKR06300	2,4,6,8,10,12,14,16,18,20 (CR)
SEY		SEY00000	--	SEY	42.50	SEY00000	22,24,26,28,30,32,34,36,38,40 (CL)
BIH	34.00	BIH14800	2,6,10,14,18	BIH	44.00	BIH14800	21,23,25,27,29,31,33,35,37,39 (CL)
KAZ	44.00	KAZ06600	24,28,32,36,40	KAZ	44.00	KAZ06600	1,3,5,7,9,11,13,15,17,19 (CL)
KGZ	44.00	KGZ07000	22,26,30,34,38	KGZ	44.00	KGZ07000	22,24,26,28,30,32,34,36,38,40 (CL)
LVA	23.00	LVA06100	21,25,29,33,37	LVA	44.00	LVA06100	1,3,5,7,9,11,13,15,17,19 (CR)
MDA	38.00	MDA06300	4,8,12,16,20	MDA	44.00	MDA06300	21,23,25,27,29,31,33,35,37,39 (CL)
MLD	44.00	MLD30600	4,8,12,16	MLD	44.00	MLD30600	2,4,6,8,10,12,14,16,18,20 (CR)
SVN	34.00	SVN14800	4,8,12,16,20	SVN	44.00	SVN14800	22,24,26,28,30,32,34,36,38,40 (CR)
TJK	44.00	TJK06900	1,5,9,13,17	TJK	44.00	TJK06900	22,24,26,28,30,32,34,36,38,40 (CR)
UZB	44.00	UZB07100	3,7,11,15,19	UZB	44.00	UZB07100	2,4,6,8,10,12,14,16,18,20 (CR)
AFG	50.00	AFG24500	3,7,11,15	AFG	50.00	AFG24500*	2,4,6,8,10,12,14,16,18,20 (CL)
		AFG24600	1,5,9,13			AFG24600*	
CLN	50.00	CLN21900	2,6,10,14	CLN	50.00	CLN21900	2,4,6,8,10,12,14,16,18,20 (CR)
LTU	23.00	LTU06100	3,7,11,15,19	LTU	50.00	LTU06100	2,4,6,8,10,12,14,16,18,20 (CL)

WRC-97 Plan				Draft Plan			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
NPL	50.00	NPL12200	17,19,21,23	NPL	50.00	NPL12200	1,3,5,7,9,11,13,15,17,19 (CR)
TKM	44.00	TKM06800	23,27,31,35,39	TKM	50.00	TKM06800	22,24,26,28,30,32,34,36,38,40 (CR)
TUR	5.00	TUR14500	1,5,9,13,17	TUR	50.00	TUR14500	1,3,5,7,9,11,13,15,17,19 (CR)
POL	-1.00	POL13200	1,5,9,13,17	POL	51.00	POL13200	22,24,26,28,30,32,34,36,38,40 (CL)
UAE	17.00	UAE27400	21,25,29,33,37	UAE	52.50	UAE27400	21,23,25,27,29,31,33,35,37,39 (CR)
IND	56.00	IND03900	1,5,9,13	IND	56.00	IND03900*	2,4,6,8,10,12,14,16,18,20 (CR)
		IND04100	18,20,22,24			IND04100*	
		IND04300	3,7,11,15			IND04300*	
		IND04500	2,6,10,14			IND04500*	
	68.00	IND04200	18,20,22,24			IND04200*	1,3,5,7,9,11,13,15,17,19 (CL)
		IND04600	17,19,21,23			IND04600*	
		IND04800	4,8,12,16			IND04800*	
RUS	56.00	RST-2	25,27,29,31,33,35,37,39 26,28,30,32,34,36,38,40	RUS	56.00	RST-2	25,27,29,31,33,35,37,39 (CL) 26,28,30,32,34,36,38,40 (CR)
CHN	79.80	CHN15400	2,6,10,14	CHN	62.00	CHN15400*	1,3,5,7,9,11,13,15,17,19 (CL)
		CHN15600	4,8,12			CHN15600*	
	62.00	CHN15500	1,5,9,13			CHN15500	2,4,6,8,10,12,14,16,18,20 (CR)
IND	68.00	IND03700	2,10,6,14	IND	68.00	IND03700	2,4,6,8,10,12,14,16,18,20 (CL)
	56.00	IND03800	17,19,21,23			IND03800*	1,3,5,7,9,11,13,15,17,19 (CR)
		IND04000	4,8,12,16			IND04000*	
	68.00	IND04700	3,7,11,15			IND04700	1,3,5,7,9,11,13,15,17,19 (CR)

WRC-97 Plan				Draft Plan			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
BGD	74.00	BGD22000	15,18,20,22,24	BGD	74.00	BGD22000	1,3,5,7,9,11,13,15,17,19 (CR)
BRU	74.00	BRU3300A	12,14,16,18	BRU	74.00	BRU3300A	2,4,6,8,10,12,14,16,18,20 (CR)
MNG	74.00	MNG24800	25,29,33,37,39	MNG	74.00	MNG24800	21,23,25,27,29,31,33,35,37,39 (CR)
SNG	74.00	SNG15100	3,7,11,15	SNG	74.00	SNG15100	1,3,5,7,9,11,13,15,17,19 (CL)
CHN	62.00	CHN15700	3,7,11	CHN	79.80	CHN15700*	1,3,5,7,9,11,13,15,17,19 (CL)
	79.80	CHN15900	18,20,22			CHN15900*	
	62.00	CHN15800	15,19,23			CHN15800	1,3,5,7,9,11,13,15,17,19 (CR)
INS	80.20	INS02800	2,4,6,8	INS	80.20	INS02800*	2,4,6,8,10,12,14,16,18,20 (CR)
		INS03000	18,20,22,24			INS03000*	
		INS03200	17,19,21,23			INS03200*	
BTN	86.00	BTN03100	5,9,13,17	BTN	86.00	BTN03100	1,3,5,7,9,11,13,15,17,19 (CR)
CBG	68.00	CBG29900	18,20,22,24	CBG	86.00	CBG29900	2,4,6,8,10,12,14,16,18,20 (CR)
MLA	86.00	MLA22700	16,18,20,22,24	MLA	86.00	MLA22700*	1,3,5,7,9,11,13,15,17,19 (CL)
		MLA22800	2,4,6,8,10			MLA22800*	
RUS	86.00	RST-3	25,27,29,31,33,35,37,39 26,28,30,32,34,36,38,40	RUS	86.00	RST-3	25,27,29,31,33,35,37,39 (CL) 26,28,30,32,34,36,38,40 (CR)
CHN	92.00	CHN16600	24	CHN	92.00	CHN16600*	1,3,5,7,9,11,13,15,17,19 (CR)
		CHN16800	22			CHN16800*	
		CHN16100	2,4,6			CHN16100*	2,4,6,8,10,12,14,16,18,20 (CL)
		CHN17500	12			CHN17500*	
		CHN17900	19			CHN17900*	

WRC-97 Plan				Draft Plan			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
		CHN18000	13			CHN18000*	
PHL	98.00	PHL28500	16,18,20,22,24	PHL	98.00	PHL28500	2,4,6,8,10,12,14,16,18,20 (CL)
THA	74.00	THA14200	1,5,9,13	THA	98.00	THA14200	1,3,5,7,9,11,13,15,17,19 (CL)
BRM	74.00	BRM29800	17,19,21,23	BRM	104.00	BRM29800	1,3,5,7,9,11,13,15,17,19 (CL)
INS	104.00	INS03500	1,5,9,13	INS	104.00	INS03500*	2,4,6,8,10,12,14,16,18,20 (CL)
		INS03600	3,7,11,15,19			INS03600*	
VTN	86.00	VTN32500	3,7,11,15	VTN	107.00	VTN32500	2,4,6,8,10,12,14,16,18,20 (CR)
J	110.00	J 11100	1,3,5,7,9,11,13,15	J	110.00	J 11100	1,3,5,7,9,11,13,15,17,19 (CR)
RUS	110.00	RUS00400	25,27,31,35,39	RUS	110.00	RUS00400	25,27,29,31,33,35,37,39 (CL) 26,28 (CR)
KOR	110.00	KOR11200	2,4,6,8,10,12	KOR	116.00	KOR11200	2,4,6,8,10,12,14,16,18,20 (CL)
CHN	122.00	CHN19000	1,5,9,13	CHN	122.00	CHN19000	1,3,5,7,9,11,13,15,17,19 (CR)
LAO	74.00	LAO28400	2,4,6,8,10	LAO	122.00	LAO28400	2,4,6,8,10,12,14,16,18,20 (CR)
USA	122.00	GUM33100	2,6,10,14,18	USA	122.00	GUM33100*	1,3,5,7,9,11,13,15,17,19 (CL)
		MRA33200	3,7,11,15,19			MRA33200*	
PNG	110.00	PNG13100	2,6,10,14	PNG	128.00	PNG13100	2,4,6,8,10,12,14,16,18,20 (CR)
SLM	146.00	SLM00000	1,5,9,13	SLM	128.00	SLM00000	1,3,5,7,9,11,13,15,17,19 (CL)
NRU	134.00	NRU30900	3,7,11,15	NRU	134.00	NRU30900	1,3,5,7,9,11,13,15,17,19 (CL)
F	140.00	NCL10000	2,6,10,14	F	140.00	NCL10000	2,4,6,8,10,12,14,16,18,20 (CR)
		WAL10200	2,6,10,14			WAL10200	2,4,6,8,10,12,14,16,18,20 (CR)
KRE	110.00	KRE28600	14,16,18,20,22	KRE	140.00	KRE28600	2,4,6,8,10,12,14,16,18,20 (CL)

WRC-97 Plan				Draft Plan			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
PLW	146.00	PLW00000	4,8,12,16,20	PLW	140.00	PLW00000	2,4,6,8,10,12,14,16,18,20 (CR)
RUS	140.00	RST-5	25,27,29,31,33,35,37,39 26,28,30,32,34,36,38,40	RUS	140.00	RST-5	25,27,29,31,33,35,37,39 (CL) 26,28,30,32,34,36,38,40 (CR)
USA	140.00	WAK33400	1,5,9,13,17	USA	140.00	WAK33400	1,3,5,7,9,11,13,15,17,19 (CR)
VUT	140.00	VUT12800	3,7,11,15	VUT	140.00	VUT12800	1,3,5,7,9,11,13,15,17,19 (CL)
FSM	146.00	FSM00000	3,7,11,15,19	FSM	146.00	FSM00000	1,3,5,7,9,11,13,15,17,19 (CL)
MHL	146.00	MHL00000	2,6,10,14,18	MHL	146.00	MHL00000	2,4,6,8,10,12,14,16,18,20 (CR)
AUS	152.00	AUS00400	3,7,11,15,19,23	AUS	152.00	AUS00400*	3,7,11,15,19,23 (CR)
		AUS0040A	3,7,11,15,19,23			AUS0040A*	
		AUS0040B	3,7,11,15,19,23			AUS0040B*	
		AUS0040C	3,7,11,15,19,23			AUS0040C*	
		AUS00500	4,8,12,16,20,24			AUS00500	4,8,12,16,20,24 (CL)
		AUS00600	2,6,10,14,18,22			AUS00600	2,6,10,14,18,22(CL)
			--			AUS0040A* (Feeder-link)	1,5 (CR)
		AUS0040A	3,7,11,15,19,23			AUS0040A*	
		AUS0040B	3,7,11,15,19,23			AUS0040B*	
		AUS0040C	3,7,11,15,19,23			AUS0040C*	
		AUS0070A	3,7,11,15,19,23			AUS0070A*	
		AUS0090A	1,5,9,13,17,21			AUS0090A*	
		AUS0090B	1,5,9,13,17,21			AUS0090B*	

WRC-97 Plan				Draft Plan			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
NZL	158.00	CKH05200	2,6,10,14	NZL	158.00	CKH05200*	1,3,5,7,9,11,13,15,17,19 (CL)
		CKH05300	4,8,12,16			CKH05300*	
		NIU05400	19,23			NIU05400*	
		NZL05500	1,5,9,13			NZL05500*	
		TKL05800	20,24			TKL05800*	
AUS	164.00	AUS00700	3,7,11,15,19,23	AUS	164.00	AUS00700*	3,7,11,15,19,23 (CR)
		AUS0070A	3,7,11,15,19,23			AUS0070A*	
		AUS00800	2,6,10,14,18,22			AUS00800	2,6,10,14,18,22 (CL)
		AUS00900	1,5,9,13,17,21			AUS00900*	1,5,9,13,17,21 (CR)
		AUS0090A	1,5,9,13,17,21			AUS0090A*	
		AUS0090B	1,5,9,13,17,21			AUS0090B*	
			--			AUS0070A (Feeder-link)*	4,8 (CL)
		AUS0040A	3,7,11,15,19,23			AUS0040A*	
		AUS0040B	3,7,11,15,19,23			AUS0040B*	
		AUS0040C	3,7,11,15,19,23			AUS0040C*	
		AUS0070A	3,7,11,15,19,23			AUS0070A*	
		AUS0090A	1,5,9,13,17,21			AUS0090A*	
		AUS0090B	1,5,9,13,17,21			AUS0090B*	
TON	170.00	TON21500	4,8,12,16	TON	170.00	TON21500	1,3,5,7,9,11,13,15,17,19 (CL)

WRC-97 Plan				Draft Plan			
ADM	**Orbital Position (° E)**	**Beam Name**	**Channels number**	**ADM**	**Orbital Position (° E)**	**Beam Name**	**Channels number**
USA	170.00	PLM33700	1,5,9,13,17	USA	170.00	PLM33700* SMA33500* SMA33000*	2,4,6,8,10,12,14,16,18,20 (CR)
		SMA33500	1,5,9,13,17				
		SMA33000	--				
KIR	176.00	KIR00001	3,7,11	KIR	176.00	KIR00001* KIR00002*	1,3,5,7,9,11,13,15,17,19 (CR)
		KIR00002	15,19,23				
TUV	176.00	TUV00000	2,6,10,14	TUV	176.00	TUV00000	2,4,6,8,10,12,14,16,18,20 (CL)

* Composite beam

** Palestinian Authority (based on Resolution 99 (Minneapolis 1998))

ATTACHMENT 4

RESULTS OF STUDIES WITH RESPECT TO BSS/BSS (DOWNLINK AND FEEDER LINK)

The results submitted to IRG-5* have not been reproduced in this document due to, on the one hand, the large number of pages involved and, on the other hand, the IRG-5 request for complimentary studies to be conducted by the Bureau, the results of which will be submitted as addenda to this Report.

ATTACHMENT 5

RESULTS OF COMPATIBILITY STUDIES WITH OTHER SERVICES AND THE REGION 2 PLAN

The results submitted to IRG-5** have not been reproduced in this document due to, on the one hand, the large number of pages and, on the other hand, the IRG-5 request for complimentary studies to be conducted by the Bureau, the results of which will be submitted as addenda to this Report.

* Documents (IRG99-5/18, 16 and 16(Corr.1)) issued at the IRG-5 meeting, available on the ITU website (http://www.itu.int/brconf/irg-gte/index.html) and TIES.

** Documents (IRG99-5/22 and 22(Corr.1)) issued at the IRG-5 meeting, available on the ITU website (http://www.itu.int/brconf/irg-gte/index.html) and TIES.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 16 to Document 35-E*
22 May 2000
Original: English

COMMITTEE 4

Brazil (Federative Republic of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

The Brazilian Administration makes the following proposal for the work of the World Radiocommunication Conference (WRC-2000) under agenda item 1.1:

MOD B/35/96

S5.481 *Additional allocation:* in Germany, Angola, Brazil, China, Ecuador, Spain, Japan, Morocco, Nigeria, Oman, Democratic People's Republic of Korea, Sweden, Tanzania and Thailand, the band 10.45-10.5 GHz is also allocated to the fixed and mobile services on a primary basis.

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* Pursuant to Resolution 26 (Rev.WRC-97) the secretariat notes that this contribution was received on 22 May 2000.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 15 to Document 35-E
8 May 2000
Original: English

PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 6 - to identify those items requiring urgent action by the radiocommunication study groups in preparation for the next world radiocommunication conference

The Brazilian Administration proposes that the following item be included by WRC-2000 in the WRC-03 agenda:

ADD B/35/95

"to consider regulatory provisions and possibly identify additional spectrum allocation in bands above 17.8 GHz for high density systems in the fixed-satellite service (HDFSS), taking full account of its future requirements".

Reasons: Studies related to frequency sharing between FS and FSS systems have indicated that the conditions for sharing between these services are greatly affected by the number of terminals in each service. Experience has shown that a low terminal density in both services characterizes a manageable sharing situation. However, situations involving a large number of terminals in one or both services (high-density systems) can be critical.

The fixed service and the fixed-satellite service currently share many frequency bands. Many of them are being identified for HDFS use. It is expected that, as the number of HDFS systems operating in these bands increases, the sharing of these bands with FSS systems, in particular with HDFSS systems, will become increasingly difficult.

The increasing number of high-density fixed service (HDFS) applications, has motivated WRC-2000 to consider aspects related to HDFS systems, including regulatory aspects, technical and operational criteria, and methods to facilitate sharing between HDFS and other services in the bands available for high-density FS applications. It is important that WRC-03 consider the possible identification of additional spectrum in the bands above 17.8 GHz for use by HDFSS, guaranteeing a sufficiently wide allocation for HDFSS use on a global basis.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 14 to
Document 35-E
8 May 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 4 - in accordance with Resolution 95 (WRC-97), to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation

1 Introduction

WRC-97 has revised the limiting date for bringing into use an assignment of a satellite network, reducing the maximum period of six years plus a three-year extension referred to in No. 1550 to a maximum period of five years plus a possible extension of two years, as indicated in S11.44. Transitional arrangements related to this revision are contained in Resolution 51 (WRC-97). *Resolves* 3 of Resolution 51 establishes that for satellite networks with API received by the Bureau prior to 22 November 1997 this maximum period corresponds to a six-year period from the date of the receipt of the API plus a three-year extension pursuant to No. 1550. However, No. 1550 refers to a maximum of six years plus a three-year extension period from the date of the publication of the Special Section of the Weekly Circular (referred to in No. 1044). The Brazilian Administration proposes that the text in *resolves* 3 of Resolution 51 be made compatible to the text in No. 1550, so that the six plus three-year period be from the date of publication of the API.

2 Proposals

Modifications to Resolution 51

RESOLUTION 51 (WRC-97)

Provisional application of certain provisions of the Radio Regulations as modified by WRC-97 and transitional arrangements

NOC B/35/91

considering a), b) and *c)*

NOC B/35/92

resolves 1 and 2

MOD B/35/93

3 that, for satellite networks for which the API has been received by the Bureau prior to 22 November 1997, the maximum allowed time period from the date of publication of the Special Section of the Weekly Circular referred to in **S9.2B**~~receipt of the API~~ to bring the relevant frequency assignments into use shall be six years plus the extension pursuant to No. **1550** (see also Resolution **49 (WRC-97)**);

NOC B/35/94

resolves 4 and 5

Reasons: To make the period of six years plus the three-year extension referred to in *resolves* 3 of Resolution 51 compatible with the period of six plus three years in No. 1550, taking into account *inter alia* that this provision of the Radio Regulations is explicitly referred to in *resolves* 3.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 13 to
Document 35-E
14 March 2000
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PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.20 - to consider the issues related to the application of Nos. S9.8, S9.9 and S9.17 and the corresponding parts of Appendix S5 with respect to Appendices S30 and S30A, with a view to possible deletion of Articles 6 and 7 of Appendices S30 and S30A, also taking into consideration Recommendation 35 (WRC-95)

MODIFICATIONS TO ARTICLE S9 AND TO APPENDIX S5

Introduction

At present, Appendices S30 and S30A are self contained insofar as the procedures for coordinating assignments to other services with those in the BSS Plans are concerned. For example, Article 6 of Appendices S30 and S30A covers the coordination, notification and recording of terrestrial stations in the BSS and feeder-link bands subject to a Plan, respectively, and Article 7 plays a similar role for FSS assignments. The purpose of agenda item 1.20 is to reopen the WRC-97 issue of whether it would be simpler to use the general coordination procedure of Article S9 and the notification and recording procedures of Article S11 (after appropriate additions) in place of Articles 6 and 7 of Appendices S30 and S30A.

The fundamental issue of WRC-2000 agenda item 1.20 is whether or not to suppress Articles 6 and 7 of Appendices S30 and S30A. Upon careful review of the SC Report, it is apparent that suppressing Articles 6 and 7 (or effectively suppressing these articles by simply using them to refer to provisions of Article S9) would result in significant changes to how coordination is conducted between the planned and unplanned services.

We remain unconvinced that suppression of Articles 6 and 7, with the associated complex and significant changes, improves on the current situation. The existing procedures have been used for 20 years and no problems have arisen that cannot be corrected within the Appendices. Further, such significant revisions lead to the risk of unintended consequences associated with revising the still evolving procedures of Articles S9 and S11 to make them applicable to the other services with allocations in the Appendices S30 and S30A bands, in respect of the Plans.

Considering all this, Approach “A” of the CPM-99 Report (retention of Articles 6 and 7 of Appendices S30 and S30A and corresponding suppression or modification, as appropriate, of provisions in Article S9 and Appendix S5) is the best solution. In addition, Approach “A” includes updating of Appendices S30 and S30A to cover the sharing situations that are not currently addressed in these two Appendices.

We can support changes to the procedures of Article 4 that would facilitate modification of the Plans, and there may be consequential changes to Article 4 under Approach “A”.

The Brazilian Administration proposes to suppress the provisions Nos. S9.8 and S9.9 and retain Articles 6 and 7 of Appendices S30 and S30A (Approach “A”).

ARTICLE S9

Procedure for effecting coordination with or obtaining agreement of other administrations[1, 2, 3, 4, 5]

Section II – Procedure for effecting coordination[8, 9]

Sub-Section IIA – Requirement and request for coordination

NOC **S9.6**
to
S9.7

SUP B/35/80

S9.8

SUP B/35/81

S9.9

NOC **S9.10**
to
S9.16

MOD B/35/82

S9.17 *f)*~~[13]~~ for any specific earth station or typical mobile earth station in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services, in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**, Article 4 of Appendix **S30A** and BSS receive earth stations associated with assignments subject to the Appendix **S30** Plans;

~~[13] **S9.17.1** Application of this provision with respect to Articles 6 and 7 of Appendices S30 and S30A is suspended pending a decision of WRC-99 on the revision of these two Appendices.~~

MOD B/35/83

S9.17A *g)* for any specific earth station, in respect of other earth stations operating in the opposite direction of transmission, in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission and where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of another earth station, with the exception of the ~~frequency bands subject to the~~coordination under Article 6 of Appendix **S30**, Article 7 of Appendix **S30A** ~~Plans~~ and No. **S9.19**;

MOD B/35/84

S9.18 *h)* for any [transmitting station] of a terrestrial service in the bands referred to in No. **S9.17** within the coordination area of an earth station, in respect of this earth station, with the exception of the coordination under Nos. **S9.16** ~~and~~, **S9.19** and Article 6 of Appendix **S30**;

MOD B/35/85

S9.19 *i)* for any transmitting station of a terrestrial service or a transmitting earth station in the fixed-satellite service (Earth-to-space) in a frequency band shared on an equal primary basis with the broadcasting-satellite service, with respect to an earth station of the broadcasting-satellite service, except where this service is subject to the Appendix **S30** Plans;

NOC **S9.20**
to
S9.31

MOD B/35/86

S9.32 If the responsible administration concludes that coordination is not required under No~~s~~. **S9.7** ~~to **S9.9**~~, it shall send the relevant information pursuant to Appendix **S4** to the Bureau for action under No. **S9.34**.

NOC **S9.32**
to
S9.40A

MOD B/35/87

S9.41 Following receipt of the Weekly Circular referring to requests for coordination under No~~s~~. **S9.7** ~~to **S9.9**~~, an administration believing that it should have been included in the request shall, within four months of the date of publication of the relevant Weekly Circular, inform the initiating administration and the Bureau, giving its technical reasons for doing so, and shall request that its name be included.

NOC **S9.42**
to
S9.44

Sub-Section IIB – Acknowledgement of receipt of a request for coordination

NOC **S9.45**
to
S9.49

Sub-Section IIC – Action upon a request for coordination

MOD B/35/88

S9.51 Following its action under No. **S9.50**, the administration with which coordination was sought under No~~s~~. **S9.7** ~~to **S9.9**~~ shall, within four months of the date of publication of the Weekly Circular under No. **S9.38**, either inform the requesting administration and the Bureau of its agreement or act under No. **S9.52**.

NOC **S9.51A**
to
S9.59

Sub-Section IID – Action in the event of no reply, no decision or disagreement on a request for coordination

MOD B/35/89

S9.60 If, within the same four-month period specified in Nos. **S9.51** or **S9.51A**, an administration with which coordination is sought under Nos. **S9.7** ~~to **S9.9**~~ and **S9.15** to **S9.19** fails to reply or to give a decision under Nos. **S9.51** or **S9.51A** or, following its disagreement under No. **S9.52**, fails to provide information concerning its own assignments on which its disagreement is based, the requesting administration may seek the assistance of the Bureau.

NOC **S9.61**
to
S9.65

APPENDIX S5

Identification of administrations with which coordination is to be effected or agreement sought under the provisions of Article S9

MOD B/35/90

TABLE S5-1

Technical conditions for coordination
(see Article **S9**)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
~~No. **S9.8**~~ ~~GSO/GSO~~	~~A transmitting space station in the fixed-satellite service (FSS) using the GSO in a frequency band shared with the broadcasting-satellite service (BSS) on an equal primary basis, in respect of space stations in the latter service which are subject to the Plans in Appendix **S30**~~	~~11.7-12.2 GHz (Region 2)~~ ~~12.2-12.7 GHz (Region 3)~~ ~~12.5-12.7 GHz (Region 1)~~	~~i) There is an overlap in the necessary bandwidths of the FSS and BSS space stations; and~~ ~~ii) the power flux-density (pfd) of the FSS space station exceeds the value given in Annex 4 of Appendix **S30** on the territory of another administration located in another Region~~	~~Check by using the assigned frequencies and bandwidths;~~	~~See also Article 7 of Appendix **S30**.~~ ~~Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices.~~

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
~~No. **S9.9** GSO/GSO~~	~~A station of the FSS in a frequency band shared on an equal primary basis with the feeder links of the BSS, which are subject to the Plans in Appendix **S30A**~~	~~17.7-18.1 GHz (Region 1)~~ ~~17.7-18.1 GHz (Region 3)~~ ~~17.7-17.8 GHz (Region 2)~~	~~i) Value of $\Delta T_s/T_s$ exceeds 4% (see Section I of Annex 4 of Appendix **S30A**); and~~ ~~ii) geocentric inter-satellite angular separation is less than 3° or greater than 150°~~	~~i) Case II of Appendix **S8**~~ ~~ii) Annex 1 of Appendix **S8**~~	~~The threshold/conditions do not apply when the geocentric angular separation, between an FSS transmitting space station and a receiving space station in the feeder-link plan, exceeds 150° of arc and the free-space pfd of the FSS transmitting space station does not exceed a value of –137 dB(W/m^2/MHz) on the surface of the Earth at the equatorial limb.~~ ~~Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices.~~

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.17** GSO, non-GSO/ terrestrial	A specific earth station or a typical mobile earth station in frequency bands above 1 GHz allocated with equal rights to space and terrestrial services in respect of terrestrial stations, where the coordination area of the earth station includes the territory of another country, with the exception of the coordination under No. **S9.15**, Article 4 of Appendix **S30A** and BSS receive earth stations associated with assignments subject to the Appendix **S30** Plans	Any frequency band allocated to a space service~~, except those mentioned in the Plans in Appendix **S30A**~~	The coordination area of the earth station covers the territory of another administration	Appendix **S7** (for earth stations in the radiodetermination-satellite service (RDSS) in the bands: 1 610-1 626.5 MHz, 2 483.5-2 500 MHz and 2 500-2 516.5 MHz, see Remarks column) 1) The coordination area of aircraft earth stations is determined by increasing the service area by 1 000 km with respect to the aeronautical mobile service (terrestrial) or 500 km with respect to terrestrial services other than the aeronautical mobile service	NOTE – For RDSS earth stations, a uniform coordination distance of 400 km corresponding to an airborne earth station shall be used. In cases where the earth stations are all ground-based, a coordination distance of 100 km shall be used

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.17** GSO, non-GSO/ terrestrial (*cont.*)				2) For receiving earth stations in the meteo-rological-satellite service in frequency bands shared with the meteorological aids service, the coordina-tion distance is consi-dered to be the visibility distance as a function of the earth station horizon elevation angle for a radiosonde at an altitude of 20 km above mean sea level, assuming 4/3 Earth radius	~~Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending the decision of WRC-99 on the revision of these two Appendices~~

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.17A** GSO, non-GSO/ GSO, non-GSO	A specific earth station in respect of other earth stations operating in the opposite direction of transmission in frequency bands allocated with equal rights to space radiocommunication services in both directions of transmission, where the coordination area of the earth station includes the territory of another country or the earth station is located within the coordination area of a coordinated earth station, with the exception of ~~the frequency bands subject to the Plans in~~coordination under Article 6 of Appendix **S30**, Article 7 of Appendix **S30A** and No. **S9.19**	Any frequency band allocated to a space service	The coordination area of the earth station covers the territory of another administration or the earth station is located within the coordination area of an earth station	i) For bands in Table S5-2, see § 2 of Annex 1 of this Appendix ii) See Recommendations ITU-R IS.847, ITU-R IS.848 and ITU-R IS.849	
No. **S9.18** Terrestrial/ GSO, non-GSO	Any transmitting station of a terrestrial service in the bands referred to in No. **S9.17** within the coordination area of an earth station, in respect of this earth station, with the exception of the coordination under Nos. **S9.16** ~~and~~, **S9.19** and Article 6 of Appendix **S30**	Any frequency band allocated to a space service.	Transmitting terrestrial station is situated within the coordination area of a receiving earth station	See Remarks column	The coordination area of the affected earth station has already been determined using the calculation method of No. **S9.17**

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.19** Terrestrial/ GSO	A transmitting station in a terrestrial service or a transmitting earth station in the fixed-satellite service (Earth-to-space) in a frequency band shared on an equal primary basis with the BSS, with respect to an earth station of the broadcasting-satellite service, except where the service is subject to the Plans in Appendix **S30**	Bands listed in No. **S9.11**	i) Necessary bandwidths overlap; and ii) the pfd of the terrestrial station at the edge of the BSS service area exceeds the permissible level	Check by using the assigned frequencies and bandwidths	

Reasons: To support Approach "A" of the CPM-99 Report taking into account that some modifications in Appendices S30 and S30A are required in order to solve their inconsistencies.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.20 - to consider the issues related to the application of Nos. S9.8, S9.9 and S9.17 and the corresponding parts of Appendix S5 with respect to Appendices S30 and S30A, with a view to possible deletion of Articles 6 and 7 of Appendices S30 and S30A, also taking into consideration Recommendation 35 (WRC-95)

SECTION 5 OF ANNEX 1 OF APPENDIX S30

Introduction

Annex 1 to Appendix S30 of the Radio Regulations specifies limits for determining whether a service is affected by a proposed modification to the Plan and therefore it is necessary to seek the agreement of any other administration. Section 5 of Annex 1 specifies limits to the change in the power flux-density to protect the terrestrial services from modifications to the Region 2 BSS Plan.

ITU-R studied possible modification to the pfd limits in sections 5 *b)* and 5 *c)* of Annex 1. Section 5 *c)* specifies limits for determining whether terrestrial services of administrations in Region 1 east of longitude 30° E in the 12.2-12.7 GHz band may be affected by modifications to the Region 2 BSS Plan.

Relaxation of the pfd limits in section 5 *c)* would facilitate BSS to certain geographical areas in Region 2. BSS transmit power to certain portions of Region 2 immediately adjacent to portions of Region 1 must be significantly reduced in order to meet the specified levels in the section 5 *c)* pfd limit. These lower power levels necessitate the use of much larger BSS receive antennas than other Region 2 areas.

The pfd limits in section 5 *b)* determine if terrestrial services in Region 1 west of 30º E and all of Region 3 may be affected by modifications to the Region 2 BSS Plan.

The Brazilian Administration proposes to change sections 5 *b)* and 5 *c)* of Annex 1 of Appendix S30 as follows:

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5 Limits to the change in the power flux-density to protect the terrestrial services of administrations in Regions 1 and 3[16]

With respect to § 4.3.3.4 of Article 4, an administration in Region 1 or 3 shall be considered as being affected if the proposed modification to the Region 2 Plan would result in the following power flux-density limits being exceeded:

a) in the frequency band 12.2-12.7 GHz for all the territories of administrations in Regions 1[17] and 3 and for any arrival angle γ:

–125 dB(W/m^2/4 kHz)	for broadcasting-satellite space stations using circular polarization;
–128 dB(W/m^2/4 kHz)	for broadcasting-satellite space stations using linear polarization;

b) in the frequency band 12.2-12.~~5~~7 GHz for territories of administrations in Regions 1[17] and 3~~ and those in the western part of Region 1, west of longitude 30° E~~[18]:

–~~132~~148 dB(W/m^2/~~5 M~~4 kHz)	for 0° ≤ γ < ~~10~~5°;
–~~132~~148 + ~~4.2~~0.5 (γ – ~~10~~5) dB(W/m^2/~~5 M~~4 kHz)	for ~~10~~5° ≤ γ < ~~15~~25°;
–~~111~~138 dB(W/m^2/~~5 M~~4 kHz)	for ~~15~~25° ≤ γ < 90°;

~~*c)* in the frequency band 12.2-12.7 GHz for territories of administrations in Region 1[17], east of longitude 30° E:~~

~~–134 dB(W/m²/5 MHz)~~	~~for γ = 0°;~~
~~–134 + 4.6975 γ² dB(W/m²/5 MHz)~~	~~for 0° < γ ≤ 0.8°;~~
~~–128.5 + 25 log γ dB(W/m²/5 MHz)~~	~~for γ > 0.8°;~~

~~d~~c) in the frequency band 12.5-12.7 GHz for all the territories of administrations of Regions 1[17] and 3:

–148 dB(W/m^2/4 kHz)	for $\gamma = 0°$;
–148 + 4.6975 γ^2 dB(W/m^2/4 kHz)	for $0° < \gamma \leq 0.8°$;
–142.5 + 25 log γ dB(W/m^2/4 kHz)	for $\gamma > 0.8°$;

where γ is the angle of arrival of the incident wave above the horizontal plane, in degrees.

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[16] See § 3.18 of Annex 5.

[17] In the band 12.5-12.7 GHz in Region 1, these limits are applicable only to the territory of administrations mentioned in Nos. **S5.494** and **S5.496**.

[18] See Resolution **34**.

The Brazilian Administration reminds that consequential updates in Table 3 of Article 10 of Appendix S30 would be required.

Reasons: These pfd limits are currently contained in Table S21-4 of Article S21 for the protection of the FS from the FSS in the 12 GHz bands. These limits are more relaxed than the current limits in sections 5 *b)* and 5 *c)* at low arrival angles and thus meet the expressed concerns of the BSS community. On the other hand, they are more stringent at higher arrival angles than section 5 *c)* thus providing greater protection to the terrestrial services. Therefore these limits represent a compromise between the various requirements in the band. Furthermore the Article S21 limits have been successfully applied for a long time to protect terrestrial services from the FSS.

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PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.20 - to consider the issues related to the application of Nos. S9.8, S9.9 and S9.17 and the corresponding parts of Appendix S5 with respect to Appendices S30 and S30A, with a view to possible deletion of Articles 6 and 7 of Appendices S30 and S30A, also taking into consideration Recommendation 35 (WRC-95)

SCOPE OF FOOTNOTES S5.487 AND S5.490

Introduction

Footnotes S5.487 and S5.490 state:

S5.487 In the band 11.7-12.5 GHz in Regions 1 and 3, the fixed, fixed-satellite, mobile, except aeronautical mobile, and broadcasting services, in accordance with their respective allocations, shall not cause harmful interference to broadcasting-satellite stations operating in accordance with the provisions of Appendix **S30**.

S5.490 In Region 2, in the band 12.2-12.7 GHz, existing and future terrestrial radiocommunication services shall not cause harmful interference to the space services operating in conformity with the broadcasting-satellite Plan for Region 2 contained in Appendix **S30**.

At the Special Committee meeting, in July 1999, there were discussions on the applicability of S5.487 and S5.490 to modifications to the Appendix S30 Plans. Some views were expressed that these provisions provide a super-primary status to the BSS over other co-primary services in the band, in that it requires the other services not to cause harmful interference to the broadcasting-satellite stations operating in accordance with the provisions of Appendix S30. From this some expressed the view that these footnotes should not apply to modifications to the Plans. However, § 4.3.17 of Appendix S30, Article 4 states:

4.3.17 The Bureau shall publish in a special section of its weekly circular the information received under § 4.3.14 together with the names of any administrations with which the provisions of this Article have been successfully applied. The frequency assignment concerned shall enjoy the same status as those appearing in the appropriate Regional Plan and will be considered as a frequency assignment in conformity with the Plan.

In addition the vast majority of administrations who have brought into use, or are planning to bring into use, their BSS assignment in the Plan have submitted modifications to the ITU. This is certainly true in Region 2 where all the deployed BSS systems are the result of modifications to the Plans.

B/35/78

Considering that assignments that successfully enter the Plan through the modification procedure should continue to enjoy the same status as the original assignments, the Brazilian Administration proposes that the footnotes S5.487 and S5.490 should continue to apply to modifications as well.

Reasons: To be in accordance with § 4.3.17 of Appendix S30.

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WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.19*bis* - in accordance with Article S14, to consider objections expressed by administrations with respect to the Radio Regulations Board's Rules of Procedure relating to the application of RR 2674/S23.13 in order for the Bureau to modify its findings in accordance with the conclusions of the Conference

Introduction

No. S23.13/2674 states:

"S23.13 § 4 In devising the characteristics of a space station in the broadcasting-satellite service, all technical means available shall be used to reduce, to the maximum, the radiation over the territory of other countries unless an agreement has been previously reached with such countries."

No. S23.13 (RR 2674) was adopted at WARC-71. It was intended as a statement of good engineering practice to reduce BSS interference with the terrestrial services outside of the intended service area.

At WRC-95, however, some countries sought to have the interpretation of No. S23.13 revised to require, as a condition for registration, the approval of other countries within the service area of a BSS system proposed as a plan modification. After thorough debate, WRC-95 instructed the RRB to revise its Rules of Procedure to reflect the results of its debate. The RRB made the revisions, but further concerns were raised at WRC-97. These concerns led WRC-97 to adopt Resolution 536 (WRC-97) which resolves "that, in addition to observing No. **S23.13/2674**, and before providing satellite broadcasting services to other administrations, administrations originating the services should obtain the agreement of those other administrations."

Some administrations considering that this Rule of Procedure should be applied retroactively to BSS filings received by the BR for the application of Article 4 of Appendix S30 or under Resolution 33/Article S9 before 18 November 1995, persuaded the 1998 meeting of the ITU Council to adopt new agenda item 1.19*bis*.

B/35/77

The Brazilian Administration is of the opinion that there is no need to repeat the work and discussion of WRC-95 and WRC-97, and that Resolution 536 (WRC-97) and S23.13 are sufficient.

Additionally, the Brazilian Administration considers that WRC-2000 shall not revise the Rule of Procedure modified in 1998 to apply it retroactively to BSS filings received by the BR for the application of Article 4 of Appendix S30 or under Resolution 33/Article S9 before 18 November 1995.

Brazil also supports the existing separation of Article 4 of Appendix S30 and the Rule of Procedure for RR S23.13/2674.

Reasons: This proposal is self explanatory.

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WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.19 - to consider the report of the inter-conference representative group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system

Introduction

Resolution 532 (WRC-97) deals with the review and possible revision of the 1997 broadcasting-satellite service Plans for Regions 1 and 3. Annex 1 to this Resolution presents eight principles to be used in the planning studies.

These guiding principles include those intended to preserve the integrity of Region 2 Plan:

7 Ensure that the integrity of the Region 2 Plan and its associated provisions is preserved, by providing the same protection to the assignments contained in those Plans as is now received under the relevant provisions of the Radio Regulations, and by not requiring more protection from assignments in the Region 2 Plan than that currently provided under the Radio Regulations.

8 Ensure compatibility between the BSS in Regions 1 and 3 and services having allocations in the planned bands in all three Regions.

The resultant broadcast issues for Region 2 include:

a) ensuring the protection of the BSS and other radiocommunication services in Region 2 against interference from any revisions to the Regions 1 and 3 Plan;

b) not requiring Region 2 services to provide greater protection to Regions 1 and 3 BSS than at present;

c) maintaining a guarantee for access by FSS system serving Region 2 to the orbital arc used by BSS satellites serving Region 1 equivalent to that now provided by Annex 7 to Appendix S30; and

d) protecting Plan modifications that have entered the Article 4 procedures of Appendices S30 and S30A.

B/35/76

The Brazilian Administration is of the opinion that any possible replanning must protect Region 2 services in accordance with the current criteria of Appendices S30 and S30A, and must not introduce additional constraints upon those services, in accordance with principles 7 and 8 of Annex 1 to Resolution 532 (WRC-97). Region 2 BSS and FSS systems that have initiated the coordination procedure, or Plan modification procedure, as appropriate, should be protected by any revisions of the Regions 1 and 3 Plans. Similarly, in the other direction, Region 2 FSS and BSS systems that have initiated the coordination procedure, or Plan modification procedure, as appropriate, should not have to protect any revisions of the Regions 1 and 3 Plans. As envisioned by principles 7 and 8 of Resolution 532 (WRC-97), these other services that are currently undergoing coordination under the Radio Regulations should not be subject to new retroactive requirements.

Similarly, Brazil is of the view that, at WRC-2000, the orbital position limitations of Sections A1 and A3 of Annex 7 shall be maintained. In particular, no BSS assignments serving Region 1 should be located to the west of 37º W and, within the Annex 7 restricted portion of the arc (37º W to 10º E), all assignments must use positions at, or at most, one degree to the east of existing positions in the WRC-97 Plan. However, in the case of positions within one degree to the east of existing positions the Annex 7 requirement for an 8 dB reduction in e.i.r.p. compared to that appearing in the WARC-77 Plan, should be replaced by a 3 dB reduction compared with e.i.r.p. in the WRC-97 Plan, as a result of technical studies.

Reasons: To be in conformity with principles 7 and 8 of Resolution 532 (WRC-97).

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.13 - on the basis of the results of the studies in accordance with Resolutions 130 (WRC-97), 131 (WRC-97) and 538 (WRC-97)

1.13.1 to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

1.13.2 to consider the inclusion in other frequency bands of similar limits in Articles S21 and S22, or other regulatory approaches to be applied in relation to sharing situations

Introduction

Resolutions 130 (WRC-97) and 538 (WRC-97) have requested the ITU-R to conduct a) “appropriate technical, operational and regulatory studies” to review the regulatory conditions relating to the coexistence of non-GSO FSS and GSO FSS and GSO BSS systems, in order to ensure that undue constraints are not placed on the development of non-GSO FSS, GSO FSS and GSO BSS systems, and b) the development of a methodology for calculating the power levels produced by non-GSO FSS systems and the compliance of these levels with the applicable limits established pursuant to Resolutions 130 (WRC-97) and 538 (WRC-97).

The Brazilian Administration has participated in several technical groups where topics related to WRC-2000 agenda item 1.13 have been discussed. These groups include Joint Task Group 4-9-11, Working Parties 4A, 4-9S and 10-11S and the 1999 Conference Preparatory Meeting. Specific contributions were submitted by the Brazilian Administration mainly on issues related to sharing studies between non-GSO FSS networks and FS systems and on the functional description of the validation software to be used by BR, where an original analytical method was proposed. An extensive analysis of the points that have been discussed has produced the basis for the Brazilian Administration proposals for WRC-2000. Some views and comments of the Brazilian Administration are presented in Section 2. Section 3 contains specific proposals of the Brazilian Administration for WRC-2000.

The following paragraphs present some views and comments of the Brazilian Administration on issues related to WRC-2000 agenda item 1.13.

Power flux-density limits for non-GSO satellites in the band 17.7-19.3 GHz

CPM-99 agreed on a general form for the per satellite pfd that would guarantee protection to FS receivers from the aggregate interference produced by multiple (assumed non-homogeneous) non-GSO satellite networks operating in the 17.7-19.3 GHz band. This mask is presented in section 3.1.4.1.2 of the CPM-99 Report, and was developed based on results that were obtained by direct simulation under the conservative assumption that every visible satellite in a non-GSO constellation produces the maximum allowed pfd level at the FS receiving station. It was understood that this mask would remain adequate to protect FS receivers if the number of co-frequency non-GSO networks were as many as five. Further studies, including one made by the Brazilian Administration, have considered a more realistic model in which the pfd entries reaching a given FS receiver location are characterized by statistically independent random variables having probability density functions that depend on the operational characteristics of the non-GSO network. They have shown that the aggregate interference levels obtained under the above-mentioned conservative approach are higher than those obtained using a more realistic modelling of the pfd entries. The Brazilian Administration agrees that the per satellite pfd limits contained in section 3.1.4.1.2 of the CPM Report are certainly adequate to protect the fixed service from aggregate interference generated by the satellites of multiple, co-frequency non-GSO FSS networks operating in the 17.7-19.3 GHz band. It is understood that the extensive studies, performed under the assumption of a more realistic interference model, have indicated that in many cases, because of the operational characteristics of the non-GSO networks, positive interference margins will be present.

Power flux-density limits for non-GSO satellites in the band 10.7-12.75 GHz

Joint Task Group 4-9-11 agreed on a general form for the per satellite pfd masks that would guarantee protection to FS receivers from the aggregate interference produced by multiple (three to five), assumed non-homogeneous, non-GSO satellite networks operating in the 10.7-11.7 GHz and 11.7-12.75 GHz bands. These pfd masks were also supported at CPM-99 and are presented in section 3.1.4.1.1 of the CPM-99 Report. The Brazilian Administration agrees that these per satellite pfd masks are certainly adequate to protect the fixed service from aggregate interference generated by the satellites of multiple, co-frequency non-GSO FSS networks operating in the 10.7-12.75 GHz band.

Sharing between non-GSO FSS earth stations and the fixed service

The conditions for sharing between non-GSO FSS and FS services are greatly affected by the deployment characteristics of each service. It is expected that the low-density deployment of both services would facilitate sharing while the high-density deployment of both services would greatly increase the sharing difficulties. More specifically, the Brazilian Administration believes that the sharing between non-ubiquitous FS terminals and non-ubiquitous non-GSO FSS earth stations can be handled by the usual case-by-case coordination procedures. It also believes that the use of mitigation techniques would only be helpful in the already difficult sharing cases where only one of the services (FS or FSS) is characterized by a ubiquitous deployment of terminals. If the sharing situation involves the high-density deployment of terminals in both services, the Brazilian Administration believes that the effectiveness of these mitigation techniques would be greatly decreased and the set of possible solutions would be reduced. Possible solutions in this case would be, for example, frequency separation or the constraining of one or both services to low-density non-ubiquitous applications. In summary, the Brazilian Administration believes that situations involving the ubiquitous deployment of a large number of terminals in one or both services (FS and FSS) are the most critical ones and that, in such cases, frequency sharing in the same geographic area is very difficult. The Brazilian Administration further believes that, except near international borders where coordination may be required, this sharing problem constitutes a national issue.

Single-entry epfd limits

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in the bands 17.8-18.6 GHz and 19.7-20.2 GHz were agreed upon during the discussions that took place within Joint Task Group 4-9-11 and are reflected in the CPM-99 Report. During CPM-99, a compromise agreement was also reached concerning limits to the $epfd_{down}$ radiated by non-GSO FSS systems in the 10.7-12.75 GHz band. The resulting agreed points include:

– *Limits* (validation limits) to the $epfd_{down}$ radiated by non-GSO FSS systems in the band 10.7-12.75 GHz (for antenna diameters of 0.6 m, 1.2 m, 3 m and 10 m), including limits corresponding to special cases of high latitudes to be satisfied during 100% of the time (for antenna diameters greater than 0.6 m).

– *Operational limits* to the $epfd_{down}$ radiated by non-GSO FSS systems in the bands 10.7-12.75 GHz, to be satisfied during 100% of the time (for antenna diameters between 3 and 18 metres).

– *Additional operational limits* to the $epfd_{down}$ radiated by non-GSO FSS systems into 3 and 10 metre GSO FSS earth station antennas in the bands 10.7-12.75 GHz.

– *Limits* to the $epfd_{down}$ radiated by non-GSO FSS systems in the band 17.8-18.6 GHz (for antenna diameters of 1 m, 2 m and 5 m).

– *Operational limits* to the $epfd_{down}$ radiated by non-GSO FSS systems in the bands 17.8-18.6 GHz, to be satisfied during 100% of the time.

– *Limits* to the $epfd_{down}$ radiated by non-GSO FSS systems in the band 19.7-20.2 GHz (for antenna diameters of 0.7 m, 0.9 m, 2.5 m and 5 m).

– *Operational limits* to the $epfd_{down}$ radiated by non-GSO FSS systems in the bands 19.7-20.2 GHz, to be satisfied during 100% of the time.

Concerning the protection of GSO BSS systems, a compromise was reached at CPM-99. The compromise includes *limits* (validation) to the $epfd_{down}$ radiated by non-GSO FSS systems in the 11.7-12.7 GHz band (for antenna diameters of 0.3 m, 0.45 m, 0.6 m, 0.9 m, 1.2 m, 1.8 m, 2.4 m and 3 m) and *limits* corresponding to special cases of high latitudes to be satisfied during 100% of the time (for antenna diameters of 1.8 m, 2.4 m and 3 m). An *operational limit* (100% of the time, single entry) for 2.4 m BSS antenna diameters in a certain northern high latitude area of Region 2 was also included.

During the discussion within JTG 4-9-11 there was also agreement on *limits* to the $epfd_{up}$ radiated by non-GSO FSS systems in certain bands within the 12.5-30.0 GHz range and on *limits* to the $epfd_{is}$ radiated by non-GSO FSS systems in certain bands within the 10.7-18.4 GHz range. These agreements are reflected in the CPM-99 Report.

The Brazilian Administration supports the above-mentioned agreements and calls the attention of WRC-2000 to the following points:

– With regard to the $epfd_{down}$ *operational limits*, there is a need for regulatory procedures to implement them. These procedures should identify non-GSO systems exceeding the *operational limits* and also ensure immediate reduction of the interference level to the allowed limits by any non-GSO system exceeding the *operational limits*. There is also a need for a WRC-2000 Resolution calling for the ITU-R to develop, as a matter of urgency, Recommendations to permit administrations to check compliance with the *operational limits*.

– Concerning the $epfd_{down}$ *additional operational limits* ($epfd_{down}$ radiated into 3 m and 10 m GSO FSS earth station antennas in the 10.7-12.75 GHz band), there is a need for regulatory procedures to implement them. There is also a need for a WRC-2000 Resolution calling for ITU-R to develop, as a matter of urgency, studies aiming at the assessment of the statistical behaviour (time distribution) of the actual $epfd_{down}$ levels radiated by a non-GSO FSS system. These studies should also contemplate methodologies to consider intermediate antenna sizes. Recommendations to permit administrations to check compliance with the *additional operational limits* should also be developed.

Off-axis e.i.r.p. density limits

The Brazilian Administration supports the application of off-axis e.i.r.p. density limits to earth stations operating with GSO satellites in the bands 12.75-13.25 GHz, 13.75-14.5 GHz and 29.5-30.0 GHz. However, the Brazilian Administration do not favour the application of off-axis e.i.r.p. density limits to earth stations operating with non-GSO satellites, since it believes that if such limits are applied to the earth stations of a given non-GSO network, it would possibly be helpful only in decreasing the amount of interference affecting its own satellites (internal interference) and not in facilitating sharing with other non-GSO (or GSO) FSS systems. The Brazilian Administration also supports the idea of a grandfathering clause to protect existing earth stations that operate with systems for which complete coordination or notification information has been received by ITU before 2 June 2000.

Resolutions 130 (WRC-97) and 538 (WRC-97)

The Brazilian Administration believes that *resolves* 6 in Resolution 130 (WRC-97), concerning non-GSO FSS systems not claiming protection from GSO networks in the FSS, and *resolves* 8 in Resolution 130 (WRC-97) and 1.7 in Resolution 538 (WRC-97), both related to coordination under No. S9.12, are important and needed. The Brazilian Administration is of the opinion that *resolves* 6 and 8 of Resolution 130 (WRC-97) and *resolves* 1.7 of Resolution 538 (WRC-97) should be reflected in the pertinent footnotes of the Radio Regulations.

Use of the band 17.3-17.8 GHz (in Region 2)

The Brazilian Administration is of the opinion that the use of the band 17.3-17.8 GHz in Region 2 by FSS systems (Earth-to-space) operating with non-GSO satellites should be restricted to earth stations having antennas greater than 4.5 metres that are located in non-urban areas and that do not cause harmful interference to BSS terminals located anywhere outside the 500 m radius circle centred at the FSS earth station location.

MODIFICATIONS TO SECTION V OF ARTICLE S21

ARTICLE S21

Terrestrial and space services sharing frequency bands above 1 GHz

Section V – Limits of power flux-density from space stations

NOC

S21.16

NOC

TABLE **S21-4**

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TABLE **S21-4** *(continued)*

Frequency band	**Service***	**Limit in dB(W/m^2) for angle of arrival (δ) above the horizontal plane**			**Reference bandwidth**
		0°-5°	**5°-25°**	**25°-90°**	
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	–150 ~~14~~	–150 + 0.5(δ – 5) ~~14~~	–140 ~~14~~	4 kHz
10.7-11.7 GHz	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	–126	–126 + 0.5(δ – 5)	–116	1 MHz
11.7-12.5 GHz (Region 1) 12.5-12.75 GHz (Region 1 countries listed in Nos. **S5.494** and **S5.496**) 11.7-12.~~2~~7 GHz (Region 2) 11.7-12.~~2~~75 GHz (Region 3) ~~12.2-12.7 GHz (Region 2)~~	Fixed-satellite (space-to-Earth), non-geostationary-satellite orbit	~~–148 15~~ –124	~~–148 + 0.5(δ – 5) 15~~ –124 + 0.5(δ – 5)	~~–138 15~~ –114	~~4 kHz~~ 1 MHz

12.2-12.~~5~~75 GHz[7] (Region 3) 12.5-12.75 GHz[7] (Region 1 ~~and Region 3~~ countries listed in Nos. **S5.494** and **S5.496**)	Fixed-satellite (space-to-Earth), geostationary-satellite orbit	–148 ~~14~~	–148 + 0.5(δ – 5) ~~14~~	–138 ~~14~~	4 kHz
15.43-15.63 GHz	Fixed-satellite (space-to-Earth)	–127	5°-20°: –127 20°-25°: –127 + 0.56(δ – 20)^2	25°-29°: –113 29°-31°: –136.9 + 25 log (δ – 20) 31°-90°: –111	1 MHz
17.7-19.3 GHz[7, 8]	Fixed-satellite (space-to-Earth) Meteorological-satellite (space-to-Earth)	–115[aa] or ~~–125 12~~ –115 – X[12]	–115 + 0.5(δ – 5)[aa] or ~~–125 + (δ – 5) 12~~ –115 – X + ((10 + X)/20) (δ – 5)[12]	–105[aa] or –105 [12]	1 MHz
19.3-19.7 GHz 22.55-23.55 GHz 24.45-24.75 GHz 25.25-27.5 GHz	Fixed-satellite (space-to-Earth) Earth exploration-satellite (space-to-Earth) Inter-satellite	–115	–115 + 0.5(δ – 5)	–105	1 MHz

Reasons: To add per satellite power flux-density masks that would protect fixed service receivers from interference generated by multiple (three to five) non-GSO satellite constellations. These new masks were developed based on the aggregate interference generated by a non-GSO constellation under the assumption that every visible satellite in the constellation produces the maximum allowed pfd level at the fixed service receiver location. In the particular case of the 17.7-19.3 GHz band, studies that have used a more realistic interference model have indicated that, because of the operational characteristics of the non-GSO networks, these new masks in Table S21-4 will probably protect the FS receivers with some positive margin.

NOC

TABLE **S21-4** *(end)*

NOC

S21.16.1 to **S21.16.5**

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[12] **S21.16.6** ~~These values shall apply provisionally only to emissions of space stations on non-geostationary satellites in networks operating with a large number of satellites, that is systems operating with more than 100 satellites (see Resolution **131 (WRC-97)**).~~The function X is defined as a function of the number, N, of satellites in the non-GSO FSS constellation as follows:

– for N ≤ 50 $X = 0$ (dB)

– for 50 < N ≤ 288 $X = \frac{5}{119}(N - 50)$ (dB)

– for N > 288 $X = \frac{1}{69}(N + 402)$ (dB)

In the band 18.8-19.3 GHz, these limits apply to emissions of a space station on a non-geostationary FSS satellite for which complete coordination or notification information, as appropriate, has been received by the Radiocommunication Bureau after 17 November 1995, and which was not operational by that date.

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[12*bis*] **S21.16.6*bis*** These limits apply to emissions of a space station on a meteorological-satellite and on a geostationary FSS satellite. These limits also apply to emissions of a space station on a non-geostationary FSS satellite in the bands 18.8-19.3 GHz for which complete coordination or notification information has been received by the Radiocommunication Bureau by 17 November 1995, or are in operation by that date.

Reasons: The above regulatory text reflects the date-specific provisions currently in Resolution 131 (WRC-97). It maintains the original limits for non-GSO FSS systems in the band 18.8-19.3 GHz that were notified or operational prior to the end of WRC-95 per the decision in Resolution 131 (WRC-97). In the band 17.7-18.8 GHz, the new limits would apply to all non-GSO systems irrespective of the date of receipt of information or date of bringing into operation.

NOC

[13] **S21.16.7**

SUP B/35/30

[14] **S21.16.8**

SUP B/35/31

[15] **S21.16.9**

MODIFICATIONS TO SECTION II OF ARTICLE S22

ARTICLE S22

Space services[1]

Section II – Control of interference to geostationary-satellite systems

NOC

S22.2 to **S22.5A**

SUP B/35/32

S22.5B

Reasons: Existing texts from Nos. S22.5C to S22.5G, including Nos. S22.5C.1 and S22.5D.1, are proposed to be modified as described in the proposed provisions below.

MOD B/35/33

S22.5C § ~~5~~6 1) The equivalent power flux-density[2], epfd$_{down}$ at any point on the Earth's surface visible from the geostationary-satellite orbit, produced by emissions from all the space stations of a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Tables ~~**S22-1**~~**S22-1A** to **S22-1D**, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the limits given in Tables ~~**S22-1**~~ **S22-1A** to **S22-1D** for the given percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions, into a reference antenna and in the reference bandwidth specified in Tables ~~**S22-1**~~**S22-1A** to **S22-1D**, for all pointing directions towards the geostationary-satellite orbit.

NOC

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[1] **A.S22.1**

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[2] **S22.5C.1, D.1, F.1** The equivalent power flux-density is defined as the sum of the power flux-densities produced at a ~~point~~GSO receive station on the Earth's surface or in the geostationary orbit, as appropriate, by all ~~space~~the transmit stations within a non-geostationary-satellite system, taking into account the off-axis discrimination of a reference receiving antenna assumed to be pointing ~~towards the geostationary-satellite orbit~~in its nominal direction. The equivalent power flux-density is calculated using the following formula:

$$\cancel{epfd = 10 \cdot \log_{10}\left[\sum_{i=1}^{N_s} 10^{pfd_i/10} \cdot \frac{G_r(\theta_i)}{G_{max}}\right]}$$

$$epfd = 10 \log_{10}\left[\sum_{i=1}^{N_a} 10^{\frac{P_i}{10}} . \frac{G_t(\theta_i)}{4\pi d_i^2} . \frac{G_r(\varphi_i)}{G_{r,\max}}\right]$$

where:

N_a: number of transmit stations in the non-geostationary-satellite system that are visible from the GSO receive station considered on the Earth's surface or in the geostationary orbit, as appropriate;

i: index of the transmit station considered in the non-geostationary-satellite system;

P_i RF power at the input of the antenna of the transmit station, considered in the non-geostationary-satellite system in dBW in the reference bandwidth;

θ_i: off-axis angle between the boresight of the transmit station considered in the non-geostationary-satellite system and the direction of the GSO receive station;

$G_t(\theta_i)$: transmit antenna gain (as a ratio) of the station considered in the non-geostationary-satellite system in the direction of the GSO receive station;

d_i: distance in metres between the transmit station considered in the non-geostationary-satellite system and the GSO receive station;

φ_i: off-axis angle between the boresight of the antenna of the GSO receive station and the direction of the ith transmit station considered in the non-geostationary-satellite system;

$G_r(\varphi_i)$: receive antenna gain (as a ratio) of the GSO receive station in the direction of the ith transmit station considered in the non-geostationary-satellite system;

$G_{r,max}$: maximum gain (as a ratio) of the antenna of the GSO receive station;

epfd: is the computed equivalent power flux-density in dB(W/m^2) in the reference bandwidth.

~~N_s: number of non-geostationary space stations visible from the point considered at the Earth's surface, within an elevation angle greater than or equal to 0°;~~

~~i: index of the non-geostationary space station considered;~~

~~pfd_i: power flux-density produced at the point considered on the Earth's surface in dB(W/m^2) in the reference bandwidth;~~

~~θ_i: angle between the direction considered towards the geostationary-satellite orbit and the direction of the interfering space station in the non-geostationary-satellite system;~~

~~$G_r(\theta_i)$: gain (as a ratio) of the receive reference antenna to be considered as part of a geostationary-satellite network;~~

~~G_{max}: maximum gain (as a ratio) of the above receive reference antenna;~~

~~*epfd*: computed equivalent power flux-density in dB(W/m^2) in the reference bandwidth.~~

SUP B/35/35

TABLE **S22-1**

ADD B/35/36

TABLE **S22-1A**[3, 5]

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$epfd_{down}$ (dB(W/m^2))**	**Percentage of time during which $epfd_{down}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern**[4]
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3 and 12.5-12.75 in Regions 1 and 3	–175.4	0	40	60 cm, Rec. ITU-R S.[4/57]
	–174	90		
	–170.8	99		
	–165.3	99.73		
	–160.4	99.991		
	–160	99.997		
	–160	100		
	–181.9	0	40	1.2 m, Rec. ITU-R S.[4/57]
	–178.4	99.5		
	–173.4	99.74		
	–173	99.857		
	–164	99.954		
	–161.6	99.984		
	–161.4	99.991		
	–160.8	99.997		
	–160.5	99.997		
	–160	99.9993		
	–160	100		
	–190.45	0.00	40	3 m, Rec. ITU-R S.[4/57]
	–189.45	90.00		
	–187.45	99.50		
	–182.4	99.70		
	–182	99.855		
	–168	99.971		
	–164	99.988		
	–162	99.995		
	–160	99.999		
	–160	100		
	–195.45	0.00	40	10 m, Rec. ITU-R S.[4/57]
	–195.45	99.00		
	–190.00	99.65		
	–190	99.71		
	–172.5	99.99		
	–160	99.998		
	–160	100		

3 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

4 Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

5 In addition to the limits shown in Table **S22-1A**, the following single-entry $epfd_{down}$ limits apply to all antenna sizes greater than 60 cm in the frequency bands listed in Table **S22-1A**.

100% of the time $epfd_{down}$ (dB(W/(m^2 · 40 kHz)))	**Latitude (North or South) (degrees)**
–160	0 < |Latitude| ≤ 57.5
–160 + 3.4(57.5 – |Latitude|)/4	57.5 < |Latitude| ≤ 63.75
–165.3	63.75 ≤ |Latitude|

Reasons: During CPM-99, a compromise agreement was also reached concerning limits to the $epfd_{down}$ radiated by non-GSO FSS systems in the 10.7-12.75 GHz band. The resulting agreed points include:

– *Limits* (validation limits) to the $epfd_{down}$ radiated by non-GSO FSS systems in the band 10.7-12.75 GHz (for antenna diameters of 0.6 m, 1.2 m, 3 m and 10 m), including limits corresponding to special cases of high latitudes to be satisfied during 100% of the time (for antenna diameters greater than 0.6 m).

– *Operational limits* to the $epfd_{down}$ radiated by non-GSO FSS systems in the bands 10.7-12.75 GHz, to be satisfied during 100% of the time (for antenna diameters between 3 and 18 metres).

– *Additional operational limits* to the $epfd_{down}$ radiated by non-GSO FSS systems into 3 and 10 metre GSO FSS earth station antennas in the bands 10.7-12.75 GHz.

ADD B/35/37

TABLE **S22-1B**[6]

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$epfd_{down}$ (dB(W/m^2))**	**Percentage of time during which $epfd_{down}$ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference pattern**[7]
17.8-18.6	–175.4	0	40	1 m, Rec. ITU-R S.[4/57]
	–175.4	90		
	–172.5	99		
	–167	99.714		
	–164	99.971		
	–164	100		
	–161.4	0	1 000	
	–161.4	90		
	–158.5	99		
	–153	99.714		
	–150	99.971		
	–150	100		

17.8-18.6	–178.4 –178.4 –171.4 –170.5 –166 –164 –164	0 99.4 99.9 99.913 99.971 99.977 100	40	2 m, Rec. ITU-R S.[4/57]
	–164.4 –164.4 –157.4 –156.5 –152 –150 –150	0 99.4 99.9 99.913 99.971 99.977 100	1 000	
17.8-18.6	–185.4 –185.4 –180 –180 –172 –164 –164	0 99.8 99.8 99.943 99.943 99.998 100	40	5 m, Rec. ITU-R S.[4/57]
	–171.4 –171.4 –166 –166 –158 –150 –150	0 99.8 99.8 99.943 99.943 99.998 100	1 000	

[6] For certain receive earth stations see also ADD **S9.7A** and ADD **S9.7B**.

[7] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

Reasons: Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in the 17.8-18.6 GHz band were agreed upon during the discussions that took place within Joint Task Group 4-9-11 and are reflected in the CPM-99 Report. The resulting agreed limits include:

– *Limits* to the $epfd_{down}$ radiated by non-GSO FSS systems in the band 17.8-18.6 GHz (for antenna diameters of 1 m, 2 m and 5 m).

– *Operational limits* to the $epfd_{down}$ radiated by non-GSO FSS systems in the bands 17.8-18.6 GHz, to be satisfied during 100% of the time.

ADD B/35/38

TABLE **S22-1C**[8]

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	$epfd_{down}$ (dB(W/m^2))	Percentage of time during which $epfd_{down}$ may not be exceeded	Reference bandwidth (kHz)	Reference antenna diameter, and reference pattern[9]
19.7-20.2	–187.4	0	40	70 cm, Rec. ITU-R S.[4/57]
	–182	71.429		
	–172	97.143		
	–154	99.983		
	–154	100		
	–173.4	0	1 000	
	–168	71.429		
	–158	97.143		
	–140	99.983		
	–140	100		
19.7-20.2	–190.4	0	40	90 cm, Rec. ITU-R S.[4/57]
	–181.4	91		
	–170.4	99.8		
	–168.6	99.8		
	–165	99.943		
	–160	99.943		
	–154	99.997		
	–154	100		
	–176.4	0	1 000	
	–167.4	91		
	–156.4	99.8		
	–154.6	99.8		
	–151	99.943		
	–146	99.943		
	–140	99.997		
	–140	100		

19.7-20.2	–196.4 –162 –154 –154	0 99.98 99.99943 100	40	2.5 m, Rec. ITU-R S.[4/57]
	–182.4 –148 –140 –140	0 99.98 99.99943 100	1 000	
19.7-20.2	–200.4 –189.4 –187.8 –184 –175 –164.2 –154.6 –154 –154	0 90 94 97.143 99.886 99.99 99.999 99.9992 100	40	5 m, Rec. ITU-R S.[4/57]
	–186.4 –175.4 –173.8 –170 –161 –150.2 –140.6 –140 –140	0 90 94 97.143 99.886 99.99 99.999 99.9992 100	1 000	

[8] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[9] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

Reasons: Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in the 19.7-20.2 GHz band were agreed upon during the discussions that took place within Joint Task Group 4-9-11 and are reflected in the CPM-99 Report. The resulting agreed limits include:

– *Limits* to the $epfd_{down}$ radiated by non-GSO FSS systems in the band 19.7-20.2 GHz (for antenna diameters of 0.7 m, 0.9 m, 2.5 m and 5 m).

– *Operational limits* to the $epfd_{down}$ radiated by non-GSO FSS systems in the bands 19.7-20.2 GHz, to be satisfied during 100% of the time.

ADD B/35/39

TABLE **S22-1D**[11, 12]

Limits to the $epfd_{down}$ radiated by non-GSO FSS systems in certain frequency bands 30 cm, 45 cm, 60 cm, 90 cm, 120 cm, 180 cm, 240 cm and 300 cm BSS antennas

Frequency band (GHz)	**$epfd_{down}$ (dB(W/m^2))**	**Percentage of time during which $epfd_{down}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna diameter, and reference radiation pattern**[10]
11.7-12.5 in Region 1; 11.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	–165.841	0.000	40	30 cm, Rec. ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	–165.541	25.000		
	–164.041	96.000		
	–158.600	98.857		
	–158.600	99.429		
	–158.330	99.429		
	–158.330	100		
11.7-12.5 in Region 1; 11.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	–175.441	0.000	40	45 cm, Rec. ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	–172.441	66.000		
	–169.441	97.750		
	–164.000	99.357		
	–160.750	99.809		
	–160.000	99.986		
	–160.000	100		
11.7-12.5 in Region 1; 11.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	–176.441	0.000	40	60 cm, Rec. ITU-R BO.[Doc. 11/137(Rev.1) Annex 1]
	–173.191	97.800		
	–167.750	99.371		
	–162.000	99.886		
	–161.000	99.943		
	–160.200	99.971		
	–160.000	99.997		
	–160.000	100		
11.7-12.5 in Region 1; 11.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	–178.94	0.000	40	90 cm, Rec. ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
	–178.44	33.000		
	–176.44	98.000		
	–171.00	99.429		
	–165.50	99.714		
	–163.00	99.857		
	–161.00	99.943		
	–160.00	99.991		
	–160.00	100		

11.7-12.5 in Region 1; 11.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	–182.440 –180.690 –179.190 –178.440 –174.940 –173.750 –173.000 –169.500 –167.800 –164.000 –161.900 –161.000 –160.400 –160.000	0.000 90.000 98.900 98.900 99.500 99.680 99.680 99.850 99.915 99.940 99.970 99.990 99.998 100	40	120 cm, Rec. ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 in Region 1; 11.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	–184.941 –184.101 –181.691 –176.250 –163.250 –161.500 –160.350 –160.000 –160.000	0.000 33.000 98.500 99.571 99.946 99.974 99.993 99.999 100	40	180 cm, Rec. ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 in Region 1; 11.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	–187.441 –186.341 –183.441 –178.000 –164.400 –161.900 –160.500 –160.000 –160.000	0.000 33.000 99.250 99.786 99.957 99.983 99.994 99.999 100	40	240 cm, Rec. ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]
11.7-12.5 in Region 1; 11.7-12.2 and 12.5-12.75 in Region 3; 12.2-12.7 in Region 2	–191.941 –189.441 –185.941 –180.500 –173.000 –167.000 –162.000 –160.000 –160.000	0.000 33.000 99.500 99.857 99.914 99.951 99.983 99.991 100	40	300 cm, Rec. ITU-R BO. [Doc. 11/137(Rev.1) Annex 1]

[10] Under this section, reference patterns are to be used only for the calculation of interference from non-GSO FSS systems into GSO BSS systems.

[11] For BSS antenna diameters 180 cm, 240 cm and 300 cm, in addition to the single-entry limits shown in Table **S22-1D**, the following single-entry 100% of the time $epfd_{down}$ limit also applies in the frequency bands listed in Table **S22-1D**:

100% of the time $epfd_{down}$ dB(W/(m^2 · 40 kHz))	**Latitude (North or South) (degrees)**
–160.0	0 ≤ |Latitude| ≤ 57.5
–160.0 + 3.4(57.5 – |Latitude|)/4	57.5 ≤ |Latitude| ≤ 63.75
–165.3	63.75 ≤ |Latitude|

[12] For BSS antenna diameter 240 cm, in addition to the single-entry 100% of the time $epfd_{down}$ limit specified in footnote 11 of this table, a –167 dB(W/(m^2 · 40 kHz)) single-entry 100% of the time operational $epfd_{down}$ limit also applies to receive antennas located in Region 2, west of 140° W, north of 60° N, pointing toward GSO BSS satellites at 91° W, 101° W, 110° W, 119° W and 148° W with elevation angles greater than 5°. [This limit is implemented during a transition period of [15] years.][*]

Reasons: Concerning the protection of GSO BSS systems, a compromise was reached at CPM-99. The compromise includes *limits* (validation) to the $epfd_{down}$ radiated by non-GSO FSS systems in the 11.7-12.7 GHz band (for antenna diameters of 0.3 m, 0.45 m, 0.6 m, 0.9 m, 1.2 m, 1.8 m, 2.4 m and 3 m) and *limits* corresponding to special cases of high latitudes to be satisfied during 100% of the time (for antenna diameters of 1.8 m, 2.4 m and 3 m). An *operational limit* (100% of the time, single entry) for 2.4 m BSS antenna diameters in a certain northern high latitude area of Region 2 was also included in the compromise.

MOD B/35/40

S22.5D 2) The ~~aggregate~~equivalent power flux-density[32], $epfd_{up}$, produced at any point in the geostationary-satellite orbit by emissions from all the earth stations in a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Table **S22-2**, for all conditions and for all methods of modulation, shall not exceed the limits given in Table **S22-2** for the specified percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions, into a reference antenna and in the reference bandwidth specified in Table **S22-2**, for all pointing directions towards the Earth's surface visible from any given location in the geostationary-satellite orbit.

[*] This transitional regime would be applicable only if the pfd limits in section 5 *c)* of Annex 1 to Appendix **S30** are sufficiently relaxed.

SUP B/35/41

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~~[3] **S22.5D.1** The aggregate power flux-density is defined as the sum of the power flux- densities produced at a point in the geostationary-satellite orbit by all the earth stations of a non-geostationary-satellite system. The aggregate power flux-density is computed by means of the following formula~~:

$$\cancel{apfd = 10 \cdot \log_{10} \left[\sum_{i=1}^{N_e} 10^{P_i/10} \cdot \frac{G_t(\theta_i)}{4 \pi d_i^2} \right]}$$

~~where:~~

~~N_e: number of earth stations in the non-geostationary-satellite system with an elevation angle greater than or equal to 0°, from which the point considered in the geostationary-satellite orbit is visible;~~

~~i: index of the earth station considered in the non-geostationary-satellite system;~~

~~P_i: RF power at the input of the transmitting antenna of the earth station considered in the non-geostationary-satellite system in dBW in the reference bandwidth;~~

~~θ_i: off-axis angle between the boresight of the earth station considered in the non-geostationary-satellite system and the direction of the point considered in the geostationary-satellite orbit;~~

~~$G_t(\theta_i)$: transmit antenna gain (as a ratio) of the earth station considered in the non-geostationary-satellite system in the direction of the point considered in the geostationary-satellite orbit;~~

~~d_i: distance in metres between the earth station considered in the non-geostationary-satellite system and the point considered in the geostationary-satellite orbit;~~

~~*apfd*: aggregate power flux-density in dB(W/m^2) in the reference bandwidth.~~

~~NOTE – Tables **S22-1** to **S22-4** and Nos. **S22.26** to **S22.29** contain provisional limits corresponding to an interference level caused by one non-geostationary fixed-satellite service system in the frequency bands to be applied in accordance with Resolutions **130 (WRC-97)** and **538 (WRC-97)**. These provisional limits are subject to review by ITU-R and are subject to confirmation by WRC-99.~~

(SUP) B/35/42

TABLE **S22-2**

~~**Frequency band (GHz)**~~	~~**Aggregate pfd dB(W/m^2/4 kHz)**~~	~~**Percentage of time during which aggregate pfd level may not be exceeded**~~
~~17.3-18.1 in Regions 1 and 3 and 17.8-18.1 in Region 2~~	~~–163~~	~~100%~~

ADD B/35/43

TABLE **S22-2**

Limits to the $epfd_{up}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**$epfd_{up}$ (dB(W/m^2))**	**Percentage of time during which $epfd_{up}$ may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna beamwidth and reference radiation pattern**
12.50-12.75 12.75-13.25 13.75-14.5	–160	100	40	4°, Rec. ITU-R S.672, L_S = –20[13]
17.3-17.8 Region 1 and Region 3;[14] 17.8-18.1	–160	100	40	4°, Rec. ITU-R S.672, L_S = –20[13]
27.5-28.6	–162	100	40	1.55°, Rec. ITU-R S.672, L_S = –10[13]
29.5-30.0	–162	100	40	1.55°, Rec. ITU-R S.672, L_S = –10[13]

[13] For the case of L_S = –10, the values a = 1.83 and b = 6.32 should be used in the equations in Annex 1 of Recommendation ITU-R S.672 for single-feed circular beams. In all cases of L_S, the parabolic main beam equation should start at zero.

[14] This $epfd_{up}$ level also applies to the frequency band 17.3-17.8 GHz to protect BSS feeder links in Region 2 from non-GSO FSS Earth-to-space transmissions in Regions 1 and 3.

SUP B/35/44

S22.5E

SUP B/35/45

[4] **S22.5E.1**

(SUP) B/35/46

TABLE **S22-3**

PART A

(SUP) B/35/46*bis*

TABLE **S22-3**

PART B

MOD B/35/47

S22.5F ~~4~~3) The ~~aggregate~~ equivalent power flux-density[2]~~[5]~~, epfd$_{is}$, produced at any point in the geostationary-satellite orbit by emissions from all the ~~earth~~ space stations in a non-geostationary-satellite system in the fixed-satellite service in the frequency bands listed in Table **S22-3**, including emissions from a reflecting satellite, for all conditions and for all methods of modulation, shall not exceed the limits given in Table **S22-~~4~~3** for ~~any~~ the specified percentages of time. These limits relate to the equivalent power flux-density which would be obtained under free-space propagation conditions into a ~~the~~ reference antenna and in the reference bandwidth specified in Table **S22-~~4~~3**, for all pointing directions towards the Earth's surface visible from any given location in the geostationary-satellite orbit.

SUP B/35/48

[5] **S22.5F.1**

ADD B/35/49

TABLE **S22-3**

Limits to the epfd$_{is}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**epfd$_{is}$ dB(W/m^2)**	**Percentage of time epfd$_{is}$ level may not be exceeded**	**Reference bandwidth (kHz)**	**Reference antenna beamwidth and reference radiation pattern**[15]
10.7-11.7 (Region 1); 12.5-12.75 (Region 1); 12.7-12.75 (Region 2)	–160	100	40	4°, Rec. ITU-R S.672, L_S = –20
17.8-18.4	–160	100	40	4°, Rec. ITU-R S.672, L_S = –20

[15] Under this section, this reference pattern is to be used only for the calculation of interference from non-GSO FSS systems into GSO FSS systems.

SUP B/35/50

TABLE **S22-4**

PART A

SUP B/35/50*bis*

TABLE **S22-4**

PART B

MOD B/35/51

S22.5G The limits given in Tables **S22-1A to S22-1D**~~and **S22-3**~~ may be exceeded on the territory of any country whose administration has so agreed.

ADD B/35/52

S22.5H The limits specified in Nos. **S22.5C, S22.5D** and **S22.5F** apply to non-GSO FSS systems for which complete coordination or notification information, as appropriate, has been received after 22 November 1997.

Reasons: Reflects the "*instructs the Radiocommunication Bureau*" in Resolutions 130 (WRC-97) and 538 (WRC-97), and *resolves* 2 of Resolution 130 (WRC-97). Review of the findings by the Bureau under "*instructs the Radiocommunication Bureau*" in Resolution 130 (WRC-97) and Resolution 538 (WRC-97) should be kept in an updated version of these resolutions to cover transitional aspects. It was noted that no notification was received prior to 22 November 1997 for non-GSO FSS systems (Earth-to-space) in the bands 17.3-18.1 GHz (Regions 1 and 3) and 17.8-18.1 GHz (Region 2).

ADD B/35/53

S22.5I An administration operating a non-GSO FSS system which is in compliance with the limits in Nos. **S22.5C**, **S22.5D** and **S22.5F** (see also Resolution **WWW**) shall be considered as having fulfilled its obligations under No. **S22.2** with respect to any GSO network, irrespective of the dates of receipt by the Bureau of the complete coordination or notification information, as appropriate, for the non-GSO system and of the complete coordination information for the GSO network, provided that the $epfd_{down}$ radiated by the non-GSO FSS system into any operating GSO FSS earth station does not exceed the operational limits given in footnote 3 of Table **S22-1D** or the operational limits given in Tables **S22-4A** and **S22-4B**, when the diameter of the earth station is equal to the values given in Table **S22-4A** or the gain of the earth station is equal to or greater than the values given in Table **S22-4B** for the corresponding orbital inclination of the GSO FSS satellite. Except as otherwise agreed between concerned administrations, an administration operating a non-GSO FSS system that is subject to the limits in Nos. **S22.5C**, **S22.5D** and **S22.5F** and which radiates $epfd_{down}$ into any operating GSO FSS earth station at levels in excess of the operational limits given in footnote 3 of Table **S22-1D** or the operational limits given in Tables **S22-4A** and **S22-4B**, when the diameter of the earth station is equal to the values given in Table **S22-4A** or the gain of the earth station is equal to or greater than the values given in Table **S22-4B** for the corresponding orbital inclination of the GSO FSS satellite, shall be considered in violation of its obligations under No. **S22.2**.

Reasons: Reflects *resolves* 4 and 1.4 of Resolutions 130 (WRC-97) and 538 (WRC-97), respectively, and the principles provided in section 3.1.2.1.4.2 *c)*. Other additions to the provision correct the language, and make explicit the intention that any non-GSO FSS system that exceeds the validation, operational or additional operational limits, as applicable, shall, except otherwise agreed between concerned administrations be deemed to be in violation of its obligations under No. S22.2.

ADD B/35/54

TABLE **S22-4A**[16, 18]

Operational limits to the epfd$_{down}$ radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	**epfd$_{down}$ (dB(W/m^2))**	**Percentage of time during which epfd$_{down}$ may not be exceeded**	**Reference bandwidth (kHz)**	**Receive GSO earth station antenna diameter[17] (m)**	**Orbital inclination of GSO satellite (degrees)**
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; 12.5-12.75 in Regions 1 and 3 (prior to 31 December 2005)	–163 –166 –167.5 –169.5	100	40	3 6 9 ≥ 18	≤ 2.5
	–160 –163 –164.5 –166.5	100	40	3 6 9 ≥ 18	≤ 4.5
10.7-11.7 in all Regions; 11.7-12.2 in Region 2; 12.2-12.5 in Region 3; 12.5-12.75 in Regions 1 and 3 (after 31 December 2005)	–161.25 –164 –165.5 –167.5	100	40	3 6 9 ≥ 18	≤ 2.5
	–158.25 –161 –162.5 –164.5	100	40	3 6 9 ≥ 18	≤ 4.5

16 For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

17 Linear interpolation of epfd levels in decibels should be performed for other intermediate antenna diameters using a logarithmic scale for the antenna diameter.

18 In addition to the operational limits shown in Table **S22-4A**, the following additional operational limits apply to certain GSO FSS earth station antenna sizes in the frequency bands listed in Table **S22-4A**. A method of assessing interference levels for intermediate antenna sizes should also be developed within ITU-R.

ADD B/35/54*bis*

TABLE **S22-4A1**

Additional operational limits to the $epfd_{down}$ radiated by non-GSO FSS systems into 3 and 10 metre GSO FSS earth station antennas

$epfd_{down}$ (dB(W/(m^2/40 kHz)))	Percentage of time during which $epfd_{down}$ may be exceeded	Receive GSO earth station antenna diameter[17] (m)
–182	0.1	3
–179	0.06	
–176	0.03	
–171	0.02	
–168	0.016	
–165	0.007	
–163	0.001	
–161.25	0.00025	
–161.25	0	
–185	0.03	10
–183	0.02	
–179	0.01	
–175	0.004	
–171	0.002	
–168	0.001	
–166	0.0002	
–166	0	

Reasons: During CPM-99, a compromised agreement was also reached concerning limits to the $epfd_{down}$ radiated by non-GSO FSS systems in the 10.7-12.75 GHz band. The resulting agreed points include:

– *Limits* (validation limits) to the $epfd_{down}$ radiated by non-GSO FSS systems in the band 10.7-12.75 GHz (for antenna diameters of 0.6 m, 1.2 m, 3 m and 10 m), including limits corresponding to special cases of high latitudes to be satisfied during 100% of the time (for antenna diameters greater than 0.6 m).

– *Operational limits* to the $epfd_{down}$ radiated by non-GSO FSS systems in the bands 10.7-12.75 GHz, to be satisfied during 100% of the time (for antenna diameters between 3 m and 18 m).

– *Additional operational limits* to the $epfd_{down}$ radiated by non-GSO FSS systems into 3 m and 10 m GSO FSS earth station antennas in the bands 10.7-12.75 GHz.

With regard to the $epfd_{down}$ *operational limits,* there is a need for regulatory procedures to implement them. There is also a need for a WRC-2000 Resolution calling for ITU-R to develop, as a matter of urgency, Recommendations to permit administrations to check compliance with the *operational limits*.

Concerning the epfd_{down} *additional operational limits* (epfd_{down} radiated into 3 m and 10 m GSO FSS earth station antennas in the 10.7-12.75 GHz band), there is a need for regulatory procedures to implement them. These procedures should identify non-GSO systems exceeding the *additional operational limits* and also ensure immediate reduction of the interference level to the allowed limits by any non-GSO system exceeding the *additional operational limits*. There is also a need for a WRC-2000 Resolution calling for ITU-R to develop, as a matter of urgency, studies aiming the assessment of the statistical behaviour (time distribution) of the actual epfd_{down} levels radiated by a non-GSO FSS system. These studies should also contemplate methodologies to consider intermediate antenna sizes. Recommendations to permit administrations to check compliance with the *additional operational limits* should also be developed.

ADD B/35/55

TABLE **S22-4B**[19]

Operational limits to the epfd_{down} radiated by non-GSO FSS systems in certain frequency bands

Frequency band (GHz)	epfd_{down} (dB(W/m^2))	Percentage of time during which epfd_{down} may not be exceeded	Reference bandwidth (kHz)	Receive GSO earth station antenna Gain (dBi)	Orbital inclination of GSO satellite (degrees)
19.7-20.2	–157 –157 –155	100 100 100	40 40 40	≥ 49 ≥ 43[20] ≥ 49	≤ 2.5 ≤ 2.5 > 2.5 and ≤ 4.5
19.7-20.2	–143 –143 –141	100 100 100	1 000 1 000 1 000	≥ 49 ≥ 43[20] ≥ 49	≤ 2.5 ≤ 2.5 > 2.5 and ≤ 4.5
17.8-18.6	–164 –162	100 100	40 40	≥ 49 ≥ 49	≤ 2.5 > 2.5 and ≤ 4.5
17.8-18.6	–150 –148	100 100	1 000 1 000	≥ 49 ≥ 49	≤ 2.5 > 2.5 and ≤ 4.5

[19] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

[20] The operational limit applies to non-GSO systems operating at altitudes of 7 000 km or above in order to protect GSO FSS systems employing adaptive coding.

Reasons: Limits to the epfd_{down} radiated by non-GSO FSS systems in the bands 17.8-18.6 GHz and 19.7-20.2 GHz were agreed upon during the discussions that took place within Joint Task Group 4-9-11 and are reflected in the CPM-99 Report.

– *Limits* to the epfd_{down} radiated by non-GSO FSS systems in the band 17.8-18.6 GHz (for antenna diameters of 1 m, 2 m and 5 m).

– *Operational limits* to the epfd_{down} radiated by non-GSO FSS systems in the bands 17.8-18.6 GHz, to be satisfied during 100% of the time.

– *Limits* to the epfd_{down} radiated by non-GSO FSS systems in the band 19.7-20.2 GHz (for antenna diameters of 0.7 m, 0.9 m, 2.5 m and 5 m).

– *Operational limits* to the epfd_{down} radiated by non-GSO FSS systems in the bands 19.7-20.2 GHz, to be satisfied during 100% of the time.

With regard to the $epfd_{down}$ *operational limits*, there is a need for regulatory procedures to implement them. These procedures should identify non-GSO systems exceeding the *operational limits* and also ensure immediate reduction of the interference level to the allowed limits by any non-GSO system exceeding the *operational limits*. There is also a need for a WRC-2000 Resolution calling for ITU-R to develop, as a matter of urgency, Recommendations to permit administrations to check compliance with the *operational limits*.

The operational limits proposed for antennas with a gain equal to or greater than 49 dBi represent a compromise agreed upon at the CPM-99 meeting. CPM-99 agreed that the “operational” limits contained in Table S22-4B above in conjunction with $epfd_{down}$ “validation” masks would adequately protect GSO FSS systems with an antenna gain equal to or greater than 49 dBi.

ADD B/35/56

S22.5J In case of *force majeure*, telecommand and ranging carriers transmitted to non-geostationary satellites in the fixed-satellite service are not subject to the limits given in Table **S22-2**.

Reasons: Specific provision needed to cover emergency situations.

MODIFICATIONS TO SECTION VI OF ARTICLE S22

MOD B/35/57

Section VI – GSO ~~E~~earth station off-axis power limitations in the fixed-satellite service[11]

MOD B/35/58

S22.26 § 9 The level of equivalent isotropically radiated power (e.i.r.p.) emitted by an earth station within a geostationary-satellite network shall not exceed the following values for any off-axis angle φ which is ~~2.5~~3° or more off the main-lobe axis of an earth station antenna:

Off-axis angle	*Maximum e.i.r.p.*
~~2.5~~3° ≤ φ ≤ 7°	(~~39~~42 – 25 log φ) dB(W/40 kHz)
7° < φ ≤ 9.2°	~~18~~21 dB(W/40 kHz)
9.2° < φ ≤ 48°	(~~42~~45 – 25 log φ) dB(W/40 kHz)
48° < φ ≤ 180°	~~0~~3 dB(W/40 kHz)

MOD B/35/59

S22.27 For FM-TV emissions with energy dispersal, the limits in No. **S22.26** above may be exceeded by up to 3 dB provided that the off-axis total e.i.r.p. of the transmitted FM-TV carrier does not exceed the following values:

Off-axis angle	*Maximum e.i.r.p.*
~~2.5~~3° ≤ φ ≤ 7°	(~~53~~56 – 25 log φ) dBW
7° < φ ≤ 9.2°	~~32~~35 dBW
9.2° < φ ≤ 48°	(~~56~~59 – 25 log φ) dBW
48° < φ ≤ 180°	~~14~~17 dBW

MOD B/35/60

S22.28 FM-TV carriers which operate without energy dispersal should be modulated at all times with programme material or appropriate test patterns. In this case, the off-axis total e.i.r.p. of the emitted FM-TV carrier shall not exceed the following values:

Off-axis angle	*Maximum e.i.r.p.*
~~2.5~~3° ≤ φ ≤ 7°	(~~53~~56 – 25 log φ) dBW
7° < φ ≤ 9.2°	~~32~~35 dBW
9.2° < φ ≤ 48°	(~~56~~59 – 25 log φ) dBW
48° < φ ≤ 180°	~~14~~17 dBW

NOC

S22.29 The e.i.r.p. limits given in Nos. **S22.26**, **S22.27** and **S22.28** are applicable in the following frequency bands allocated to the fixed-satellite service (Earth-to-space):

12.75-13.25 GHz

13.75-14 GHz

14-14.5 GHz.

ADD B/35/61

S22.30 The e.i.r.p. limits given in Nos. **S22.26, S22.27** and **S22.28** do not apply to earth station antennas ready to be in service[12] prior to 2 June 2000 nor to earth stations associated with a satellite network in the fixed-satellite service for which complete coordination or notification information has been received before 2 June 2000.

ADD B/35/62

[12] **S22.30.1** "Ready to be in service" relates to the case where antennas have been installed but the start of service has been delayed due to *force majeure*.

ADD B/35/63

S22.31 Telecommand and ranging carriers transmitted to geostationary satellites in the fixed-satellite service in normal mode of operation (i.e. earth station transmitting telecommand and ranging carriers to a directive receiving antenna on the space station) may exceed the levels given in No. **S22.26** by no more than 16 dB in the frequency bands 12.75-13.25 GHz and 13.75-14.5 GHz. In all other modes of operation, and in case of *force majeure,* telecommand and ranging carriers transmitted to geostationary satellites in the fixed-satellite service are exempted from the levels given in No. **S22.26**.

ADD B/35/64

S22.32 § 10 The level of equivalent isotropically radiated power (e.i.r.p.) density emitted by an earth station within a geostationary-satellite network in the 29.5-30.0 GHz frequency band shall not exceed the following values for any off-axis angle φ which is 3° or more off the main-lobe axis of an earth station antenna:

Off-axis angle	*Maximum e.i.r.p. density*[12]
3° ≤ φ ≤ 7°	(28 – 25 log φ) dB(W/40 kHz)
7° < φ ≤ 9.2°	7 dB(W/40 kHz)
9.2° < φ ≤ 48°	(31 – 25 log φ) dB(W/40 kHz)
48° < φ ≤ 180°	1 dB(W/40 kHz)

ADD B/35/64*bis*

[12] **S22.32.1** The above values are 6 dB higher than the corresponding values in Recommendation ITU-R S.524-5.

ADD B/35/65

S22.33 The e.i.r.p. limits given in No. **S22.32** do not apply to earth station antennas ready to be in service prior to [XXXX] nor to earth stations associated with satellite networks in the fixed-satellite service which have been brought into use before 2 June 2000.

ADD B/35/66

S22.34 Telecommand and ranging[13] carriers transmitted to geostationary satellites in the fixed-satellite service in normal mode of operation (i.e. earth station transmitting telecommand and ranging carriers to a directive receiving antenna on the space station) may exceed the levels given in **S22.32** by no more than 10 dB[14] in the frequency band 29.5-30 GHz.

In all other modes of operation, and in case of *force majeure,* telecommand and ranging carriers transmitted to geostationary satellites in the fixed-satellite service are exempted from the levels given in No. **S22.32**.

ADD B/35/66*bis*

[13] **S22.34.1** Measurement of the distance to the satellite.

ADD B/35/66*ter*

[14] **S22.34.2** Further studies are required to confirm the value of 10 dB.

ADD B/35/67

S22.35 For GSO systems in which the earth stations are expected to transmit simultaneously in the same 40 kHz band, e.g. for the GSO systems employing CDMA, the maximum e.i.r.p., values in No. **S22.32** should be decreased by 10 log(N) dB, where N is the number of earth stations which are in the receive satellite beam of the satellite to which these earth stations are communicating and which are expected to transmit simultaneously on the same frequency.

ADD B/35/68

S22.36 Earth stations operating in the 29.5-30 GHz frequency band should be designed in such a manner that 90% of the their peak off-axis e.i.r.p. density levels do not exceed the values given in No. **S22.32**. Further study is needed to determine the off-axis angular range over which these exceedances would be permitted, taking into account the interference level into adjacent satellites. The statistical processing of the off-axis e.i.r.p. density peaks should be dealt with using the method given in Recommendation ITU-R S.732.

ADD B/35/69

S22.37 The values given in No. **S22.32** are maximal values under clear-sky conditions. In case of systems employing uplink power control, these levels include any additional margins above the minimum clear-sky level necessary for the implementation of uplink power control. During rain faded conditions, the levels in No. **S22.32** may be exceeded by earth stations when implementing uplink power control.

ADD B/35/70

S22.38 FSS earth stations operating in the 29.5-30 GHz band, which have lower elevation angles to the GSO will require higher e.i.r.p. levels relative to the same terminals at higher elevation angles to achieve the same power flux-densities at the GSO due to the combined effect of increased distance and atmospheric absorption. Earth stations with low elevation angles may exceed the levels given in **S22.32** by the following amount:

Elevation angle to GSO (ε)	*Increase in e.i.r.p. density (dB)*
$\varepsilon \leq 5°$	2.5
$5 < \varepsilon \leq 30°$	$0.1(25 - \varepsilon) + 0.5$

ADD B/35/71

S22.39 The values in No. **S22.32** applicable to the off-axis angle range from 48° to 180° is intended to account for spillover effects.

Reasons: The application of off-axis e.i.r.p. density limits to earth stations operating in the bands 12.75-13.25 GHz, 13.75-14.5 GHz and 29.5-30 GHz should be restricted to earth stations that operate with GSO satellites. Off-axis e.i.r.p. density limits need not be applied to earth stations that operate with non-GSO satellites since imposing off-axis e.i.r.p. density to the earth stations of a given non-GSO network would possibly help only in decreasing the amount of interference affecting its own satellites (internal interference) and not in facilitating sharing with other non-GSO (or GSO) FSS systems.

It is important to have a grandfathering clause to protect existing earth stations that operate with systems for which complete coordination or notification information has been received by ITU before 2 June 2000.

MODIFICATIONS TO FOOTNOTES OF ARTICLE S5

MOD B/35/72

S5.441 The use of the bands 4 500-4 800 MHz (space-to-Earth), 6 725-7 025 MHz (Earth-to-space) by the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by geostationary-satellite systems in the fixed-satellite service shall be in accordance with the provisions of Appendix **S30B**. The use of the bands 10.7-10.95 GHz (space-to-Earth), 11.2-11.45 GHz (space-to-Earth) and 12.75-13.25 GHz (Earth-to-space) by a non-geostationary-satellite system~~s~~ in the fixed-satellite service ~~shall be in accordance with the provisions of Resolution **130 (WRC-97)**~~is subject to the application of the provisions of No. **S9.12** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations. The provisions of Resolution **130 (Rev.WRC-2000)** apply.

MOD B/35/73

S5.484A The use of the bands 10.95-11.2 GHz (space-to-Earth), 11.45-11.7 GHz (space-to-Earth), 11.7-12.2 GHz (space-to-Earth) in Region 2, 12.2-12.75 GHz (space-to-Earth) in Region 3, 12.5-12.75 GHz (space-to-Earth) in Region 1, 13.75-14.5 GHz (Earth-to-space), 17.8-18.6 GHz (space-to-Earth), 19.7-20.2 GHz (space-to-Earth), 27.5-28.6 GHz (Earth-to-space), 29.5-30 GHz (Earth-to-space) by a non-geostationary~~- and geostationary-~~satellite system~~s~~ in the fixed-satellite service is subject to application of the provisions of ~~Resolution **130** (WRC-97). The use of the band 17.8-18.1 GHz (space-to-Earth) by non-geostationary fixed-satellite service systems is also subject to the provisions of Resolution **538 (WRC-97)**~~ No. **S9.12** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations. The provisions of Resolutions **130 (Rev.WRC-2000)** and **538 (Rev.WRC-2000)** apply.

MOD B/35/74

S5.487A *Additional allocation:* in Region 1, the band 11.7-12.5 GHz, in Region 2, the band 12.2-12.7 GHz and, in Region 3, the band 11.7-12.2 GHz, are also allocated to the fixed-satellite service (space-to-Earth) on a primary basis, limited to non-geostationary systems and subject to the application of the provisions of ~~Resolution **538 (WRC-97)**~~No. **S9.12** for coordination between non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from GSO networks in the broadcasting-satellite service operating in accordance with the Radio Regulations. The provisions of Resolution **538 (Rev.WRC-2000)** apply.

Reasons: *Resolves* 8 in Resolution 130 (WRC-97) and 1.7 in Resolution 538 (WRC-97) (both related to coordination under No. S9.12) and *resolves* 6 in Resolution 130 (WRC-97) (concerning non-GSO FSS systems not claiming protection from GSO networks in the FSS) are important and needed. They should be reflected in the pertinent footnotes of the Radio Regulations.

MOD B/35/75

S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2 by non-geostationary-satellite systems in the fixed-satellite service is subject to the application of the provisions of ~~Resolution **538 (WRC-97)**~~No. **S9.12** for coordination between non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations. The use of the band 17.3-17.8 GHz in Region 2 by FSS systems (Earth-to-space) operating with non-GSO satellites is restricted to earth stations having antennas greater than 4.5 m that are located in non-urban areas and that do not cause harmful interference to BSS terminals located anywhere outside the 500 m radius circle centered at the FSS earth station location. The provisions of Resolution **538 (Rev.WRC-2000)** apply.

Reasons: *Resolves* 8 in Resolution 130 (WRC-97) and 1.7 in Resolution 538 (WRC-97) (both related to coordination under No. S9.12) and *resolves* 6 in Resolution 130 (WRC-97) (concerning non-GSO FSS systems not claiming protection from GSO networks in the FSS) are important and needed. They should be reflected in footnote S5.16 of the Radio Regulations.

In Region 2, in the frequency band 17.3-17.8 GHz, BSS systems are expected to have a high density of ubiquitous deployed terminals. To allow for the frequency sharing between such BSS systems and non-GSO systems (Earth-to-space) operating in the band, it is necessary to limit the number and the interfering potential of earth stations operating with non-GSO systems, since frequency sharing between two services is very difficult when one or both services have a high density of ubiquitous deployed terminals.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.10 - to consider results of ITU-R studies carried out in accordance with Resolution 218 (WRC-97) and take appropriate action on this subject

Introduction

Resolution 218 (WRC-97) requests ITU-R to determine the future spectrum requirements for the provision of distress, urgency and safety communications in the GMDSS by the mobile-satellite and AMS(R)S. It also requests to study the feasibility of priorization, real-time pre-emptive access and, if necessary, interoperability between different mobile-satellite systems for GMDSS and AMS(R)S.

Presently, the ICAO CNS/ATM system, which will require up to 10.8 MHz of spectrum by 2010 according to ICAO and IATA, is being implemented. Therefore, it is necessary to guarantee that the systems operating in the mobile-satellite service (MSS) will not impose restrictions on the implementation of new systems of AMS(R)S.

MOD B/35/24

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 535-1 559	MOBILE-SATELLITE (space-to-Earth) S5.341 S5.351 S5.353A S5.354 S5.355 S5.356 S5.357 MOD S5.357A S5.359 S5.362A	

MOD B/35/25

1 610-1 660 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 626.5-1 660	MOBILE-SATELLITE (Earth-to-space) S5.341 S5.351 S5.353A S5.354 S5.355 MOD S5.357A S5.359 S5.362A S5.374 S5.375 S5.376	

MOD B/35/26

S5.357A In applying the procedures of No. **S9.11A** to the mobile-satellite service in the bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz, priority shall be given to accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service providing transmission of messages with priority 1 to 6 in Article **S44**. The mobile-satellite service shall not impose restrictions, during the coordination process, to the implementation of new systems or to expansion of the existing systems of the aeronautical mobile-satellite (R) service. Aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **S44** shall have priority access and immediate availability, by pre-emption if necessary, over all other mobile-satellite communications operating within a network. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **S44**. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (See Resolution **218 (WRC-97)**.)

Reasons: To guarantee that the systems operating in the mobile-satellite service (MSS) will not impose restrictions to the implementation of new systems of AMS(R)S.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.9 - take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service (MSS) in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions 213 (Rev.WRC-95) and 220 (WRC-97)

Introduction

Resolution 220 (WRC-97) calls, *inter alia*, for ITU-R to study, as a matter of urgency, the technical criteria as well as operational and safety requirements to determine if sharing between the aeronautical radionavigation and radionavigation-satellite services (ARNS/RNSS) operating or planned to operate in the band 1 559-1 610 MHz, and the mobile-satellite service (MSS) in a portion of the 1 559-1 567 MHz frequency range, is feasible, taking into account the essential need to protect these services, the requirements to provide additional spectrum to the MSS and Resolution 213 (Rev.WRC-95). The latter Resolution calls, *inter alia*, for ITU-R to investigate a potentially suitable downlink band that may assist in meeting the spectrum requirements of the MSS.

So far, all discussions on the subject have centred on the feasibility of sharing between ARNS/RNSS (space-to-Earth) and the MSS (space-to-Earth) in the referred band. Only few, or none at all, have attempted to address Resolution 213 (Rev.WRC-95).

Examination of studies carried out in ITU-R, on the feasibility of sharing between ARNS/RNSS and MSS in the space-to-Earth direction in the concerned band, has indicated the incompatibility between these services. The frequency band 1 559-1 610 MHz is allocated to the ARNS and RNSS (space-to-Earth) on a primary basis. Today the GPS, which is an element of the global navigation satellite system (GNSS) of the International Civil Aviation Organization (ICAO), is the only system in operation near or in the band 1 559-1 567 MHz. Studies have, however, considered the GPS augmentations which are planned to be implemented to include, e.g. pseudolites. Pseudolites (from pseudo satellites) are ground-based radio transmitters that transmit signals to those from RNSS satellites and are intended to provide additional facilities to the system. These studies have also considered ARNS/RNSS systems from other administrations, such as the E-NSS-1 and LSATNAV, that are planned to be implemented. All this will make this portion of the spectrum extremely crowded and populated by systems recognized by the Radio Regulations as safety-of-life related services, leading to the conclusion that sharing is not feasible.

NOC B/35/22

1 525-1 610 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 559-1 610	AERONAUTICAL RADIONAVIGATION RADIONAVIGATION-SATELLITE (space-to-Earth) S5.341 S5.355 S5.359 S5.363	

SUP B/35/23

RESOLUTION 220 (WRC-97)

Studies to consider the feasibility of use of a portion of the band 1 559-1 610 MHz by the mobile-satellite service (space-to-Earth)

Reasons: Studies concluded that sharing is not feasible.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.8 - to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands

Introduction

This proposal presents regulatory and technical provisions for operation of earth stations on board vessels (ESVs) using frequencies allocated to the fixed-satellite service and for protection of the terrestrial stations operating at the same band. More than protecting the stations in the fixed service, this service must be assured of its growth without any constraint from the ESVs.

ESVs operating in the fixed-satellite service beyond a certain distance do not present a potential for interference to stations in the fixed service operating in accordance with the RR the 6 GHz FS allocation, and therefore need not be coordinated. Operations while these earth stations are stationary at predetermined points can be coordinated bilaterally with fixed service systems. Technical and regulatory issues concern the potential for interference between in-motion operations by these ESVs operating close to shore and stations in the fixed service both on and offshore.

MOD B/35/18

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
3 400-3 600 FIXED FIXED-SATELLITE (space-to-Earth) Mobile Radiolocation S5.431	**3 400-3 500** FIXED FIXED-SATELLITE (space-to-Earth) Amateur Mobile Radiolocation S5.433 S5.282 S5.432	
3 600-~~4 200~~3 700 FIXED FIXED-SATELLITE (space-to-Earth) Mobile	**3 500-3 700** FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile Radiolocation S5.433 S5.435	
3 700-4 200 FIXED FIXED-SATELLITE (space-to-Earth) Mobile ADD S5.ESV	**3 700-4 200** FIXED FIXED-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile ADD S5.ESV	

Reasons: To establish regulatory and technical provisions for operations of earth stations on board vessels in the fixed-satellite service.

MOD B/35/19

5 830-7 550 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
5 925-~~6 700~~6 425	FIXED FIXED-SATELLITE (Earth-to-space) ADD S5.ESV MOBILE S5.149 S5.440 S5.458	
6 425-6 700	FIXED FIXED-SATELLITE (Earth-to-space) MOBILE S5.149 S5.440 S5.458	

Reasons: To establish regulatory and technical provisions for operations of earth stations on board vessels in the fixed-satellite service.

ADD B/35/20

S5.ESV In the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz, transponders on space stations in the fixed-satellite service may be used, additionally, by earth stations on board vessels. Such use is subject to the provisions specified in the procedures of Resolution **ZZZ (WRC-2000)**.

Reasons: To establish regulatory and technical provisions for operations of earth stations on board vessels in the fixed-satellite service and protection for the terrestrial stations operating in the FS in the same band.

ADD B/35/21

RESOLUTION ZZZ (WRC-2000)

Provisions to enable earth stations located on board vessels to operate in fixed-satellite service networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that there is a demand for global wideband satellite communication services on vessels;

b) that the technology exists that would permit the use of fixed-satellite services (FSS) networks by earth stations on board vessels (ESVs) operating in the 3 700-4 200 MHz and 5 925-6 425 MHz bands;

c) that ESVs have the potential to cause unacceptable interference to the fixed service (FS) systems in the band 5 925-6 425 MHz;

d) that FS systems have the potential to cause interference to ESVs in the 3 700-4 200 MHz band;

e) that ESVs operating in these bands require considerably less than the full bandwidth in this FSS allocation and only a portion of the visible geostationary arc;

f) that there are a limited number of geostationary FSS systems that have global coverage;

g) that in order to ensure the protection and future growth of the FS, the ESV must operate with certain technical and operational constraints;

h) that administrations may authorize radiocommunication stations on offshore structures and platforms for which they are responsible;

i) that based on appropriate assumptions a minimum distance can be calculated beyond which the ESV will not have the potential to cause unacceptable interference to the fixed service in this band,

noting

a) that operation within the territorial sea is at the discretion of the administration with territorial authority, in which case the relevant procedures of that administration will apply;

b) that operation of earth stations on vessels from specified fixed points at locations outside the territorial sea but for which an administration has territorial jurisdiction is fully within the FSS,

resolves

1 that the administration that issues the radio licence for the use of ESVs in these bands (licensing administration) shall ensure that such stations do not cause unacceptable interference to stations in the fixed service;

2 that licensing administrations shall ensure that ESVs are capable of operating in compliance with the requirements of this Resolution;

3 that operators of ESVs shall comply with the conditions established by the licensing administration(s);

4 that ESVs shall not claim protection from fixed service station transmissions;

5 that any transmissions from ESVs within a distance of 200 km off any given coast shall be based upon the prior agreement of that coastal administration;

6 that the ESV system shall include means of identification and an automatic mechanism to terminate transmissions whenever the station operates outside its pre-authorized geographic (see *resolves* 5) or operational limits;

7 that ESVs shall be equipped so as to enable the licensing administration under the provisions of Article **S18** to verify earth station performance and to accomplish the switch off of the ESV transmission immediately upon request by an administration whose services may be affected;

8 that when ESVs operating beyond the territorial sea but within 200 km of the coast of an administration fail to comply with the terms required by that administration pursuant to *resolves* 3 and 5, then that administration may:

– request the ESV to comply with such terms or cease operation immediately; or

– request the licensing administration to require such compliance or immediate cessation of the operation;

9 that any licensing authority that licenses ESVs shall agree to maintain at all times a point of contact, which shall be published in a circular of ITU, that may be contacted by an affected administration seeking assistance pursuant to *resolves* 3 and 5 above,

instructs ITU-R

to study and develop Recommendations on methods for coordination between terrestrial stations and ESVs while in motion at less than the minimum coordination distance from the shore.

Reasons: To establish regulatory and technical provisions for operations of earth stations on board vessels in the fixed-satellite service and protection for the terrestrial stations operating in the FS in the same band.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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COMMITTEE 5

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.4 - to consider issues concerning allocations and regulatory aspects related to Resolutions 126 (WRC-97), 128 (WRC-97), 129 (WRC-97), 133 (WRC-97), 134 (WRC-97) and 726 (WRC-97)

Proposal addressing the use of the frequency range 37-40 GHz by the fixed service (Resolution 133 (WRC-97))

Brazil supports CITEL proposals IAP/14/86 to IAP/14/106, and consequently is withdrawing this document. Nevertheless, Brazil wants to call attention of the administrations that, as a country located in tropical climate region, with rain rates corresponding to the ITU-R rain zones N and P, the frequency band 37 to 40 GHz, represents the best opportunity to deploy terrestrial high-density fixed systems.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.4 - to consider issues concerning allocations and regulatory aspects related to Resolutions 126 (WRC-97), 128 (WRC-97), 129 (WRC-97), 133 (WRC-97), 134 (WRC-97) and 726 (WRC-97)

Proposal addressing the use of the frequency range 37-40 GHz by the fixed service (Resolution 133 (WRC-97))

Introduction

Resolution 133 deals with sharing of the FS with other services in the range 37-40 GHz. Point-to-point FS systems are already deployed on a large scale and their use is growing in the 37-40 GHz range which is allocated to the FS on a primary basis. The initial large-scale deployment of P-P systems in this band was in mobile and competitive market networks with a concentration mainly in and around urban and industrial areas. A more recent large-scale FS application of this band represents a new variety of FWA using P-P and P-MP systems that terminate directly on subscriber premises. While the current major use of the 38 GHz band is the application of P-P systems with smaller capacities, there is an accelerating trend toward higher capacities up to *n* x 155 Mbit/s, using higher level modulation methods (e.g. 256-QAM). Deployment levels and further details can be found in draft new Recommendation ITU-R F.[Doc. 9/1015].

In recent years, Brazil has experienced a tremendous growth in the deployment of point-to-point digital radio systems, mainly with transmission capacity ranging from 2 to 34 Mbit/s, for mobile telecommunication system back-haul connections, as well as for corporate wireless access applications, at frequency bands higher than 15 GHz. Currently, in the metropolitan areas, due to the saturation at the lower frequency bands, the 38 GHz band has been authorized for the above applications. A huge deployment rate of radio hops at 38 GHz is taking place in urban areas, gaining characteristics of high density deployments.

Rain outage events are the primary cause of unavailability in frequency bands above 30 GHz. These characteristics are more pronounced in tropical regions of the world, with high rain precipitation rates, like ITU-R rain zones N and P, as is the case of the most populated urban areas of Brazil. In such high rain precipitation regions, HDFS systems operating above 40 GHz will have severe limitations on allowable hop lengths, making difficult its deployment in many applications envisaged. Thus, it is important to tropical region countries that choose the lower frequency bands for HDFS deployments.

Sharing between the HDFS and FSS has been shown to be technically feasible, particularly where the FS and/or the FSS would not rely on the ubiquitous deployment of terminals.

MOD B/35/13

34.2-40.5 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
37-37.5	FIXED MOBILE SPACE RESEARCH (space-to-Earth) MOD S5.547 ADD S5.547F	
37.5-38	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE SPACE RESEARCH (space-to-Earth) Earth exploration-satellite (space-to-Earth) MOD S5.547 ADD S5.547F	
38-39.5	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE Earth exploration-satellite (space-to-Earth) MOD S5.547 ADD S5.547F	
39.5-40	FIXED FIXED-SATELLITE (space-to-Earth) MOBILE MOBILE-SATELLITE (space-to-Earth) Earth exploration-satellite (space-to-Earth) MOD S5.547 ADD S5.547F	

MOD B/35/14

S5.547 The bands 31.8-33.4 GHz, 37-40 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are available for high-density applications in the fixed service ~~(see Resolution **726 (WRC-97)**)~~.

ADD B/35/15

S5.547F In the band 37.5-40 GHz, the power flux-density limits specified in Table **S21-4** of Article **S21** shall apply to the FSS.

Reasons: To establish regulatory and technical provisions to the operation of high-density fixed systems in the band 37-40 GHz.

MOD B/35/16

TABLE **S21-4** *(end)*

Frequency band	Service*	Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane			Reference bandwidth
		0°-5°	**5°-25°**	**25°-90°**	
31.0-31.3 GHz 34.7-35.2 GHz (space-to-Earth transmissions referred to in No. **S5.550** on the territories of countries listed in No. **S5.549**) ~~37.0-40.5 GHz~~	Fixed-satellite Mobile-satellite Space research	–115 [10]	–115 + 0.5(δ – 5) [10]	–105 [10]	1 MHz
37.0-37.5 GHz	Space research (space-to-Earth) non-GSO GSO	 –120 –125	 –120 + 0.75(δ – 5) –125 + (δ – 5)	 –105 –105	1 MHz
37.5-38.0 GHz	Space research Fixed-satellite (space-to-Earth) non-GSO GSO	 –120 –125	 –120 + 0.75(δ – 5) –125 + (δ – 5)	 –105 –105	1 MHz
38.0-40.0 GHz	Fixed-satellite (space-to-Earth) non-GSO GSO	 –120 –125	 –120 + 0.75(δ – 5) –125 + (δ – 5)	 –105 –105	1 MHz

Reasons: As a consequence of studies undertaken in Working Party 4-9S, as well as studies presented by some administrations directly to CPM-99.

SUP B/35/17

RESOLUTION 133 (WRC-97)

Sharing between the fixed service and other services in the band 37-40 GHz

Reasons: The regulatory and technical provisions established above are sufficient to introduce the operations of the high-density fixed systems in the band 37-40 GHz, and Resolution 133 (WRC-97) is no longer needed.

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PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.4 - to consider issues concerning allocations and regulatory aspects related to Resolutions 126 (WRC-97), 128 (WRC-97), 129 (WRC-97), 133 (WRC-97), 134 (WRC-97) and 726 (WRC-97)

Proposal for the confirmation of the fixed service allocation in the 31.8-33.4 GHz frequency range (Resolutions 126 (WRC-97) and 726 (WRC-97))

Introduction

Resolutions 126 (WRC-97) and 726 (WRC-97) invite ITU-R to address, among other issues, sharing between high-density fixed systems (HDFS) and other radiocommunication services sharing spectrum in the bands 31.8-33.4 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz bands.

At WRC-97, a number of frequency bands above 30 GHz were identified through Resolution 726 (WRC-97) as available for the deployment of high-density fixed systems. Included in Resolution 726 (WRC-97) is the frequency range 31.8-33.4 GHz. WRC-97 amended the Table of Frequency Allocations to include the fixed service on a primary basis in the 31.8-33.4 GHz range subject to conditions found in Resolution 126 (WRC-97). The first condition stipulated that this allocation to the fixed service would not go into force until 1 January 2001. Secondly, this allocation would be reviewed at WRC-2000 taking into account the results of sharing studies and the future requirements of the other allocated services. The frequency range 31.8-33.4 GHz also has primary allocations to the radionavigation, space research (space-to-Earth) (deep space) and the inter-satellite services.

ITU-R, through various working parties, has studied the sharing potential between the fixed service (high-density applications) and the other primary services. With regard to sharing between the fixed and radionavigation service, studies indicate that sharing may be possible through the use of appropriate mitigation and operational measures, recognizing that fixed systems may receive emissions from airborne radionavigation systems. However, actual interference events are expected to be rare. The CPM Report recommended that sharing between the fixed and radionavigation services could be addressed through the development of appropriate ITU-R Recommendations. Sharing between the fixed service and the deep-space facilities is considered practical as there are only a few deep-space sites in the world and coordination with the fixed stations is feasible. It would be appropriate to adopt a suitable free-space spectral pfd limit at the surface of the Earth in order to provide adequate protection to HDFS systems from SRS satellites in a temporary near-Earth orbit phase. Studies have also concluded that interference levels from high-density fixed stations into inter-satellite receivers are well within acceptable limits.

MOD B/35/7

29.9-34.2 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
31.8-32	FIXED MOD S5.547A RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) MOD S5.547 S5.547B S5.548	
32-32.3	FIXED MOD S5.547A INTER-SATELLITE RADIONAVIGATION SPACE RESEARCH (deep space) (space-to-Earth) MOD S5.547 S5.547C S5.548	
32.3-33	FIXED MOD S5.547A INTER-SATELLITE RADIONAVIGATION MOD S5.547 S5.547D S5.548	
33-33.4	FIXED MOD S5.547A RADIONAVIGATION MOD S5.547 S5.547E	

SUP B/35/8

RESOLUTION 726 (WRC-97)

Frequency bands above 30 GHz available for high-density applications in the fixed service

MOD B/35/9

S5.547 The bands 31.8-33.4 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz are available for high-density applications in the fixed service ~~(see Resolution **726 (WRC-97)**)~~.

SUP B/35/10

RESOLUTION 126 (WRC-97)

Use of the frequency band 31.8-33.4 GHz for high density systems in the fixed service

MOD B/35/11

S5.547A ~~Use of the band 31.8-33.4 GHz by the fixed service shall be in accordance with Resolution **126 (WRC-97)**.~~ Due to the operational nature of the radionavigation service, systems in the fixed service operating in the 31.8-33.4 GHz band may be subject to emissions from airborne radionavigation systems. Interference into fixed systems is expected to be rare, however, administrations are encouraged to take practical measures to minimize potential interference, taking into account **S4.10**.

MOD B/35/12

TABLE **S21-4** *(end)*

Frequency band	**Service***	**Limit in dB(W/m²) for angle of arrival (δ) above the horizontal plane**			**Reference bandwidth**
		0°-5°	**5°-25°**	**25°-90°**	
31.8-32.3 GHz	Space research	–120	–120 + 0.75(δ – 5)	–105	1 MHz
32-33 GHz	Inter-satellite	–135	–135 + (δ – 5)	–115	1 MHz

Reasons: Sharing studies have concluded that reasonable measures can be taken by the various services using this band to ensure practical coexistence. As a result, it is possible to confirm the fixed allocations in the band 31.8-33.4 GHz, and to identify this band as being available for HDFS applications. Consequently, Resolution 126 (WRC-97) can be suppressed. In addition, the draft CPM Report to WRC-2000 provides suitable pfd limits to protect the fixed service. With regard to the band 31.8-33.4 GHz, Resolution 726 (WRC-97) can be suppressed since the necessary ITU-R studies required to confirm the fixed service allocation have been completed.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 2 to
Document 35-E
14 March 2000
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PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.2 - to finalize remaining issues in the review of Appendix S3 to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation 66 (Rev.WRC-97) and the decisions of WRC-97 on adoption of new values, due to take effect at a future time, of spurious emissions for space services

Introduction

Recommendation 66 (Rev.WRC-97) directs ITU-R to submit a report to WRC-2000 with a view to finalizing the space services spurious emissions limits in Appendix S3 of the Radio Regulations. Appendix S3 contains tables of maximum permitted spurious emission power levels. Table I contains the values applicable to transmitters installed on or before 1 January 2003 (valid until 1 January 2012), while Table II applies to the transmitters installed after 1 January 2003 and to all transmitters after 1 January 2012. Note 14 of Table II identifies the spurious emissions limits for space services as “design objectives” until after WRC-2000.

ITU-R concluded that there is no further need for the “design objectives” qualification for space services limits and that at this time, they believe that no changes to the attenuation values or the reference bandwidth for space services are applicable. This reflects its view to transform these “design objectives” into a regulatory limit.

The Brazilian Administration proposes text that would remove the “design objectives” designation from the space services spurious emissions limits and make related appropriate modifications applicable to deep-space systems. Also the Brazilian Administration proposes to correct an oversight in Appendix S3 regarding limits for the radiodetermination service, and specify that spurious emission levels for radar systems be determined from radiated emissions.

APPENDIX S3

Section I – Spurious emission limits for transmitters installed on or before 1 January 2003 (valid until 1 January 2012)

MOD B/35/3

6 Radar systems are exempt from spurious emission limits under this section.~~The measurement methods for radar systems should be guided by Recommendation ITU-R M.1177. For those radar systems for which acceptable methods of measurement do not exist, t~~The lowest practicable power of spurious emission should be achieved.

Section II – Spurious emission limits for transmitters installed after 1 January 2003 and for all transmitters after 1 January 2012

Application of these limits

MOD B/35/4

8 Guidance regarding the methods of measuring spurious emissions is given in the most recent version of Recommendation ITU-R SM.329. The e.i.r.p. method specified in that Recommendation should be used when it is not possible to measure the power supplied to the antenna transmission line~~.~~, or for specific applications, such as radars, where the antenna is designed to provide significant attenuation at the spurious frequencies. Additionally, the e.i.r.p. method may need some modification for special cases, e.g. beam-forming radars.

MOD B/35/5

TABLE II

Attenuation values used to calculate maximum permitted spurious emission power levels for use with radio equipment

Service category in accordance with Article S1, or equipment type[15]	**Attenuation (dB) below the power supplied to the antenna transmission line**
Space services (earth stations) [10~~, 14~~]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Space services (space stations) [10~~, 14~~]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Radiodetermination [14]	43 + 10 log (*PEP*), or 60 dB, whichever is less stringent
Amateur services operating below 30 MHz (including with SSB) [12, 16]	43 + 10 log (*PEP*), or 50 dB, whichever is less stringent

Notes to Table II

MOD B/35/6

14 ~~These values are "design objectives". This note will not be applicable after WRC-99.~~ Radiodetermination (Radar) system spurious emission (dB) attenuation shall be determined for radiated emission levels, not at the antenna transmission line. The measurement methods for determining the radiated spurious emission levels from the radar systems should be guided by Recommendation ITU-R M.1177.

Reasons: Clarify the exemption of radar systems from the Section I limits, in order to correct an oversight in Appendix S3 regarding limits for the radiodetermination service that may lead incorrectly to the application of the Section I limits to radars. Clarify the application of the e.i.r.p. measurement method to radars particularly, but also to other systems where antenna line measurements may not be appropriate. Confirm the values in Table II and "clean up" the table by removing the "design objectives" designation from the space services spurious emissions limits.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

WRC-2000 agenda item 1.1 - requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution 26 (Rev.WRC-97)

Introduction

Resolution 26 (Rev.WRC-97) urges administrations to review footnotes periodically and to propose the deletion of their country footnotes or of their country names from footnotes, as appropriate. Also, Recommendation 34 (WRC-95) has a long-term objective to harmonize the use of frequencies throughout the world as showed in *considering c)* and *recommends* 2.

In Regions 1 and 3 the band 10-10.45 GHz is allocated to the fixed and mobile services on a primary basis, and in Region 2 this allocation is restricted to a few countries according to footnote S5.480: Brazil, Costa Rica, Ecuador, Guatemala, Honduras and Mexico. In addition to this, there are some countries working on the planning of the band 10 to 10.45 GHz for fixed services, including FWA systems, in Region 2.

MOD B/35/1

10-11.7 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
10-10.45 FIXED MOBILE RADIOLOCATION Amateur S5.479	**10-10.45** <ins>FIXED</ins> <ins>MOBILE</ins> RADIOLOCATION Amateur S5.479 ~~S5.480~~	**10-10.45** FIXED MOBILE RADIOLOCATION Amateur S5.479

SUP B/35/2

S5.480

Reasons: Harmonization of the use of frequencies in the band 10-10.45 GHz throughout the world.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Brazil (Federative Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Introduction

The Brazilian Administration has pleasure to submit its proposals covering several items of the agenda of WRC-2000.

The following addenda are, thus, herein included:

Addendum 1: agenda item 1.1;

Addendum 2: agenda item 1.2;

Addendum 3: agenda item 1.4a;

Addendum 4: agenda item 1.4b;

Addendum 5: agenda item 1.8;

Addendum 6: agenda item 1.9;

Addendum 7: agenda item 1.10;

Addendum 8: agenda item 1.13;

Addendum 9: agenda item 1.19;

Addendum 10: agenda item 1.19*bis*;

Addendum 11: agenda item 1.20a;

Addendum 12: agenda item 1.20b;

Addendum 13: agenda item 1.20c.

The Brazilian Administration is also submitting additional proposals jointly with other CITEL administrations. These will appear as separate documents.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Note by the Secretary-General

PREPARATION OF RADIO REGULATIONS AND RELATED ISSUES

ADDITIONAL INFORMATION

Additional information on the subjects referred to in Document 36 is brought to the attention of the Conference at the request of the Director of the Radiocommunication Bureau.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

Director, Radiocommunication Bureau

Information related to the preparation of the Radio Regulations

1 Introduction

Document 36 contains background information on the preparation of the 1998 edition of the Radio Regulations, as well as an indication of errors, inconsistencies and obsolete parts. In that document, the Bureau announced that additional information might be submitted, pending the review of other subjects related to the texts appearing in the Radio Regulations.

This document deals with issues that were identified in such a review and are drawn to the attention of the Conference for such action as may be deemed appropriate.

2 Discrepancies between Annex 2A to Appendix S4 and Annex 2 to Appendices S30 and S30A

WRC-97, in revising Appendix S4, integrated the Annex 2 information of Appendices S30, S30A and S30B into Annexes 2A and 2B to that Appendix.

Annex 2 to Appendices S30 and S30A was also revised at the same Conference. However, some of the revised data items of Annex 2 to Appendices S30 and S30A have not been incorporated into Annex 2A to Appendix S4.

The Conference may wish to consider aligning Annex 2 to Appendices S30 and S30A with Annex 2A to Appendix S4, as follows:

- Replace description of item B.3 *g)* 1) of Annex 2A to Appendix S4 with that of item 12 *a)* of Annex 2 to Appendix S30 and item 3.4 *a)* of Annex 2 to Appendix S30A in order to include cross-polar maximum antenna gain in the case of a beam in other than elliptical shape.
- Delete item B.3 *g)* 7) (ΔG) which had been removed from Annex 2 to Appendix S30 at WRC-97.
- Align item C.8 *h)* of Annex 2A to Appendix S4 with item 11 of Annex 2 to Appendix S30.
- Align item C.11 *b)* of Annex 2A to Appendix S4 with item 2.3 of Annex 2 to Appendix S30A.
- Introduce two new data items C.9 *b)* 9) and C.15 to Annex 2A to Appendix S4 extracted from items 14 *i)* and 23 of Annex 2 to Appendix S30 respectively (items 1.6 *i)* and 5 of Annex 2 to Appendix S30A respectively).

A possible revision to the above-mentioned data items is included in Attachment 1 to this document.

3 Issues referred in Resolution 30 (WRC-97)

Resolution 30, in paragraph 8 ("*further instructs the Director of the Radiocommunication Bureau*"), instructed the Director, BR, to report to the next world radiocommunication conference on the experience gained in the introduction of the CD-ROM format, with a view to making any necessary consequential amendments to the Radio Regulations. The same Resolution, in paragraph 7, instructed the Director to consider an alternative name, if appropriate, for the Weekly Circular.

As indicated in Document 41 (Activity Report), the Bureau has implemented Resolution 30 (WRC-97) and the new publication, the "International Frequency Information Circular (IFIC)" is being published every two weeks, in CD-ROM format, as from 11 January 2000. Therefore, an **appropriate change of the reference (from Weekly Circular to IFIC) might be required in various provisions of the Radio Regulations**.

The following provisions of the Radio Regulations make reference to the "Weekly Circular" or to "Circular" in the meaning of "Weekly Circular":

- Article S9: provisions Nos. S9.1, S9.2B, S9.3 (twice), S9.5B, S9.5D, S9.38, S9.40. S9.41 (twice), S9.51, S9.52, S9.52A, S9.55, and S9.64;
- Article S11: Nos. S11.28 and S11.43;
- Appendix S4: In section A.13;
- Appendix S7: § 1;
- Appendix S25: Nos. S25/1.2, 1.6, 1.8, 1.9, 1.11.1, 1.11.2, 1.22, Table of Added Allotments (Notes 3.1, 10 and footnote 2);
- Appendix S30: Nos. 4.3.5.1, 4.3.6, 4.3.7, 4.3.12, 4.3.17, 4.4, 5.1.6 (twice), 5.1.7, 6.3.4 (three times), 6.3.5, 7.1.3 (twice), 7.1.4, 7.1.7 (twice), 7.1.8, 7.2.3 (three times), 7.2.5 (twice), 7.2.6a, 7.2.6b, 7.4.2 (twice), 7.4.3, Article 10 (Notes 11 and 12);
- Appendix S30A: Nos. 4.2.6.1, 4.2.7, 4.2.8, 4.2.13, 4.2.18, 4.3, 5.1.10 (twice), 5.1.11;
- Appendix S30B: Nos. 5.6, 6.2.6, 6.33, 6.34, 6.49, 6.50 and 6.54 a);

It is to be noted that some of the references (e.g. those in Notes 11 and 12 of Article 10 in Appendix S30) are of a historical nature and need not be changed.

The term "Weekly Circular" or "Circular" is also used in several Resolutions and Recommendations, notably:

- Resolution 4: in *resolves* 1.2;
- Resolution 8: in Annex B (§ 4) and in Annex C (§ 6);
- Resolution 33: section A (§ 2.2 - twice, § 2.3);
- Resolution 42: in the Annex (§§ 6, 8, 10, 11);
- Resolution 46: in Annex 1 (§ 1.3 - twice, §§ 1.4, 1.6, 2.7.2, 2.9, 2.17, 5.1.6);
- Resolution 49: in *resolves* 5 and 6; in Annex 1 (§§ 8, 11);
- Resolution 312: in the Annex (footnote 1);
- Resolution 500: in *requests the Bureau*;
- Resolution 533: in *resolves* 5 (twice);

- Recommendation 35: in the Annex (Nos. T10.12, T10.13, T10.14, T10.17, T10.24).

In addition, as the International Frequency List is now systematically published with every issue of the IFIC, an appropriate amendment might be required to the relevant provisions in Article S20 (Nos. S20.2 to S20.6).

4 Numbering of the provisions of the Radio Regulations

The 1998 edition of the Radio Regulations systematically applies the prefix S in front of every provision of the Radio Regulations (e.g. Article S5, No. S19.28, Appendix S7, etc.). The prefix S was introduced to distinguish the provisions of the new, simplified Radio Regulations, that were adopted by WRC-95 and WRC-97, from the provisions of the former Radio Regulations, often referred to with the prefix RR (e.g. RR1107), in the application of the relevant procedures.

In view of the fact that the 1997 revision of the Radio Regulations resulted in a consistent set of provisions that are referred to with the prefix S in the 1998 edition of the Radio Regulations, whose provisional application commenced on 1 January 1999 with respect to the frequency assignment notices received after 31 December 1998, and that the Bureau is about to complete the examinations of the frequency assignment notices received prior to 1 January 1999 whose treatment was governed by the former provisions of the Radio Regulations that were in force, **the Conference may wish to consider the abolition or otherwise of the prefix S in front of the provisions of the Radio Regulations in the forthcoming editions of the Radio Regulations**.

ATTACHMENT 1

Possible modification to Annex 2A to Appendix S4

ANNEX 2A

(to Appendix S4)

MOD

B.3 *g)* 1) ~~maximum isotropic antenna gain (dBi)~~co-polar gain of the antenna in the direction of maximum radiation referred to an isotropic radiator (dBi), as well as the cross-polar gain of the antenna in the case of a beam of other than elliptical shape;

SUP

B.3 *g)* 7)

MOD

C.8 *h)* In the case of a space station submitted in accordance with Appendix **S30**:

~~– the power supplied to the antenna (dBW) (Regions 1 and 3);~~

– the power supplied to the antenna (dBW) and the maximum power density per Hz supplied to the antenna (dB(W/Hz)), averaged over the worst 5 MHz, ~~40 kHz and 4~~ kHz and 27 MHz, as well as averaged over the worst 40 kHz in the case of Region 2~~supplied to the antenna (Region 2)~~.

MOD

C.11 *b)* In the case of a space station submitted in accordance with Appendix **S30A**:

~~– where the feeder-link earth station is in Region 2, the geographical coordinates of the feeder-link station in the frequency band 17.7-17.8 GHz, including the rain climatic zone;~~

– a set of a maximum of twenty feeder-link test points, and

– ~~in all other cases, the feeder-link service area identified by a set of a maximum of ten feeder-link test points, including the rain climatic zone for each test point, and by~~ a service area contour on the surface of the Earth or a service area defined by a minimum elevation angle in degrees.

ADD

C.9 *b)* 9) in the case of a digital modulation, the effective and transmitted bit/symbol rates;

ADD

C.15 Description of the group(s) required in the case of non-simultaneous emissions.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Note by the Secretary-General

The attached document is brought to the attention of the Conference at the request of the Director, Radiocommunication Bureau and summarizes those errors, inconsistencies and obsolete parts of the Radio Regulations that were discovered by the Bureau's staff and/or were drawn to the attention of the Bureau with a view to presenting them appropriately to WRC-2000.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

Director, Radiocommunication Bureau

Preparation of the Radio Regulations

1 Introduction

The preparation of the Radio Regulations deserves special attention as they, as an integral part of the Constitution and Convention of ITU, represent an internationally binding instrument.

The 1998 edition of the Radio Regulations was prepared on the basis of the consolidated text of the Simplified Radio Regulations (Document 2 of WRC-97) and the Final Acts of WRC-97.

Document 2 already contained, in almost all cases, references to the Simplified Radio Regulations, based on the table of correspondence between the provisions of the Radio Regulations (1994 edition) and the provisions of the Simplified Radio Regulations (as adopted by WRC-95) that was established by the VGE and further completed by the ITU Secretariat. However, in some cases, where it was not possible to establish an unambiguous mapping between the old and new references, because of the modified scope of some provisions in the new Articles **S9** and **S11**, WRC-97 was requested to take an appropriate decision as to the correct reference for the new set of provisions. Although WRC-97 took such decisions in many cases, some provisions (e.g. those of Appendix **S30**) were not reviewed by the Conference.

In addition to the substantive changes adopted by WRC-97, which are reflected in the Final Acts of WRC-97, the Conference introduced editorial changes to several texts of the Simplified Radio Regulations that were not reflected in the Final Acts. Moreover, WRC-97 instructed the Bureau to introduce further editorial changes, where appropriate, in the remaining part of the Radio Regulations, to reflect:

1) ITU structural changes (world administrative radio conferences to world radiocommunication conferences, CCIR to ITU-R, IFRB to the Radiocommunication Bureau, Administrative Council to Council, etc.);

2) the replacement of ex-CCIR Reports by ITU-R Recommendations;

3) the renumbering of RR provisions resulting from the simplification of the RR.

The Bureau also replaced the term “Member(s)” with “Member State(s)” to correspond to the terminology subsequently approved by the Plenipotentiary Conference (Minneapolis, 1998).

2 Summary of experiences

The general guidelines, as indicated in the introduction, were not sufficient for the Bureau to arrive at unambiguous formulations. For instance, the term “IFRB” was used in the former Radio Regulations with two meanings: one referring to the former IFRB Secretariat (whose functions are now undertaken by the Radiocommunication Bureau) and the other to the former Board (whose functions are now undertaken by the Radio Regulations Board). In other places, the term “Board” was used in the generic sense meaning IFRB. In this context, where the differentiation was not always clear, the Bureau was faced with a problem as to the use of the proper replacement term. For instance, Article 8 of Appendix **S30**, at several places, makes reference to the “Board”. Although some of the actions referred to in this regard are now under the responsibilities of the Bureau, the term “Board” was nevertheless maintained (in all provisions of Article 8 of Appendix **S30**, as well as in all provisions of Article 8 of Appendix **S30A**).

Similar difficulties were experienced with respect to those provisions that make reference to an abrogated Resolution or Recommendation. The most illustrative example in this regard is No. **S5.120**: the only function of this provision is the cross-referencing of Resolution **640**; as Resolution **640** was abrogated by WRC-97, provision No. **S5.120** became useless. Despite the fact that provision No. **S5.120** does not serve any useful purpose, the Bureau maintained it (with an appropriate Note), as the suppression of a provision remains within the prerogatives of a Conference.

Further difficulties were experienced in identifying relevant ITU-R Recommendations as replacements for the former CCIR Reports. Such identification was particularly difficult in the context of some very old WARC Resolutions and Recommendations (e.g. Recommendations **705** and **706**), where the quoted CCIR texts are no longer in force and several new texts now make reference to the subject referred to in the quoted CCIR texts. In such cases, the Bureau maintained the historical references to the relevant CCIR texts, indicating, through appropriate notes, the obsolete status of these texts.

This document summarizes those errors, inconsistencies and obsolete parts of the Radio Regulations that were discovered by the Bureau’s staff and/or were drawn to the attention of the Bureau with a view to presenting them appropriately to WRC-2000. The document does not deal with other issues related to the application of the Radio Regulations (e.g. imprecise formulations, etc.); some of these issues are covered in another document of the Bureau concerning its experiences with the application of the Radio Regulations (Document 16), as well as in various proposals from administrations (e.g. those relating to the revision of Appendix **S5**).

3 Errors, inconsistencies and obsolete parts

Despite very careful preparation of the 1998 edition of the Radio Regulations, it contains several errors, inconsistencies and obsolete parts.

3.1 Typographical errors

Several typographical errors were noticed in the 1998 edition. These errors, as summarized in Table 1, will be corrected in the forthcoming edition of the RR.

TABLE 1

List of typographical errors

Volume, page	Incorrect text	Correct text
1, p. 34, No. S5.2, in E/F/S	The map does not agree with the definition in No. **S5.9**	
1, p. 67 box 47-50 MHz (R3); box 50-54 MHz (R2 and R3), box 54-58 MHz (R3)	Missing No. **S5.162A** in the footnote references	ADD **S5.162A** in the list of footnote references
1, p. 69, No. S5.177, in S 1, p. 69, No. S5.181, in S	Hungría to be deleted Bélgica, España to be deleted	

1, p. 74, No. S5.212, in E	Zaire to be deleted	Democratic Republic of the Congo
1, p. 83, boxes 455-456 MHz (R2) and 459-460 MHz (R2)	Appearance of No. **S5.271** in the footnote references	SUP No. **S5.271** in the list of footnote references
1, p. 140, frequency band: 40-40.5 MHz, first line, in F	Exploration de la terre par satellite	EXPLORATION DE LA TERRE PAR SATELLITE
2, p. 31, row dealing with item 9H	Appearance of sign "+" in columns AP1/A7 and AP5	Delete sign "+" in columns AP1/A7 and AP5, as far as this row is concerned
2, p. 55, No. S9.11, third row, in E/F/S	17.7-17.8	17.3-17.8
2, p. 55-57	Reference to "Table 5-2" in the third columns, against rows referring to Nos. **S9.12** to **S9.16**	Change reference to: "Table 5-1A"
2, p. 60, row dealing with S9.21, fourth column	pdf	pfd
2, p. 139, § 2, first line	Chapter	Appendix
2, p. 180, title of the table, in F	S15.1	S15-1
2, p. 329, row dealing with Area 2	Frequency 4 696 appears under the column 5.4 (R2)	Frequency 4 696 should appear under the column 4.7 NOTE - RDARA 2 is situated in Region 1
2, p. 344, row dealing with 5 466 kHz	131	13I
2, p. 751, sixth entry	VRA - VSZ	VSA - VSZ
3, p. 41	Reference to No. **S5.199**	Delete the reference to No. **S5.199** as that provision contains no reference to an ITU-R Recommendation NOTE - This matter is on the WRC-2000 agenda (item 2) and the whole of Annex 3 may be reviewed
3, p. 44, first column, second group of provisions	No. **S19.21** (twice)	No. **S9.21** (twice) NOTE - This matter is on the WRC-2000 agenda (item 2) and the whole of Annex 3 may be reviewed
3, p. 47, row dealing with Recommendation ITU-R IS.847-1, fifth column	Appendix **S5**, Annex 2	Appendix **S5**, Annex 1
3, p. 47, row dealing with Recommendation ITU-R IS.849-1, fifth column	Appendix **S5**, Annex 2	Appendix **S5**, Annex 1
3, p. 276, Resolution 533, *recognizing b)*, in E	position	positions

3.2 Inconsistencies

Several inconsistencies were found in the 1998 edition. These inconsistencies, as summarized in Table 2, are brought to the attention of WRC-2000 which may wish to propose corrective action.

TABLE 2

Inconsistencies in the RR

Volume, page	Nature of inconsistency	Possible corrective action
1, p. 38, text of No. S5.50	The current text is inconsistent with the overall approach (see box 117.6-126 kHz, R3, and the relationship between fixed, maritime mobile and No. **S5.64**)	Redraft No. **S5.50** to read: “The footnote references which appear in the Table below the allocated service or services apply to more than one of the allocated service, or to the whole frequency band.”
1, p. 187	The course of action referred to in the last sentence of No. **S14.4** may also occur after the course of action referred to in Nos. **S14.5** and **S14.6**. However, No. **S14.6** does not foresee a course of action as indicated in No. **S14.4**	Add the whole text of the last sentence of No. **S14.4** as a penultimate sentence of No. **S14.6**
2, p. 13	Paragraph 6 is placed under Section I, but this is a general text which should be placed before the title of Section I	Place § 6 before the title of Section I NOTE - This matter is on the WRC-2000 agenda (item 1.2)
2, p. 46-48	Annex 2 of Appendix **S30/S30A** was updated by WRC-97 but these changes are not reflected in Annex 2B of Appendix **S4**	Update Annex 2B as indicated in the addendum to this document
2, p. 60, row dealing with No. S9.21, fourth and fifth columns	Reference to Appendix **S30B**	Delete the reference to Appendix **S30B** (frequency bands of Appendix **S30B** are not subject to the procedure of No. **S9.21**)
2, p. 168, § 11	This paragraph calls for publication of the same information in two different lists (List IV and List VI). In view of the different periodicity of publication of these lists, the information may not be compatible	Delete all text after the word “stations” in the third line NOTE - No. **S20.15** specifies the course of action with respect to the content of service documents
2, p. 718	§ 8.3 and § 8.4 are contradictory to some extent. This is a consequence of the fact that § 8.3 now makes reference to No. **S11.32** (which encompasses both the former RR1504 and 1505), whereas the original § 8.3 made reference only to RR1504	§ 8.3 could be amended to read "... except with respect to the coordination requirements vis-à-vis space radiocommunication stations of other administrations, under No. **S11.32** and related provisions."

3.3 Obsolete parts

Several obsolete texts were found in the 1998 edition. These texts, as summarized in Table 3, are brought to the attention of WRC-2000 which may wish to propose corrective action. Another document (Document 15), which deals with a general review of the Resolutions and Recommendations from WARCs/WRCs, indicates which Resolutions and Recommendations are obsolete.

TABLE 3

Obsolete parts in the RR

Volume, page	Obsolete text	Possible course of action
1, p. 43: boxes 435-495 kHz (R1) and 415-495 kHz (R2 and R3) 1, p. 44, text of No. S5.81	Provision No. **S5.81** is obsolete as from 1 February 1999	Delete No. **S5.81** and the appropriate footnote reference in the relevant boxes
1, p. 53, No. S5.120	No. **S5.120**	Delete No. **S5.120**
2, pages 29-32	Table in Annex 1B makes reference to notice types AP1/A1, AP1/B, AP1/C, AP1/A2, AP1/A4, AP1/A5, AP1/A6, AP1/A7, AP2, AP5 that were replaced by notice types T01, T02, T11-T17	Make appropriate changes Annexes 1A and 1B, as indicated in Attachments 1 and 2 to this document
2, p. 73	Last paragraph in § 2.1 Last paragraph in § 2.3	Delete these two paragraphs as the subject matter was considered by WRC-97

ATTACHMENT 1

Proposed modifications to Annex 1A of Appendix S4

ANNEX 1A

List of characteristics of stations in the terrestrial services[1]

ITEM B – Notifying administration

~~Country s~~Symbol of the notifying administration.

ITEM SYNC – Synchronized network

Symbol followed by the identification ~~number~~ of the network, if the station concerned by the assignment pertains to a synchronized network.

ITEM 1A – Assigned frequency

The assigned frequency as defined in Article **S1**.

ITEM 1AA – Usable frequency range

The difference between the maximum and minimum assignable frequencies of a distinct frequency band.

ITEM 1B – Reference frequency

The reference frequency as defined in Article **S1**.

ITEM 1C – Preferred band (MHz)

For notifications under No. **S7.6** and for HF broadcasting stations in their exclusive bands.

ITEM 1D – Vision carrier frequency

The vision carrier frequency of a television broadcasting assignment.

ITEM 1E – Frequency offset, line frequency

The carrier frequency offset expressed as a multiple of 1/12 of the line frequency of the television system concerned, expressed by a number (positive or negative)~~and a symbol (P or M)~~.

ITEM 1E1 – Frequency offset, kHz

The carrier frequency offset, in kHz, expressed by a number (positive or negative).

ITEM 1G – Alternative frequency

For HF broadcasting stations in their exclusive bands.

[1] The Radiocommunication Bureau shall develop and keep up-to-date forms of notice to meet fully the statutory provisions of this Appendix and related decisions of future conferences. Additional information on the items listed in this Annex together with an explanation of the symbols is to be found in the Preface to the International Frequency List.

~~*ITEM 1H – Other frequencies used*~~

~~For HF broadcasting stations in their exclusive bands.~~

ITEM 1X – Channel number proposed or allotted channel

For HF coast radiotelephone stations.

ITEM 1Y – Channel number of the alternative proposed channel

For HF coast radiotelephone stations.

ITEM 1Z – Channel number of channel to be replaced

For HF coast radiotelephone stations.

ITEM 2C – Date of bringing into use

The date (actual or foreseen, as appropriate) of bringing the frequency assignment (new or modified) into use.

ITEM 3A – Call sign or station identification

The call sign or other identification used in accordance with Article **S19**.

ITEM 4A – Name of the location of the transmitting station

The name of the locality by which the transmitting station is known or in which it is situated.

ITEM 4B – Country or geographical area

~~The country or~~ Symbol of the geographical area in which the station is located.

ITEM 4C – Geographical coordinates

The geographical coordinates (longitude and latitude in degrees and minutes) of the transmitter site. In some cases, seconds are also indicated.

ITEM 4D – Radius of the circular area

The nominal radius (km) of the circular area in which the mobile transmitting stations are operating.

ITEM 4E – Country symbol or standard defined area

A country symbol or a standard defined area described by the symbols contained in standard references.

~~*ITEM 4F – B1 character (transmitter coverage area identifier)*~~

~~For a coast station assignment in the international NAVTEX system.~~

ITEM 4G – Ground conductivity

For assignments to stations of the broadcasting service covered by the LF/MF Broadcasting Agreement (Regions 1 and 3) (Geneva, 1975).

ITEM 5A – Name of the location of the receiving station

The name of the locality by which the receiving station is known or in which it is situated.

ITEM 5B – Country or geographical area

~~The country or~~ Symbol of the geographical area in which the receiving station is located.

ITEM 5C – Geographical coordinates

The geographical coordinates (longitude and latitude in degrees and minutes) of the site of the receiving station.

ITEM 5D – Area of the receiving station(s)

The standard defined area of reception of the transmitting station.

ITEM 5E – Longitude and latitude of the centre of the circular receiving area

The geographical coordinates (in degrees and minutes).

ITEM 5F – Nominal radius of the circular receiving area

The radius (km) of the circular receiving area.

ITEM 5G – Maximum length of circuit

The maximum length of the circuit (in km) for receiving areas other than circular.

ITEM 6A – Class of station

The class of station described by a symbol.

ITEM 6B – Nature of service

The nature of service described by a symbol.

ITEM 7A – Class of emission, necessary bandwidth and description of transmission

The class of emission, necessary bandwidth and description of transmission, in accordance with Article **S2** and Appendix **S1**.

ITEM 7A1 – Frequency stability

Frequency stability RELAXED, NORMAL or PRECISION for analogue television

ITEM 7AA – Type of modulation

~~The choice of modulation is needed in order to specify if the requirement is to~~ For HF broadcasting stations in their exclusive bands, a symbol which specifies the use of DSB, SSB or any new broadcasting techniques recommended by ITU-R.

ITEM 7B – Class of operation of the assignment

The class of operation of the assignment.

ITEM 7B1 – Adjacent channel protection ratio

For assignments to stations of the broadcasting service covered by the LF/MF Broadcasting Agreement (Regions 1 and 3) (Geneva, 1975), the protection ratio (dB) to be used for adjacent channel interference calculations.

ITEM 7C1 – Television system

Symbol corresponding to the television system.

ITEM 7C2 – Colour system

Symbol corresponding to the colour system.

ITEM 7D – Transmission system

Symbol corresponding to the transmission system for an assignment to a VHF sound broadcasting station.

ITEM 7E – Frequency deviation

For any type of modulation, as applicable: the peak-to-peak frequency deviation (MHz).

ITEM 7F – Energy dispersal

For any type of modulation, as applicable: the sweep frequency (kHz) of the energy dispersal waveform.

ITEM 8 – Power (dBW)

Symbol X, Y or Z describing, as appropriate, the type of power corresponding to the class of emission.

ITEM 8A – Power delivered to the antenna ~~(dBW)~~

The power delivered to the antenna transmission line expressed in dBW with the exception of LF/MF sound broadcasting for which the power delivered to the antenna shall be expressed in kW.

ITEM 8AB – Maximum power density (dB(W/Hz))

The maximum power density (dB(W/Hz)) for each carrier type averaged over the worst 4 kHz band for carriers below 15 GHz, or averaged over the worst 1 MHz band for carriers above 15 GHz, supplied to the antenna transmission line.

ITEM 8B – Radiated power (dBW)

The radiated power expressed in dBW in one of the forms described in Nos. **S1.161** to **S1.163**. ~~In the ce of systems where automatic power control is applied, indicate the range of power control, expressed in dB relative to the transmitted power indicated above.~~

ITEM 8BA – Range of power control

In the case of systems where automatic power control is applied, the range of power control (dB) above the nominal power indicated in 8B.

ITEM 8BH – Maximum ~~E~~effective radiated power (dBW) – horizontal

The maximum effective radiated power of the horizontally ~~polarization~~ polarized component (for VHF sound broadcasting (BC) and VHF/UHF television broadcasting (BT) assignments).

ITEM 8BV – Maximum ~~E~~effective radiated power (dBW) – vertical

The maximum effective radiated power of the vertically ~~polarization~~ polarized component (for VHF sound broadcasting (BC) and VHF/UHF television broadcasting (BT) assignments).

ITEM 8D – Vision/sound power ratio

Vision/sound carrier power ratio for VHF/UHF analogue television broadcasting (BT) assignments.

ITEM 9 – Directivity of the antenna

Directional (D) or non-directional (ND) antenna.

ITEM 9A – Azimuth of maximum radiation

For a directional transmitting antenna, the azimuth of maximum radiation of the transmitting antenna in degrees (clockwise) from True North~~, or the symbol "ND" for a non-directional antenna~~.

ITEM 9AA – Central azimuth of augmentation

The central azimuth of the augmentation (centre of the span) in degrees for an assignment to an MF broadcasting station in Region 2.

ITEM 9AB – Azimuthal sector for rotating antenna

Two azimuths in degrees (clockwise from True North) defining the sector in which the antenna rotates.

ITEM 9B – Elevation angle of maximum directivity

The angle of maximum directivity in degrees with one decimal position.

ITEM 9C – Angular width of radiation main lobe (beamwidth)

The total angle measured horizontally in a plane containing the direction of maximum radiation, in degrees, within which the power radiated in any direction does not fall more than 3 dB below the power radiated in the direction of maximum radiation.

ITEM 9CA – Total span of augmentation

The total span of the augmentation in degrees for an assignment to an MF broadcasting station in Region 2.

ITEM 9D – Polarization

Information on polarization.

ITEM 9E – Height of antenna

Information on height above ground level, in metres.

ITEM 9EA – Altitude of site above sea level

Information on the altitude of the site above mean sea level, in metres (for VHF sound broadcasting (BC) and VHF/UHF television broadcasting (BT) assignments, and for all terrestrial stations in the frequency bands above 1 GHz that are shared between space radiocommunication and terrestrial radiocommunication services).

ITEM 9EB – Maximum effective antenna height

The maximum effective height of the antenna, in metres (for VHF sound broadcasting (BC) and VHF/UHF television broadcasting (BT) assignments).

ITEM 9EC – Effective antenna height at different azimuths

The effective height of the antenna at different azimuths, in metres, for every 10° interval (for VHF sound broadcasting (BC) and VHF/UHF television broadcasting (BT) assignments).

ITEM 9F – Electrical height or maximum height of the antenna

The electrical height of the antenna in degrees or metres.

ITEM 9G – Maximum antenna gain (isotropic, relative to a short vertical antenna or relative to a half-wave dipole, as appropriate)

The maximum gain of the antenna in the direction of maximum radiation (see No. **S1.160**).

ITEM 9GH – Antenna gain for different azimuths in the horizontal plane

The antenna gain in the horizontal plane for different azimuths (dB).

ITEM 9GV – Antenna gain for different azimuths in the vertical plane

The antenna gain in the vertical plane for different azimuths (dB).

~~*ITEM 9H – Azimuths defining the sectors of limited radiation in degrees (clockwise) from True North*~~

~~The azimuth or azimuthal sectors of limited radiation, in degrees (clockwise) from True North.~~

ITEM 9I – Maximum ~~agreed~~ radiation ~~in the sectors~~or r.m.s. value of radiation

The maximum ~~agreed~~ radiation ~~in the sector~~, in dB relative to a cymomotive force (c.m.f.) of 300 V or an effective monopole radiated power (e.m.r.p.) of 1 kW, determined from the nominal power of the transmitter and the theoretical gain of the antenna without allowing for miscellaneous losses.

For assignments to stations of the broadcasting service covered by the MF Broadcasting Agreement (Region 2) (Rio de Janeiro, 1981), the product of the r.m.s. characteristic field strength, calculated in the horizontal plane, and the square root of the power.

ITEM 9IA – Radiation at central azimuth of augmentation

The value of the radiation at the central azimuth of the augmentation, expressed in mV/m at 1 km.

ITEM 9J – Reference antenna

The measured radiation pattern of the antenna, the reference radiation pattern or the symbols in standard references to be used for coordination.

ITEM 9K – Receiving system noise temperature

The lowest total receiving system noise temperature, in Kelvin.

ITEM 9L – Maximum effective radiated power (dB(kW))

The maximum effective radiated power , expressed in dB relative to an e.r.p. of 1 kW on a short vertical antenna.

ITEM 9N – Attenuation in a sector (dB)

The value in dB of the attenuation in a defined sector.

ITEM 9NA – Augmentation number

The serial numbers of the augmentations as described in items 9IA, 9AA and 9CA.

ITEM 9NH – Attenuation (dB) ~~in~~ of the horizontally polarized component ~~plane~~ at different azimuths

The value of attenuation ~~in dB~~ of the horizontally polarized component in the horizontal plane at different azimuths, with respect to the maximum e.r.p. of this component, expressed in dB~~in the horizontal plane at different azimuths~~.

ITEM 9NV – Attenuation (dB) ~~in~~ of the vertically polarized component ~~plane~~ at different azimuths

The value of attenuation ~~in dB~~ of the vertically polarized component in the horizontal plane at different azimuths, with respect to the maximum e.r.p. of this component, expressed in dB~~in the vertical plane at different azimuths~~.

ITEM 9O – Type of pattern

The type of antenna radiation pattern, represented by a symbol.

ITEM 9P – Special quadrature factor

The value of the special quadrature factor, in mV/m at 1 km (to replace the normal expanded quadrature factor when special precautions are taken to ensure pattern stability).

ITEM 9Q – Type of antenna

Symbol designating a ~~S~~simple vertical antenna or ~~directional~~ any other antenna.

ITEM 9R – Slew angle

For HF broadcasting stations in their exclusive bands, ~~T~~the slew angle represents the difference between the azimuth of maximum radiation and the direction of unslewed radiation.

ITEM 9T1 – Tower number

The serial number of each of the towers whose characteristics are described in items 9T2 to 9T8.

ITEM 9T2 – Tower field ratio

The ratio of the tower field to the field of the reference tower.

ITEM 9T3 – Phase difference of the field

The positive or negative phase difference in the tower field with respect to the field of the reference tower, in degrees.

ITEM 9T4 – Electrical tower spacing

The electrical spacing of the tower from the reference point, in degrees.

ITEM 9T5 – Angular tower orientation

The angular orientation of the tower from the reference point, in degrees (clockwise) from True North.

~~*ITEM 9T6 – Reference point indicator*~~

~~The reference point.~~

ITEM 9T7 – Electrical height of tower

The electrical height of the tower, in degrees.

ITEM 9T8 – Tower structure

Symbol corresponding to the tower structure.

ITEMS 9T9A to 9T9D – Description of top-loaded or sectionalized tower

Description of top-loaded or sectionalized towers, in ~~degrees~~ accordance with RJ81 Agreement.

~~*ITEM 10A – Maximum hours (UTC) of operation of the circuit to each locality or area*~~

~~The maximum hours of operation, expressed in hours and minutes (UTC) or by symbols.~~

ITEM 10B – Regular hours (UTC) of operation of the frequency assignment

The regular hours of operation (in hours and minutes from ... to ...) of the frequency assignment, in UTC.

ITEM 10CA – Start date

For HF broadcasting stations in their exclusive bands, ~~U~~used in the case that the requirement starts after the start of the schedule.

ITEM 10CB – Stop date

For HF broadcasting stations in their exclusive bands, ~~U~~used in the case that the requirement stops before the end of the schedule.

ITEM 10CC – Days of operation

For HF broadcasting stations in their exclusive bands, ~~U~~used when the station does not transmit every day of the week.

ITEM 10D – Estimated peak hours of traffic

For HF coast radiotelephone stations.

ITEM 10E – Estimated daily volume of traffic

For HF coast radiotelephone stations.

~~*ITEM 10F – Duration of transmissions*~~

~~For coast stations in the International NAVTEX system, the duration of transmission in hours and minutes.~~

ITEM 11 – Coordination with other administrations

~~Country or geographical area~~ Symbol of the administration with which coordination ~~is to be~~ has been effected and the provision (No. of the Radio Regulations, regional agreement, or other arrangement) requiring such coordination.

ITEM 12A – Operating administration or agency

The symbol for the operating agency.

ITEM 12B – Postal and telegraphic addresses of the administration responsible for the station

Symbol for the address of the administration responsible for the station and to which communication should be sent on urgent matters regarding interference, quality of emissions and questions referring to the technical operation of the circuit (see Article **S15**).

ATTACHMENT 2

Proposed replacement table for Annex 1B of Appendix S4

ANNEX 1B

Table of characteristics to be submitted for stations in the terrestrial services

Notice type	**T01**	**T02**	**T03**	**T04**	**T11**	**T12**			**T13**		**T14**	**T15**	**T16**	**T17**		**AR S12**	**Notice type**
Item No.	**BC**	**BT**	**BC**	**BC**	**FX**	**AL, BC[1], FA, FB, FC, FL, FP, LR, OE, RN, SS**	**FD, FG, SM**	**NL**	**AM, MA, ML, MO, MR, MS, NR, OD, SA**	**RM**	**AL[2], FA[3], FB[3], FC[2], FD[2], FG[2], FL, FP, FX[3], LR, NL[2], OE, RN, SM, SS**	**FC[4]**	**AL[5], FC[5]**	**FX**	**FA, FB, FC[2], FD[2], FG[2], FL, FP**	**BC**	**Item No.**
B	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	B
SYNC			+	+													SYNC
1A	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	1A
1AA														X	X		1AA
1B					+	+	+	+	+	+	+		+	+	+		1B
1C						+						*[6]				O	1C
1D		+[7]															1D
1E		+[7]															1E
1E1																	1E1
1G																O	1G
1X												*[6]	O				1X
1Y												O					1Y
1Z												+					1Z
2C	+	+	+	+	X	X	X	X	X	X	X	X		X	X		2C
3A	O	O	O	O	+	+	X	O						+	X	O	3A

X Mandatory * One of the items + Required in specific cases O Optional

Table of characteristics to be submitted for stations in the terrestrial services *(cont.)*

Notice type	T01	T02	T03	T04	T11	T12			T13		T14	T15	T16	T17		AR S12	Notice type
Item No.	**BC**	**BT**	**BC**	**BC**	**FX**	**AL, BC[1], FA, FB, FC, FL, FP, LR, OE, RN, SS**	**FD, FG, SM**	**NL**	**AM, MA, ML, MO, MR, MS, NR, OD, SA**	**RM**	**AL[2], FA[3], FB[3], FC[2], FD[2], FG[2], FL, FP, FX[3], LR, NL[2], OE, RN, SM, SS**	**FC[4]**	**AL[5], FC[5]**	**FX**	**FA, FB, FC[2], FD[2], FG[2], FL, FP**	**BC**	**Item No.**
4A	X	X	X	X	X	X	X	X				+	X	X	X	X	4A
4B	X	X	X	X	X	X	X	X					X	X	X		4B
4C	X	X	X	X	X	X	X	X	*[8]	X	*[8]	+	X	X	X	X	4C
4D									*[8]	X	*[8]						4D
4E									*[8]		*[8]	X					4E
4G			X														4G
5A					X[9]				X	X				X[9]			5A
5B					X[9]				X	X				X[9]			5B
5C					X[9]	*[10]	*[10]	*	X	X				X[9]	*[10]		5C
5D						*[10]	*[10]					X			*[10]	X	5D
5E						*[10]	*[10]	*					X		*[10]		5E
5F						*[10]	*[10]	*					X		*[10]		5F
5G					O	O	O	O				O		O	O		5G
6A					X	X	X	X	X	X	X	X	X	X	X		6A
6B					X	X	X	X	X	X	X	X	X	X	X		6B
7A	X[11]		X[11]	O	X	X	X	X	X	X	X	X	X	X	X		7A
7A1		+[7]															7A1
7AA																X	7AA
7B				X	+									+			7B
7B1			X														7B1
7C1		X															7C1
7C2		+[7]															7C2
7D	+																7D
7E					+[12]												7E
7F					+[12]												7F

X Mandatory * One of the items + Required in specific cases O Optional

Table of characteristics to be submitted for stations in the terrestrial services *(cont.)*

Notice type	**T01**	**T02**	**T03**	**T04**	**T11**	**T12**			**T13**		**T14**	**T15**	**T16**	**T17**		**AR S12**	**Notice type**
Item No.	**BC**	**BT**	**BC**	**BC**	**FX**	**AL, BC[1], FA, FB, FC, FL, FP, LR, OE, RN, SS**	**FD, FG, SM**	**NL**	**AM, MA, ML, MO, MR, MS, NR, OD, SA**	**RM**	**AL[2], FA[3], FB[3], FC[2], FD[2], FG[2], FL, FP, FX[3], LR, NL[2], OE, RN, SM, SS**	**FC[4]**	**AL[5], FC[5]**	**FX**	**FA, FB, FC[2], FD[2], FG[2], FL, FP**	**BC**	**Item No.**
8					X	X	X	X	X	X	X	X		X	X		8
8A			X	X	*	*	X	*	*	*	*	X		X	X	X	8A
8AB					+[12]												8AB
8B					*	*	*	*	*	*	*			+	+		8B
8BA														O	O		8BA
8BH	X	X															8BH
8BV	X	X															8BV
8D		+[7]															8D
9	X	X			X	X	X	X				X		X	X		9
9A					+	+	+	+				+		+	+	X	9A
9AA				+													9AA
9AB					+	+	+	+				+		+	+		9AB
9B					+	+	+	+									9B
9C					+	+	+	+				+		+	+		9C
9CA				+													9CA
9D	X	X			+												9D
9E	X	+	X		+	+	+	+									9E
9EA	X	+			+	+	+	+									9EA
9EB	X	X															9EB
9EC	+	+															9EC
9F				+													9F
9G					+	+	+	+			+	+		+	+		9G
9GH			+														9GH
9GV			+														9GV
9I			X	X													9I

X Mandatory * One of the items + Required in specific cases O Optional

Table of characteristics to be submitted for stations in the terrestrial services *(cont.)*

Notice type	**T01**	**T02**	**T03**	**T04**	**T11**	**T12**			**T13**		**T14**	**T15**	**T16**	**T17**		**AR S12**	**Notice type**
Item No.	**BC**	**BT**	**BC**	**BC**	**FX**	**AL, BC[1], FA, FB, FC, FL, FP, LR, OE, RN, SS**	**FD, FG, SM**	**NL**	**AM, MA, ML, MO, MR, MS, NR, OD, SA**	**RM**	**AL[2], FA[3], FB[3], FC[2], FD[2], FG[2], FL, FP, FX[3], LR, NL[2], OE, RN, SM, SS**	**FC[4]**	**AL[5], FC[5]**	**FX**	**FA, FB, FC[2], FD[2], FG[2], FL, FP**	**BC**	**Item No.**
9IA				+													9IA
9J					O	O	O	O						O	O	X	9J
9K					+[12]												9K
9L																	9L
9N																	9N
9NA				+													9NA
9NH	+	+															9NH
9NV	+	+															9NV
9O				+													9O
9P				O													9P
9Q			X	X													9Q
9R																X	9R
9T1				+													9T1
9T2				+													9T2
9T3				+													9T3
9T4				+													9T4
9T5				+													9T5
9T7				+													9T7
9T8				+													9T8
9T9A				+													9T9A
9T9B				+													9T9B
9T9C				+													9T9C
9T9D				+													9T9D
10B	+	+	X	X	X	X	X	X	X	X	X	X	X	X	X		10B
10CA																+	10CA
10CB																+	10CB

X Mandatory * One of the items + Required in specific cases O Optional

Table of characteristics to be submitted for stations in the terrestrial services *(end)*

Notice type	**T01**	**T02**	**T03**	**T04**	**T11**	**T12**			**T13**		**T14**	**T15**	**T16**	**T17**		**AR S12**	**Notice type**
Item No.	**BC**	**BT**	**BC**	**BC**	**FX**	**AL, BC[1], FA, FB, FC, FL, FP, LR, OE, RN, SS**	**FD, FG, SM**	**NL**	**AM, MA, ML, MO, MR, MS, NR, OD, SA**	**RM**	**AL[2], FA[3], FB[3], FC[2], FD[2], FG[2], FL, FP, FX[3], LR, NL[2], OE, RN, SM, SS**	**FC[4]**	**AL[5], FC[5]**	**FX**	**FA, FB, FC[2], FD[2], FG[2], FL, FP**	**BC**	**Item No.**
10CC																+	10CC
10D												X					10D
10E												X					10E
11	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O		11
12A	O	O	O	O	O	O	O	O	O	O	O			O	O	+	12A
12B	+	+	+	+	X	X	X	X	X	X	X			X	X		12B

X Mandatory * One of the items + Required in specific cases O Optional

1 Outside the planned LF/MF bands and the VHF/UHF bands (up to 960 MHz), the HF bands that are governed by Article **S12**.

2 In the non-planned bands.

3 Outside the bands governed by Regional Agreements GE85M and GE89.

4 In the bands governed by Appendix **S25**.

5 In the bands governed by Regional Agreement GE85.

6 1C or 1X.

7 For analogue television only.

8 (4C and 4D) or (4E).

9 (5A, 5B and 5C) or (minimum three sets of 5C).

10 (Minimum three sets of 5C) or (5D) or (5E and 5F).

11 The necessary bandwidth only.

12 This information may be furnished for stations in the fixed service when the parameters are used as a basis to effect coordination with another administration.

____

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

France

PROPOSALS FOR THE WORK OF THE CONFERENCE

PROPOSED UPDATED SHARING CRITERIA BETWEEN FSS, BSS AND TERRESTRIAL SERVICES IN THE 11.7-12.7 GHz BAND

(Agenda item 1.19)

Introduction

Under its agenda item 1.19, WRC-2000 will have to determine the basis for the revision of Appendices S30 and S30A on the basis of the review of the studies undertaken in response to Resolution 532 (WRC-97).

Among the principles adopted by WRC-97 in this Resolution, are the following:

> 4 In order to avoid obsolescence of the Plans, caused by technical assumptions becoming out of date, ensure that the Plans are established with a view to achieving long-term flexibility.
>
> 5 Leaving capacity for future additional requirements.

The sharing criteria between the broadcasting-satellite service (BSS), the fixed-satellite service (FSS) and the terrestrial services in the bands covered by Appendix S30 are key in determining the capability of the revised Plan to satisfy these two principles.

The bands covered by Appendix S30 are also allocated to various space and terrestrial services (see Attachment 1). Due to the conflicts between the protection requirements of these various services and the necessity for each of them to respond to the growing needs of the market, it is clear that establishing the appropriate trade-offs between them can only be done by a conference decision.

This contribution reviews the existing sharing conditions in these bands, which are set forth by Annexes 1, 3, 4 and 7 of Appendix S30, and proposes that WRC-2000 take action on updating these criteria in order for the new Plan and its future evolution to satisfy principles 4 and 5 of Resolution 532 (WRC-97).

1 Criteria to protect terrestrial services

Sections 4, 5 and 8 of Annex 1 to Appendix S30 currently contain a number of different limits to trigger coordination between a proposed modification of the BSS Plan and terrestrial services. There is a need to harmonize these values and bring them in line with the current usage of these bands by terrestrial services.

F/37/1

The following pfd limits are proposed in lieu of the current Sections 4, 5 and 8 of Annex 1 to Appendix S30 to protect terrestrial services in the band 11.7-12.7 GHz, over the territory of those countries in the three Regions where these services are allocated on a primary basis, from interference caused by the BSS in the bands subject to Appendix S30:

-148 dB(W/m^2/4 kHz) for $\theta \leq 5°$;

$-148 + 0.5 (\theta - 5)$ dB(W/m^2/4 kHz) for $5° < \theta \leq 25°$;

-138 dB(W/m^2/4 kHz) for $25° < \theta \leq 90°$;

where θ is the angle of arrival.

Reasons: These limits are consistent with the currently recognized protection requirement of the terrestrial services in this band. Assuming digital BSS transmissions, they are also consistent with a practically unconstrained development of BSS in these bands.

2 Criteria to protect the broadcasting-satellite service

Protection of the BSS Plan from interference caused by FSS or non-planned BSS is currently ensured by the application of the procedure of Article 7 of Appendix S30, associated with the criterion in Annex 4 of that Appendix:

-147 dB(W/m^2/27 MHz) for $0° \leq \theta < 0.44°$;

$-138 + 25 \log \theta$ dB(W/m^2/27 MHz) for $0.44° \leq \theta < 19.1°$;

-106 dB(W/m^2/27 MHz) for $\theta \geq 19.1°$;

where θ is the orbital separation between the wanted and interfering space stations.

Noting that the current pfd levels in Annex 4 of Appendix S30 have not been modified since WARC SAT-77, although the technical parameters for the Plans in the three Regions are now substantially different, there is clearly scope to relax these criteria. A proposed alternative to the current levels in Annex 4 of Appendix S30 is provided below, for the protection of the BSS Plan in the three Regions, from interference caused by the FSS or non-planned BSS.

The following pfd limits, defined as a function of the orbital separation θ between the wanted and interfering space stations, have been studied in conjunction with a 9° coordination arc, to protect the BSS reception against FSS or non-planned BSS transmit space stations in the bands covered by Appendix S30.

-146 dB(W/m^2/27 MHz) for $\theta < 0.225°$;

$-134 + 18.5 \log \theta$ dB(W/m^2/27 MHz) for $0.225° \leq \theta < 1.8°$;

$-137 + 30 \log \theta$ dB(W/m^2/27 MHz) for $1.8 \leq \theta < 9°$;

where θ is the orbital separation in degrees between the wanted and interfering space stations.

Figure 1 provides a comparison between the alternative criterion studied and that currently applicable in Annex 4 of Appendix S30 for this interference situation.

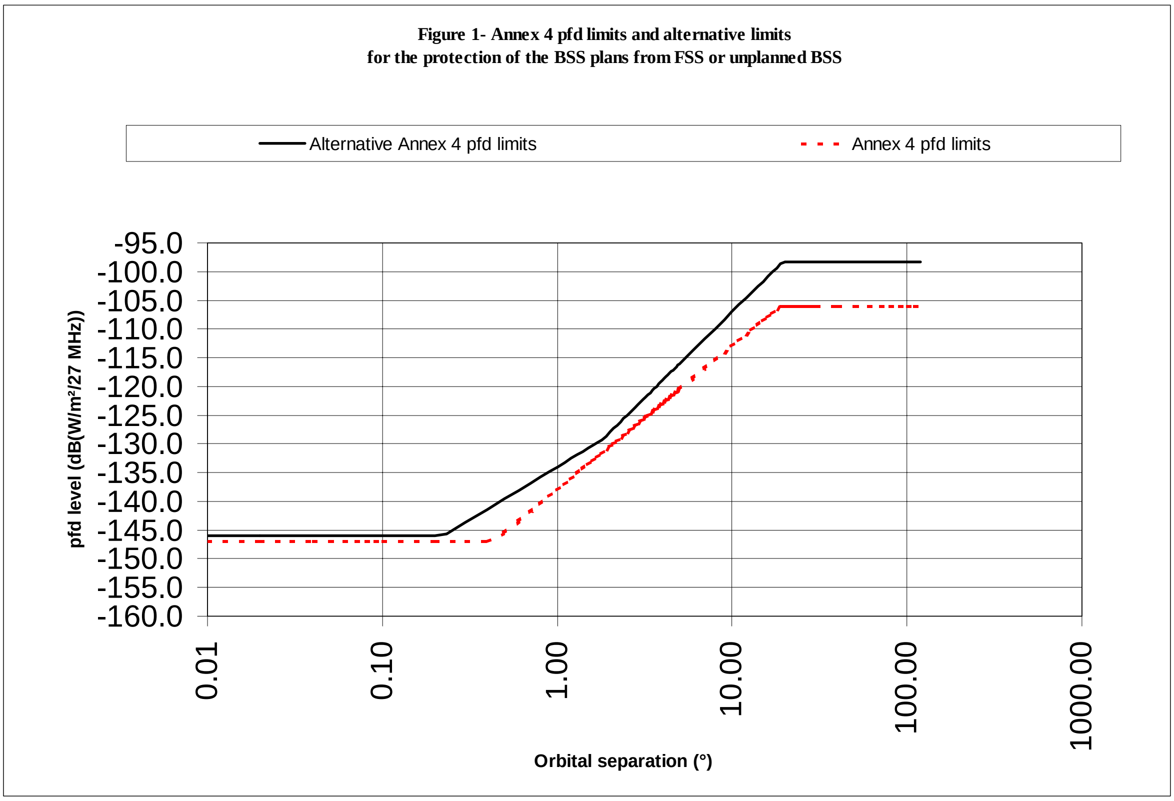


Figure 2 provides a comparison between the pfd level that would be required to achieve the protection requirements defined in Appendix S30 and the pfd limit applicable in Annex 4 for the same orbital separation, based on the following assumptions:

For Regions 1 and 3

- BSS antenna diagram in compliance with Figure 7*bis* of Annex 5 of Appendix S30;
- wanted pfd level required for 99% of the worst month into a 60 cm receive BSS antenna: –108 dB(W/m^2/27 MHz);
- wanted C/I aggregate for the downlink: 24 dB;
- required protection ratio = C/I wanted + 5 dB = 29 dB (as per Annex 6 of Appendix S30).

For Region 2

- BSS antenna diagram in compliance with Figure 8 of Annex 5 of Appendix S30;
- wanted pfd level required for 99% of the worst month into a 100 cm receive BSS antenna: –107 dB(W/m^2/24 MHz);
- wanted C/I aggregate for the overall link: 28 dB;
- required protection ratio = C/I wanted + 5 dB = 33 dB (as per Annex 6 of Appendix S30).

From Figure 2, it can be seen that apart from the 2.4 m antenna, the 30 cm and the 45 cm antenna in Regions 1 and 3, the current pfd limits in Annex 4 provide more protection than required to the Plan for all orbital separations. Also, it can be seen that there is significant margin against the Plan protection requirement for different ranges of orbital separations, for all antenna diameters. This suggests that some relaxation may be sought for these ranges of orbital separations. In addition, to take into account the increasing widespread use of digital techniques in the BSS, a 3 dB relaxation is proposed on the protection ratios, consistent with the IRG conclusions (i.e. 26 dB C/I single entry for Regions 1 and 3 protection and 30 dB for Region 2 protection).

Figure 2- Difference between the pfd required by Annex 6 of Appendix S30 for various antennas and current Annex 4 pfd limits

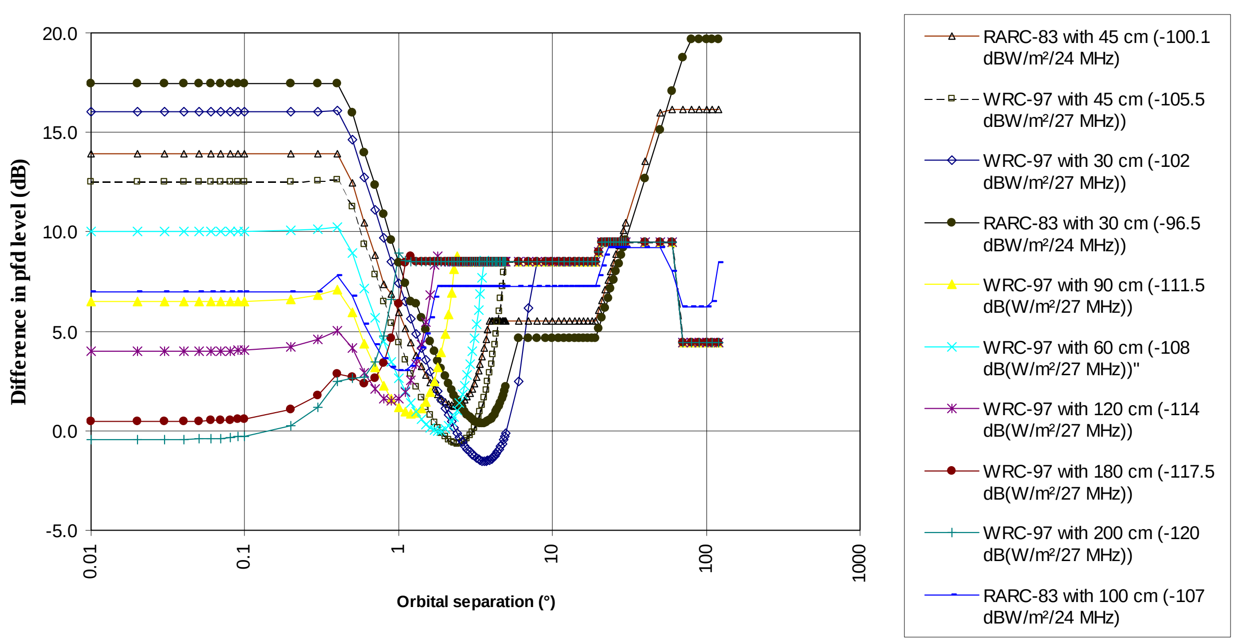


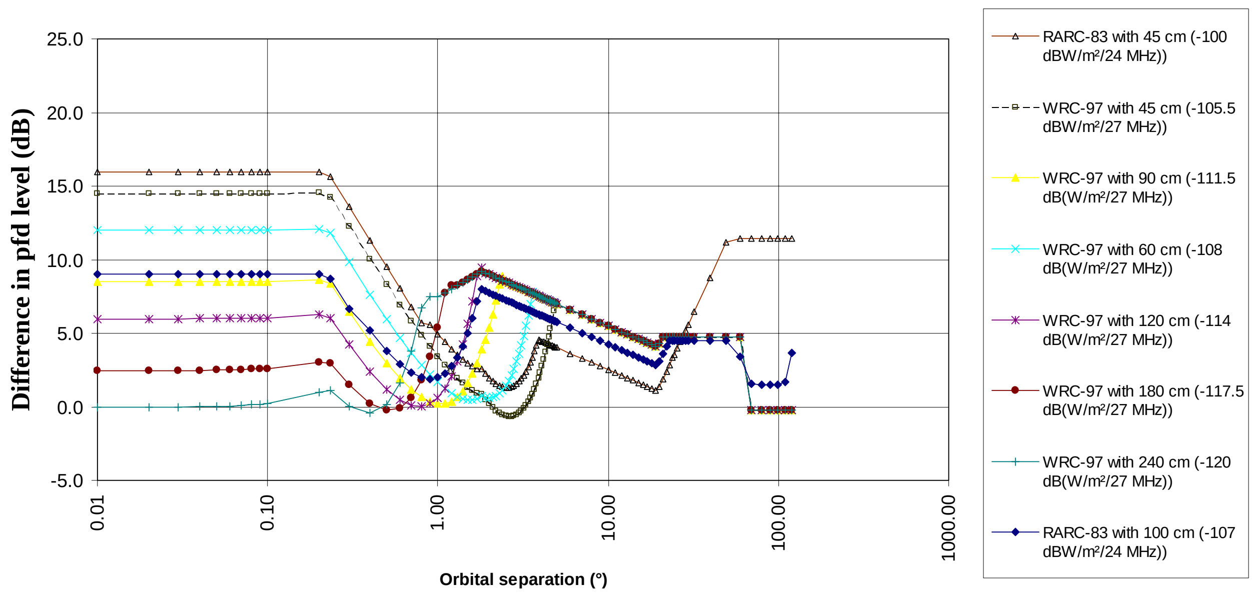
Figure 3 provides a similar comparison against the candidate alternative pfd limits. It shows that the margin in excess has been essentially eliminated, while providing satisfactory protection to all diameters in the range between 60 cm and 240 cm in Regions 1 and 3, as well as to all diameters above 45 cm diameter in Region 2.

The philosophy of the current Annex 4 limits was to protect the nominal transmissions in the Plan (90 cm/–103 dB(W/m^2/27 MHz) for individual reception and 180 cm/–111 dB(W/m^2/27 MHz) for community reception in the 1977 Plan). Since WRC-97, the nominal transmission in the Regions 1 and 3 Plan corresponds to a 60 cm antenna associated to a pfd of –108 dB(W/m^2/27 MHz). In Region 2, it corresponds to a 1 m antenna associated to a pfd of –107 dB(W/m^2/24 MHz).

From the above, it can be seen that the alternative candidate pfd mask in Figure 1 would protect a range of antenna diameters between 30 cm and 240 cm. This would in fact protect both the nominal characteristics of the Plans and any modifications. If the nominal Plan and its modifications were to be treated separately, there would be a need to split this mask into two masks: one applicable to the protection of the nominal Plan, and one applicable to the protection of the Plan modifications. As can be seen from Figure 3, the mask to protect the nominal Plan could be derived from the candidate mask by a relaxation of 9 dB for the smaller orbital separations (i.e. –137 dB(W/m^2/27 MHz) for θ < 0.69°.

Concerning the additional proposed criterion of a 9° coordination arc, this proposal is in line with the results of the most recent studies carried out in ITU-R, which indicate that identification of affected administrations in the case of S9.7 should be based on a 9° coordination arc in the 10-12 GHz band. For the particular case of the BSS protection, a 9° orbital nominal separation corresponds, taking into account a ±0.05° station-keeping accuracy for both the wanted and interfering space stations, to an off-axis angle of (9-2*0.05)*1.1 = 9.7°. Assuming that the side-lobe characteristics for the BSS receive antenna are compliant with Figure 7*bis* of Annex 5 to Appendix S30, this corresponds to an off-axis earth station discrimination of 31.2 dB. Taking into account the fact that modifications to the Plans or FSS should have lower satellite e.i.r.p. levels that the ones in the new Plan, this value is considered more than adequate to protect the BSS in all situations. In all cases, it is proposed that BR identifies the affected administrations based on the use of this criterion only.

Figure 3- Difference between the pfd required by Annex 6 of Appendix S30 for various antennas and alternative Annex 4 pfd limits



Proposals

Based on the above analysis, the following proposals are made:

a) Limits to protect the nominal characteristics of the Plans

F/37/2

The following pfd limits, defined as a function of the orbital separation θ between the wanted and interfering space stations, are proposed (in conjunction with a 9° coordination arc) to protect the nominal transmissions in the BSS Plan against FSS or non-planned BSS transmit space stations in the bands covered by Appendix S30. They would replace the current limits in Section 3 of Annex 1 of Appendix S30 and in Annex 4 of Appendix S30.

–137 dB(W/m^2/27 MHz) for $\theta < 0.69°$;

–134 + 18.5 log θ dB(W/m^2/27 MHz) for $0.69° \leq \theta < 1.8°$;

–137 + 30 log θ dB(W/m^2/27 MHz) for $1.8 \leq \theta < 9°$;

where θ is the orbital separation in degrees between the wanted and interfering space stations.

NOTE - In EUR/13/200, 217, 218, it is proposed to suppress Article 7 and Annex 4 of Appendix S30, and to move the limits of Annex 4 of Appendix S30 to Appendix S5 (EUR/13/208). If this approach were decided by WRC-2000, the limits proposed above would replace those proposed in EUR/13/208.

b) Limits to protect BSS transmissions other than nominal Plan transmissions in the bands covered by Appendix S30

F/37/3

The following pfd limits, defined as a function of the orbital separation θ between the wanted and interfering space stations, are proposed (in conjunction with a 9° coordination arc) to protect BSS transmissions other than nominal transmissions in the BSS Plan against FSS or non-planned BSS transmit space stations in the bands covered by Appendix S30. They would replace the current limits in Section 3 of Annex 1 of Appendix S30 and in Annex 4 of Appendix S30.

–146 dB(W/m^2/27 MHz) for $\theta < 0.225°$;

–134 + 18.5 log θ dB(W/m^2/27 MHz) for $0.225° \leq \theta < 1.8°$;

–137 + 30 log θ dB(W/m^2/27 MHz) for $1.8 \leq \theta < 9°$;

where θ is the orbital separation in degrees between the wanted and interfering space stations.

3 Criteria to protect the fixed-satellite service

The fixed-satellite service (FSS) is currently protected from a modification to one of the BSS Plans by the application of the procedure of Article 4 of Appendix S30, Sections 4.3.1.5 or 4.3.3.5. Sections 6 and 7 of Annex 1 to Appendix S30 and Section A3 of Annex 7 to Appendix S30 are associated with this procedure.

3.1 Threshold limits in Annex 1 of Appendix S30

The coordination criteria to determine whether an administration is affected by a proposed modification to one of the BSS Plans are contained in Sections 6 and 7 of Annex 1 to Appendix S30.

Section 7 of Annex 1 to Appendix S30 contains a ΔT/T criterion of four per cent, which applies to protect the FSS receive space station from the BSS transmit space station (operation in opposite directions of transmission).

Section 6 of Annex 1 to Appendix S30 contains two criteria applicable in the case of operation in the same direction of transmission:

- a pfd increase of 0.25 dB, applicable to modifications to an existing assignment in the Plan;

- an absolute pfd limit of –138 dB(W/m^2/27 MHz), which is independent from the real characteristics of the FSS network which is the subject of the coordination, in particular, independent from the orbital location of this network. Application of this criterion may lead to the situation where a modification to one of the BSS Plans (in all three Regions) may have to coordinate with an administration having an FSS network 70° away simply because these pfd limits are exceeded on the territory of this administration.

3.2 Discussion

Whilst the above criteria very significantly restrict the possibility of modifying the plans in the three Regions, none of them adequately protects the FSS. For example, the first criterion (0.25 dB increase in pfd) being independent of the orbital separation, the modification of an assignment in the Plan may lead to reduce the orbital separation while keeping the pfd level unchanged, hence possibly increase the interference by several orders of magnitude. The second criterion, which corresponds to a reduction in BSS pfd of 30 dB relative to the edge of service area, falls short of the FSS protection requirement by 8 dB in the case of collocated operation of the FSS and BSS space stations and use of a 2.4 m receive antenna in the FSS, as shown below.

The possibility of using a simple 6% relative noise increase criterion in lieu of pfd limits was investigated, which would have had the advantage of reducing the coordination requirements to what is strictly needed to protect the actual characteristics of the affected FSS network. However, this approach was found to have two major drawbacks: a) it would allow, by submitting especially sensitive carriers, one FSS network to block a large number of BSS Plan modifications; b) it would significantly increase the time required by the Bureau to determine the affected administrations.

Another approach was therefore investigated, by determining the pfd level required to provide a maximum 6% relative noise increase into a range of representative FSS earth station antennas. The total system receive noise temperature has been calculated from the receiver noise temperature, adding 3 dB for all other sources of noise (0.6 dB for uplink noise, 0.4 dB for terrestrial interference, 1 dB for GSO interference, 1 dB for cross polarization isolation and frequency reuse interference).

FSS receive earth station antenna diameter (m)	0.45	0.60	0.80	1.20	3.0	5.0	6.0	8.0
FSS receiver temperature	110	110	125	150	150	200	230	250
Total FSS link receive noise temperature	220	220	250	300	300	400	460	500

Based on these assumptions, and on the use of FSS earth station antenna diagrams compliant with Recommendation ITU-R S.580, Figure 4 shows the pfd mask required for the protection of each of these transmissions to obtain a 6% increase in overall link noise temperature and the envelope of all these masks.

Figure 5 provides a comparison of the above envelope pfd mask with the current Section 6 of Annex 1 pfd limit and with the alternative pfd mask proposed in Section 2 above for the replacement of the Annex 4 pfd mask for the protection of BSS transmissions other than nominal Plan transmissions.

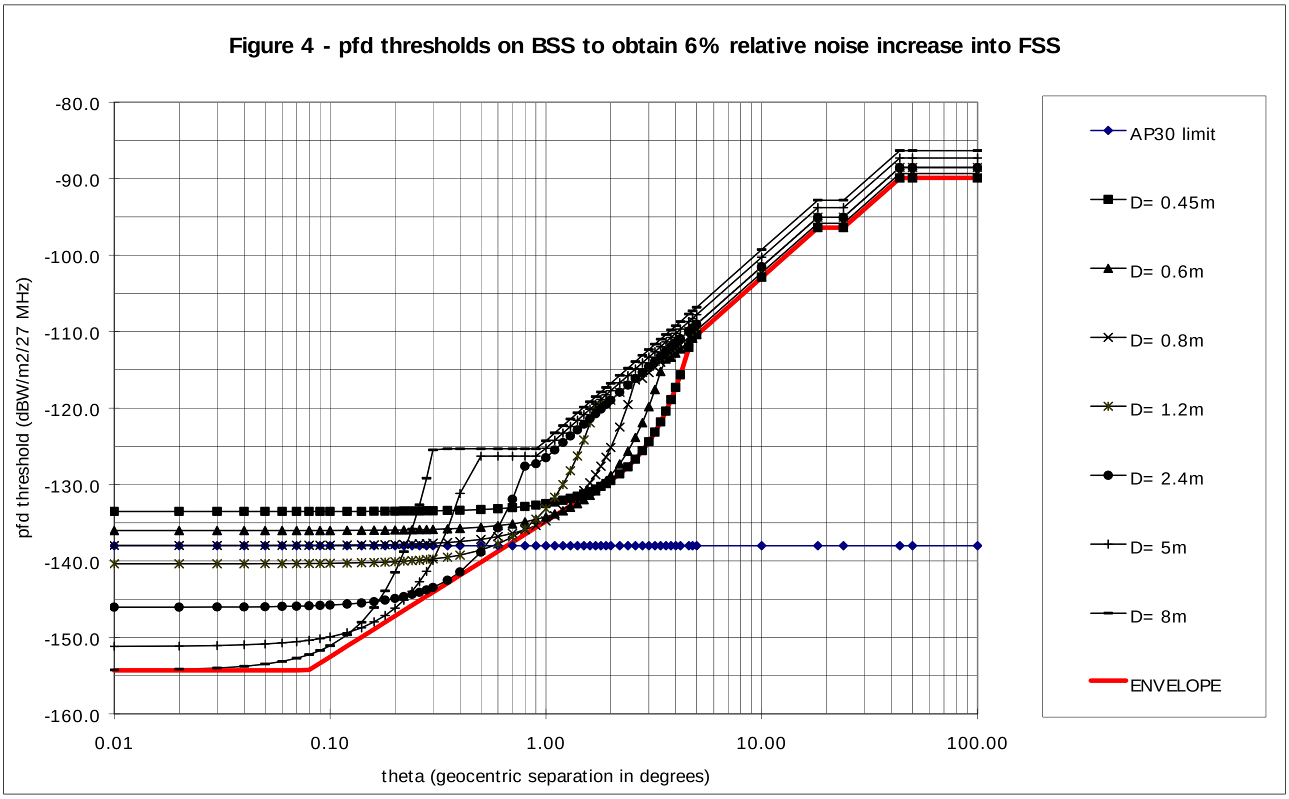
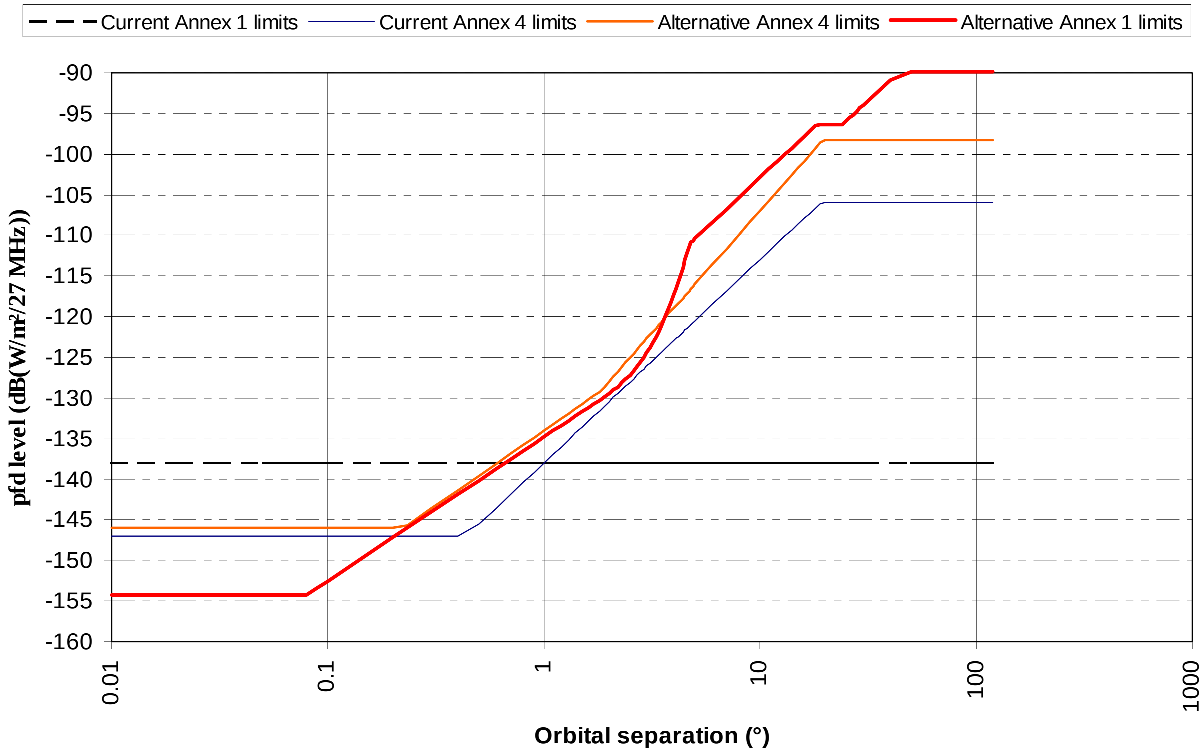


Figure 5- Current Annexes 1 and 4 pfd limits and alternative limits



As can be seen from Figure 5, except for very small and very large separations, there is no significant difference between the envelope mask of Figure 4 and the pfd mask proposed in Section 2 above as an alternative to the current Annex 4 mask.

For very large orbital separations, the pfd mask proposed in Section 2 leads to more constraints on the BSS than the envelope mask of Figure 4. For very small orbital separations, it leads to less constraints on the BSS than the envelope mask of Figure 4.

Given that the mask proposed in Section 2 already provides 8 dB better protection for the FSS at smaller orbital separation, it is concluded that an acceptable compromise to improve the protection of FSS compared to the current situation, without undue constraints on BSS, is to adopt, for the protection of FSS, the same pfd mask as the one proposed for the protection of BSS. This would also ensure an equitable access to spectrum/orbit resources to both services in all three Regions.

One important improvement afforded by the proposed pfd mask is that, for large orbital separation, up to 40 dB relaxation is obtained. Adoption of this criterion would therefore allow to avoid the current situation, where modifications to the Plan trigger coordination with virtually all FSS networks. In addition, for very small orbital separations (less than 0.7°), up to 8 dB strengthening of the mask is proposed compared to the current situation, in order to protect FSS earth stations up to 2.4 m in diameter, a lesser protection being offered for large diameters. These new criteria would allow coexistence of both services with very small orbital separations, which is not currently possible in spite of the very stringent orbital position limitations included in Annex 7 of Appendix S30.

3.3 Proposals for the protection of FSS

F/37/4

The following limits are therefore as a replacement to those appearing in Section 6 of Annex 1 to Appendix S30 to protect FSS from modifications of the Appendix S30 Plans, in conjunction with a 9° coordination arc:

-146 dB(W/m^2/27 MHz)	for $\theta < 0.225°$;
$-134+18.5 \log \theta$ dB(W/m^2/27 MHz)	for $0.225° \leq \theta < 1.8°$;
$-137 + 30 \log \theta$ dB(W/m^2/27 MHz)	for $1.8 \leq \theta < 9°$;

where θ is the orbital separation in degrees between the wanted and interfering space stations.

F/37/5

Concerning the case of operation of BSS and FSS in opposite directions of transmission, the current criterion in Section 7 of Annex 1 of Appendix S30, which is associated to paragraph 4.3.3.5 of Article 4 of Appendix S30 to cover the cases where the proposed new BSS space stations may affect receive FSS space stations, could be relaxed from a $\Delta T/T$ of 4% to 6%, which is in line with the standard protection requirement for the FSS.

3.4 Limits in Annex 7 of Appendix S30

The limits included in Annex 7 are hard limits, in the sense that if they are not met, the proposed modification to the Plan is rejected by BR. Two types of limits apply in this Annex:

– BSS satellite orbital limitations. For example, in the orbital arc 37° W-10° E, the only positions that can be used are those within 1° to the East of the nominal orbital locations in the Plan.

– BSS satellite e.i.r.p reduction. In the case of the above example, the use of an orbital location different from one of the nominal locations of the Plan leads to the obligation of an 8 dB e.i.r.p. reduction. Taking the Regions 1 and 3 Plan standard satellite e.i.r.p. as a reference, this 8 dB reduction corresponds to a pfd level of –108 –8 dB = –116 dB(W/m^2/27 MHz). Taking the minimum mandatory energy dispersal of 600 kHz, this corresponds to a maximum pfd per 4 kHz allowed of:

$$-116 - 10 \log(600/4) = -138 \text{ dB(W/m}^2\text{/4 kHz)}$$

which is exactly the pfd limit proposed for the protection of terrestrial services (see Section 1).

It would therefore appear that the satellite e.i.r.p. limitations currently included in Annex 7 of Appendix S30 could be met (in the analogue case) by the application of the proposals contained in Section 1.

Concerning the orbital position limitations, it appears that these limitations have been included in the Radio Regulations in order to enable equitable access between the FSS and the BSS, noting that the BSS already has access to a significant portion of the orbit/spectrum resources as a result of the assignments included in the Plans by the Conference. These limitations were therefore intended to maintain a global balance between the FSS use (through Article 7 of Appendix S30) and the BSS use (original Plan + modifications to the Plans through Article 4 of Appendix S30).

Attachment 2 provides a summary of the current use of the orbit/spectrum resources common to Regions 1 and 2 (in the band 11.7-12.2 GHz) and to Regions 1 and 3 (in the band 12.2-12.5 GHz).

It shows that the currently planned use by the BSS Plan and its proposed additions is comparable if not lower to the currently planned use of these resources by the FSS.

It is therefore concluded that, if suitable updated criteria such as those proposed in Sections 1, 2 and 3.3 above were applied, the balance achieved through the application of these criteria may not require maintaining the current limitations in Section A3 of Annex 7 of Appendix S30.

It is also concluded that the application of the current criteria in Appendix S30 may have resulted in BSS in Regions 1 and 3 and FSS in Regions 2 and 3 mutually preventing each other to access resources as a result of too stringent, yet inadequate, criteria. The criteria proposed in this document are expected to contribute to a more satisfactory development of the services in this band.

Proposal

F/37/6

It is proposed to suppress Section A3 of Annex 7 to Appendix S30 and to have no additional limitations in this Annex**.**

4 Example of coexistence of BSS, FSS and terrestrial systems using the proposed criteria

In the following example, an analysis is provided of the interference situation between a BSS and an FSS system located with 1° separation on the orbital arc between 47° W and 20° E (10° margin around the current Annex 7 arc between Regions 1 and 2).

4.1 Minimum angular discrimination between Regions 1 and 2

A key element in determining the level of constraints imposed by the sharing requirements between FSS in Region 2 and BSS in Region 1 is the minimum angular discrimination that can be provided in the direction of one Region by a space station serving the other Region.

In the orbital arc of interest (47° W to 20° E), the minimum angle seen from the GSO between the two Regions is 3.2°. Taking into account the pointing accuracy currently achieved by satellites of ±0.15°, this leads to a minimum requirement of 2.9° in angular distance between the two Regions.

Based on Recommendation ITU-R S.672-4, and the use of 3° wide FSS coverage area, FSS spacecraft antennas can provide a discrimination of 22 dB between the edge of FSS coverage area and a direction separated from this coverage area by 2.9°. Concerning BSS spacecraft antennas, and also based on the use of 3° wide BSS coverage areas, the use of fast roll-off antennas, in line with Figure 11B of Appendix S30, allows the provision of 29 dB discrimination between the edge of the BSS coverage area and a direction separated from this coverage area by 2.9°. Attachment 3 provides the references for the derivation of these numbers.

These values have been taken as the basis for the following analysis.

4.2 Protection of a BSS planned and non-planned use

Assuming a new FSS system is planned, it will have to protect the BSS Plan and its modifications previously received by the Bureau in the bands subject to Appendix S30.

In line with the proposal made in Section 2, a BSS system located 1° away from the planned FSS system (0.9° taking into account station keeping accuracy) would tolerate a maximum pfd from the FSS system of –135.6 dB(W/m^2/27 MHz). This corresponds to a satellite e.i.r.p. density of –135.6 + 162.7 = 27.1 dB(W/27 MHz). Taking into account the 22 dB achievable interregional discrimination, this corresponds to a maximum satellite of 49.1 dBW e.i.r.p. at the edge of the FSS service area, or 52.1 dBW boresight e.i.r.p. This is in line with most of the FSS transmissions currently planned. Using a somewhat larger satellite antenna (e.g. 2 m) would allow another 5 dB improvement if required (L_s = –30 dB) in order to protect the BSS system while implementing a 57.1 dBW maximum e.i.r.p in the FSS, or 54.1 dBW at the edge of the FSS service area.

4.3 Protection of an FSS system

The FSS system located 1° away from a BSS system would have to accept interference from this BSS system if the latter has been communicated to the Bureau previously.

In line with the proposal made in Section 3.1, an FSS system located 1° away from the BSS system (0.9° taking into account station keeping accuracy) would tolerate a maximum BSS interfering pfd of –135.6 dB(W/m^2/27 MHz). Taking into account the 29 dB achievable interregional discrimination, this corresponds to a maximum BSS satellite pfd at the edge of the BSS service area of –106.6 dB(W/m^2/27 MHz). This allows BSS satellite e.i.r.p. levels of 56.1 dBW at edge of coverage, which is in line with the maximum level currently appearing in Regions 1 and 3 Plan.

In the case where the interference comes from an assignment in the original Plan, it would correspond to a 56 dBW BSS edge of coverage e.i.r.p. Although the assignments in the original Plan do not use fast roll-off antennas, they correspond, in the worst cases involving Region 1-Region 2 separation, to half-power beamwidth of about or less than 1°. In this case, this would correspond to values of the ratio φ/φo of 7 or greater. As can be seen in Attachment 3, this would lead to a minimum 35 dB off-coverage geographic discrimination, which is 6 dB higher that the one assumed above.

ATTACHMENT 1

Current RR allocations in the 11.7-12.7 GHz band

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr>
<td rowspan="3">11.7-12.5
FIXED
BROADCASTING
BROADCASTING-SATELLITE
MOBILE except aeronautical mobile

S5.487 S5.487A S5.492</td>
<td>11.7-12.1
FIXED S5.486
FIXED-SATELLITE (space-to-Earth) S5.484A
Mobile except aeronautical mobile
S5.485 S5.488</td>
<td rowspan="2">11.7-12.2
FIXED
MOBILE except aeronautical mobile
BROADCASTING
BROADCASTING-SATELLITE

S5.487 S5.487A S5.492</td>
</tr>
<tr>
<td>12.1-12.2
FIXED-SATELLITE (space-to-Earth) S5.484A
S5.485 S5.488 S5.489</td>
</tr>
<tr>
<td rowspan="2">12.2-12.7
FIXED
MOBILE except aeronautical mobile
BROADCASTING
BROADCASTING-SATELLITE
S5.487A S5.488 S5.490 S5.492</td>
<td>12.2-12.5
FIXED
MOBILE except aeronautical mobile
BROADCASTING
S5.484A S5.487 S5.491</td>
</tr>
<tr>
<td rowspan="2">12.5-12.75
FIXED-SATELLITE (space-to-Earth) S5.484A (Earth-to-space)

S5.494 S5.495 S5.496</td>
<td rowspan="2">12.5-12.75
FIXED
FIXED-SATELLITE (space-to-Earth) S5.484A
MOBILE except aeronautical mobile
BROADCASTING-SATELLITE S5.493</td>
</tr>
<tr>
<td>12.7-12.75
FIXED
FIXED-SATELLITE (Earth-to-space)
MOBILE except aeronautical mobile</td>
</tr>
</table>

ATTACHMENT 2

List of the GSO FSS networks using the frequency band 11.7-12.2 GHz in the orbital arc 47° W to 20° E

Position	WRC-97 BSS Plan position
N	Notification
C	Coordination
ntp	Not yet processed
api	Advanced publication
A4	Under Article 4 coordination process

USASAT-26L (C ntp)	–47.00	
B-SAT L (C)	–45.00	
USASAT-13I (N)		
USASAT-25D (C ntp), USASAT-26D (C)		
B-SAT-X (C ntp)	–43.00	
USASAT-26C (C)		
INTELSAT K 319.5E, 7 319.5 E, 8 319.5 E (C)	–40.50	NSS-18 (api)
INTELSAT IBS 319.5 E (N)		
	–39.00	HISPASAT 39W KU (api)
USASAT-26A (C)	–37.50	
	–37.00	
	–36.00	HISPASAT 36W KU (api)
INTELSAT7 325.5 E, INTELSAT8 325.5 E (C)	34.50	
	–33.50	
	–33.50	UKDIGISAT-1 (A4)
INTELSAT7 328.5 E, INTELSAT8 328.5 E (C)	–31.50	
HISPASAT-1 (C)	–31.00	
	–30.00	
HISPASAT-1 (N), 2C3 KU (C)	–30.00	HISPASAT-2D KU (api)
INTELSAT7 330.5 E, INTELSAT8 330.5 E (C)	–29.50	
INTELSAT7 332.5 E, INTELSAT8 332.5 E (C)	–27.50	
	–25.00	
	–25.00	MAROC-SAT (A4)
INTELSAT7 335.5 E, INTELSAT8 335.5 E (C)	–24.50	
	–24.00	EUTELSAT B-24W (A4)
	–23.00	SMO-GEO-4A-KU (api)
INTELSAT7 338 E, INTELSAT 8 338 E (C)	–22.00	

INTELSAT K 338.5 E (N)	–21.50	NSS-7, 12, 15, 16 (api)
INTELSAT7 338.5 E, INTELSAT 8 338.5 E (C)		SMO-GEO-3A-KU (api)
INTELSAT7 340 E, INTELSAT 8 340 E (C)	–20.00	
	–19.00	
INTELSAT IBS 342 E (N), 7 342 E (N), 8 342 E (C)	–18.00	SMO-GEO-1A-KU (api) EUTELSAT B-18W (A4)
	–16.00	URUSAT-7 (api)
EMARSAT-1 E (C)	–15.50	
	–15.00	SMO-GEO-2A-KU (api) GESATCOM-E2 (api)
	–14.80	EUTELSAT 3-14.8W (api)
	–13.00	
	–12.50	EUTELSAT 3-12.5W (api)
USASAT-14L (C)	–12.00	EUTELSAT B-12W (A4) BIFROST-12W-1/2 (A4)
	–10.00	GESATCOM-E5 (api)
VIDEOSAT-6, 6-Ka (C)	–8.00	
	–7.00	
VIDEOSAT-5, 5-Ka (C)	–7.00	RADIOSAT-5C (A4)
INTERSPUTNIK-6W-Q (C)	–6.00	BIFROST-6W-1/2 (A4)
VIDEOSAT-7, 7-Ka (C)	–5.00	F-SAT-KU-E-5W (api)
	–4.00	BIFROST-4W-1/2 (A4)
INTERSPUTNIK-3W-Q (C)	–3.00	
	–1.00	
BIFROST-14 (C) INTELSAT 7 (N) INTELSAT 7 359 E, 8 359 E, Ka 359 E (C)	–1.00	
	–0.80	
	–0.80	BIFROST 5 to 19 (A4)
	–0.20	EURSAT BSS-0.2W (A4)
	2.00	EURSAT BSS-2E (A4) BIFROST-2E-1/2 (A4)
VIDEOSAT-8-KU-C (C)	3.00	
	5.00	
TELE-X (N)	5.00	
	5.20	
SIRIUS-3 (C)	5.20	
MEASAT-SA1 (C)	5.70	
	5.80	EURSAT BSS-5.8E (A4)

	7.00	EUTELSAT 3-7E (api)
USASAT-41S (C)	8.50	
MEASAT-SA2 (C)	9.00	
	9.80	EURSAT BSS-9.8E (A4)
	10.00	EUTELSAT 3-10 E (api) USASAT-27F (api)
	10.20	EUTELSAT B-10E (A4)
	11.00	
	13.00	EUTELSAT 3-13E (api)
	16.00	EUTELSAT 3-16E (api)
	16.20	EURSAT BSS-16.2E (A4)
	17.00	

List of the GSO FSS networks using the frequency band 12.2-12.5 GHz in the orbital arc 20° E to 210° E

Position	WRC-97 BSS Plan position
N	Notification
C	Coordination
ntp	Not yet processed
api	Advanced publication
A4	Under Article 4 coordination process

	22.80	EURSAT BSS-22.8E (A4)
	23.00	
	25.20	EURSAT BSS-25.2E (A4)
	25.50	EUTELSAT 3-25.5E (api)
	26.00	IRNDBS-2 (A4)
INTERSPUTNIK-27E-Q (C)	27.00	
	29.00	
	29.00	EUTELSAT 3-29E (api)
PAKSAT-C (C)	30.00	
	33.00	INTELSAT KUEXT 33E (A4)
	33.00	EUTELSAT 3-33E (api)
	34.00	
	34.00	IRNDBS-1 (A4)
	36.00	EUTELSAT 3-36E (api)
	36.00	RST-1 (A4)
MEASAT-SA3 (C)	37.00	
	38.00	
PAKSAT-1 (C)	38.00	NSS-21 (api)
PAKSAT-2 (C)	41.00	
EUROPE*STAR-2G-2 (C)	43.00	
	44.00	
	44.00	NPLSAT-44E (A4)
EMARSAT-1F (C)	44.00	EUTELSAT 3-44E (api)
EUROPE*STAR-2G-1 (C)	45.00	F-SATDAB-2 (api)
		NSS-22 (api)
	46.00	BIFROST-46.0E (A4)
MEASAT-SA4 (C)		BIFROST-46E (api)
	47.00	IRNDBS-3 (A4)

EUROPE*STAR-2G-3 (C)	47.50	
EUTELSAT 3-48E	48.00	
INSAT-EK48 (C)		
	50.00	
	50.00	NPLSAT-50E (A4)
	50.20	BIFROST-50.2E (api)
		BIFROST-50.2E(A4)
	50.40	BULSAT-BSS (A4)
THAICOM-C1 (C)	50.50	
	51.00	NSS-23 (api)
EMARSAT-1G (C)	52.50	
		EMARSAT-1 ADD-1 (A4)
	53.20	BIFROST-53.2 (api)
		BIFROST-53.2E-1 (A4)
EMARSAT-1B (C)	54.00	
INSAT-EK55, ST-1D (C)	55.00	
	56.00	
NSS-8 (C)	57.00	SMO-GEO-5A-KU (api)
		INTELSAT7 57E (api)
	57.00	INTELSAT KUEXT 57E (A4)
	60.00	SMO-GEO-6A-KU (api)
		INTELSAT KUEXT 60E (A4)
	62.00	
	62.00	INTELSAT KUEXT 62E (A4)
	63.00	SMO-GEO-7A-KU (api)
	64.00	INTELSAT KUEXT 64E (A4)
N-SAT-65.5 (C)	65.50	
INTELSAT 7 66E	66.00	
		INTELSAT KUEXT 66E (A4)
	68.00	
ST-1 E (C)	68.00	VINASAT-3A (api)
USASAT-14I (C)	68.50	
ST-1F (C)	70.00	TONGASAT-H70 (api)
	70.50	EUTELSAT 3-70.5E (api)
PALAPA-C5 (C)	71.50	
DEF-R-SAT-2A (C)	72.00	MEASAT-4 (api)
USASAT-14J (C)		
N-SAT-73 E (C)	73.00	
EUTELSAT 3-73.5E (C)	73.50	
	74.00	
INSAT-EK74 (C)	74.00	

		BRUSAT-BSS3 (A4)
N-SAT-74.5 E (C)	74.50	
	74.80	BIFROST-74.8 (api)
		BIFROST-74.8E (A4)
INTERSPUTNIK-75E-Q (C)	75.00	
L-STAR-1 (C)		
		LSTAR1B (A4)
	75.50	LSTAR1X (A4)
PALAPA-C6 (C)	76.00	EUTELSAT 3-76E (api)
APSTAR-4 (N)	76.50	
N-SAT-76.5 E (C)		
APSTAR-4 (N)	77.00	
ASIASAT-DK1, DK-X (C)	77.50	
	78.50	MEASAT-BSS 78.5 (A4)
		THAICOM BSS2 (A4)
THAICOM-A2B (N), G1K (C)	79.50	
N-SAT-79.5 E (C)		
	80.00	
SKYSAT-C1 (C)	80.00	
	80.20	PALAPA BSS-1 (A4)
	80.50	EUTELSAT 3-80.5E (api)
PALAPA-C7 (C)	81.00	
CHINASAT-13 (C)	81.50	
DEF-R-SAT-1A (C)	82.00	
N-SAT-82.5 E (C)	82.50	
INSAT-EK83 (C)	83.00	
		THAICOM BSS1 (A4)
TONGASAT AP-KU-4 (C)	83.30	
	83.50	EUTELSAT 3-83.5E (api)
		BRUSAT-BSS1 (A4)
N-SAT-84 E (C)	84.00	
INTELSAT KFOS 85 E (C)	85.00	
APSTAR-2 F1	85.50	
	86.00	
EUTELSAT 3-86 E (C)	86.00	
N-SAT-86 E (C)		
		MEASAT BSS-86 (A4)
		VINASAT (A4)
L-STAR-5 (C)	87.00	VINASAT-1B (api)
DFH-3A-OA (C), 3-OC (N)	87.50	
PAKSAT-D (C)	88.00	ST-3A (api)

ST-1A (C)		
	88.50	EUTELSAT 3-88.5E (api)
APSTAR-2 F2 (C ntp)	89.50	
SKYSAT-C2 (C)	90.00	
MEASAT-1, AK 91.5, IK 91.5E (C) MEASAT 91.5E (C ntp)	91.50	MEASAT BSS-91.5 (A4)
	92.00	
DEF-R-SAT-3A (C ntp) APSTAR-3 (C)	93.00	
INSAT-EK93.5 (C)	93.50	
N-SAT-94E (C ntp)	94.00	
INTELSAT8 95E (C) NSS-9 (C ntp) MEASAT-3 (C), IK 95E (C), 95E (C ntp)	95.00	INTELSAT KUEXT 95E (A4)
GESATCOM-A1 (C)	97.00	VINASAT-2B, VINASAT-3B (api)
SKYSAT-B2 (C) L-STAR-6 (C)	97.50	
	98.00	
DFH-3A-OC (C) PACSTAR-L1 (C ntp)	98.00	
ST-1B (C)	98.50	
ASIASAT-EK1 (N), EKX (C)	100.50	
PAKSAT-E (C)	101.00	CBSAT-4 (A4)
DFH-4-OF (C) SKYSAT-C3 (C)	101.50	
N-SAT-102.5E (C ntp)	102.50	
DFH-4-OB (C) INSAT-EK103 (C) KOREASAT-103KU (C ntp) L-STAR-2 (C)	103.00	LSTAR2B (A4)
N-SAT-103.5E (C ntp)	103.50	LSTAR2X (A4)
	104.00	
	104.00	PALAPA BSS-2 (A4) KSAT-1 (A4)
SKYSAT-C4 (C)	104.80	
ASIASAT-CK1, CKX (C)	105.50	
N-SAT-106.5 (C ntp)	106.50	

	107.00	DACOMSAT-8KU (api)
		VINASAT-1C (api)
		BRUSAT-BSS4 (A4)
PALAPA-C2-K (C)	108.00	
		PALAPA BSS-3 (A4)
GESATCOM-A4 (C)	108.20	
	109.00	DACOMSAT-9KU (api)
	109.65	TEST-109.65 (A4)
	109.85	NB-SAT-109.85A/AHP (A4)
	110.00	
N-SAT-110 (C), 110E (C ntp)	110.00	SB-SAT-110 (api)
ST-1C (C)		
		NB-SAT-110/110A/100AHP (A4)
		BRUSAT-BSS2 (A4)
	110.40	PALAPA BSS-4 (A4)
CHINASAT-6 (N)	110.50	
DFH-3A-OB (C)		
INSAT-EK111.5 (C)	111.50	
PALAPA-C1-K (C)	113.00	
KOREASAT-2 (N)		
		CBSAT-5 (A4)
		PALAPA BSS-5 (A4)
	114.50	VINASAT-2A (api)
DFH-4-OD (C)	115.50	
	116.00	
ASIASAT-BK1, BKX (C)	116.00	
KOREASAT-1 (N)		
L-STAR-3 (C)		
		KOREASAT-3 (A4)
		LSTAR3B (A4)
	116.50	LSTAR3X (A4)
N-SAT-117 (C ntp)	117.00	
PALAPA-C3-K (C)	118.00	
		PALAPA BSS-6 (A4)
SKYSAT-A1 (C)	118.30	
	119.00	CBSAT-6 (A4)
		LSTAR5B (A4)
	119.50	LSTAR5X (A4)
N-SAT-120E (C ntp)	120.00	HYUNDAI-AU (api)
SJC-2 (C)		
THAICOM-A3B (C), AK3 (C), G2K (C ntp)		

			THAICOM BSS3 (A4)
DFH-4-OE (C)	121.00		
SKYSAT-A2 (C)	121.50		
	122.00		
ASIASAT-AK1, AKX (C)	122.00		
PACSTAR-L2 (C ntp)			
			KSAT-2 (A4)
N-SAT-122.5E (C ntp)	122.50	VINASAT-1A (api)	
JCSAT-TT&C-123E (C ntp)	123.00		
THAICOM-A5B (C)			
KOREASAT-123.7KU (C ntp)	123.70		
JCSAT-3B (C)	124.00	SB-SAT-124 (api)	
SJC-1 (C)			
			THAICOM BSS4 (A4)
SKYSAT-A3 (C)	124.70		
DFH-4-OA (C)	125.00		
JCSAT-TT&C-125E (C ntp)			
			CBSAT-7 (A4)
JCSAT-TT&C-125.5E (C ntp)	125.50		
N-SAT-125.5E (C ntp)			
JCSAT-TT&C-126E (C ntp)	126.00	HYUNDAI-BU (api)	
L-STAR-4 (C)			
THAICOM-C2 (C)			
USASAT-14M (C)			
			LSTAR4B (A4)
JCSAT-TT&C-126.5E (C ntp)	126.50		
			LSTAR4X (A4)
JCSAT-TT&C-127E (C ntp	127.00		
	128.00		
JCSAT-3A (C)	128.00	SB-SAT-128 (api)	
N-SAT-128 (C)			
			KSAT-3 (A4)
JCSAT-TT&C-129E (C ntp)	129.00	DACOMSAT-10KU (api)	
N-SAT-129.5E (C ntp)	129.50		
DFH-3A-OD (C)	130.00		
PACSTAR-L3 (C ntp)			
D-STAR-1 & 2 (C ntp)	132.00	VINASAT-4A (api)	
N-STAR-A (N), A2 (C ntp)			
	132.50	N-SAT-132.5E (api)	
SKYBAT-B1 (C)	133.50		

	134.00		
APSTAR-2 (C)	134.00		
PALAPA PAC-1 CKU (C)			
			KSAT-4 (A4)
	134.50	N-SAT-134.5E (api)	
MTSAT-135E (C)	135.00	SB-SAT-135 (api)	
DFH-4-OC (C)	135.50		
N-STAR-B (N), B2 (C ntp)	136.00	D-STAR-2 (api)	
	136.50	N-SAT-136.5E (api)	
	137.00		PALAPA BSS-7 (A4)
SKYSAT-B3 (C)	137.50		
			INTELSAT KUEXT 137.7E (A4)
	138.00		CAN-BSS5 (A4)
PALAPA PAC-2 CKU (C)	139.00		
ORION-AP-1 (C)			
	139.50		PALAPA BSS-8 (A4)
	140.00		
MTSAT-140E (C)	140.00		
			KSAT-5 (A4)
N-SAT-141E (C ntp)	141.00		
SKYSAT-B4 (C)	141.50		
THAICOM-A4B (C), AK4 (C), G3K (C ntp)	142.00		
	143.00	N-SAT-143E (api)	
PALAPA PAC-3 CKU (C)	144.00	SB-SAT-144 (api)	
SUPERBIRD-C (N)			
ORION-AP-2 (C)			
MTSAT-145E (C)	145.00		
	146.00		
N-SAT-146 (N)	146.00	N-SAT-146A (api)	
PALAPA PAC-KU 146E (C ntp)			
N-SAT-147.5E (C ntp)	147.50		
MEASAT-148E (C ntp), MEASAT-2 (C)	148.00		
JCSAT-1 (N), 1R (C)	150.00	SB-SAT-150 (api)	
	152.00		
AUSSAT A 152E (N), A 152E PAC (C), B 152E (C)	152.00		
AUSSAT B 152E MOB, B 152E MXL (C)			
			AUS-152E (A4)
	153.00	N-SAT-153 (api)	
INTERSPUTNIK-153.5EQ (C ntp)	153.50		
JCSAT-2 (N), 2R (C)	154.00	SB-SAT-154 (api)	
	155.00	DACOMSAT-11KU (api)	

AUSSAT A 156E, A 156E PAC (N) AUSSAT B 156E, B 156E MC, B 156E R (N) AUSSAT B 156E MOB, B 156E MXL, B 156E NZ (C) AUSSAT C 156E FSS (C ntp)	156.00	AUSSAT C 156E BSS (A4)
	157.00	INTELSAT KUEXT 157E (A4)
	158.00	
SUPERBIRD-A (N), A2 (C)	158.00	SB-SAT-158 (api)
AUSSAT A 160E, A 160E PAC (N) AUSSAT B 160E, B 160E MC, B 160E NZ, B 160E R (N) AUSSAT B 160E MOB, B 160E MXL (C)	160.00	
SUPERBIRD-B (N), B2 (C)	162.00	SB-SAT-162 (api)
	164.00	
AUSSAT A 164E, A 164E PAC (N) AUSSAT B 164E, B 164E MOB, B 164E MXL (C) EASTSAT	164.00	AUS-164E (A4)
N-SAT-166E (C) USASAT-14H (C)	166.00	
PACSTAR-3 (C)	167.45	
N-SAT-168E (C)	168.00	
USASAT-14G (C)	169.00	
SKYSAT-C5 (C)	169.20	
	170.00	
TONGASAT C1/C1-R (C)	170.75	
USASAT-14K (C)	172.00	
N-SAT-175.5E (C)	175.50	
	176.00	
	177.00	SMO-GEO-8A-KU (api)
N-SAT-178.5E (C)	178.50	
	180.00	SMO-GEO-9A-KU (api) NSS-14 (api)
N-SAT-178.5W (C)	–178.50	
	–178.00	
	–177.00	SMO-GEO-10A-KU (api) NSS-10, 19 (api)
N-SAT-176W (C ntp)	–176.00	
N-SAT-175.5W (C ntp)	–175.50	
N-SAT-175W (C) PACSTAR-4 (C)	–175.00	
N-SAT-174.5W (C ntp)	–174.50	

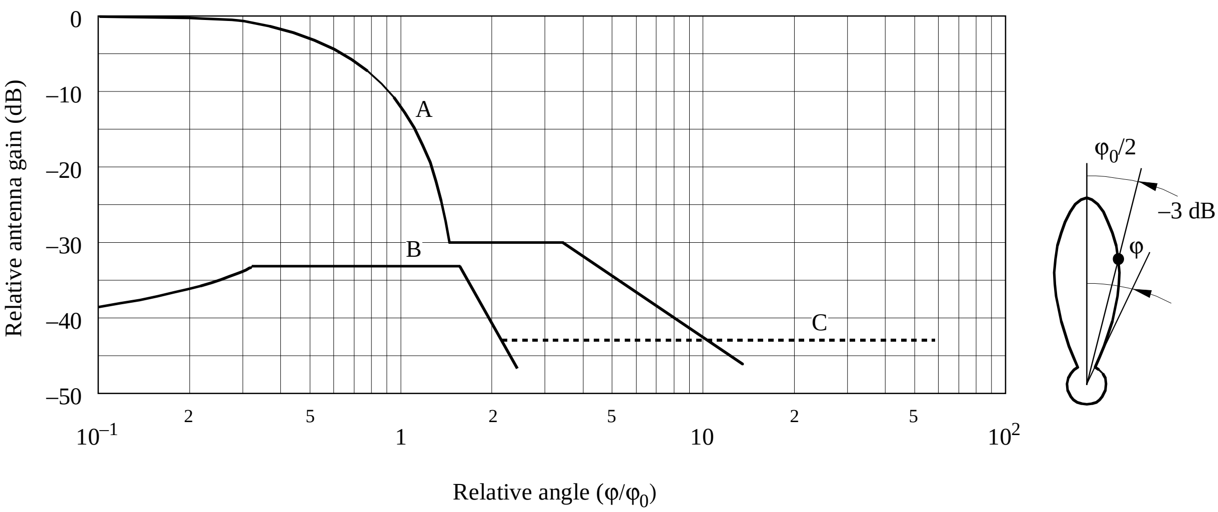
USASAT-14E (C ntp)	–174.30
N-SAT-173W (C)	–173.00
	–172.00
N-SAT-172W (C ntp)	–172.00
N-SAT-169W (C ntp)	–169.00
N-SAT-167W (C)	–167.00
	–166.00
N-SAT-165W (C)	–165.00
N-SAT-163W (C)	–163.00
N-SAT-161W (C)	–161.00
	–160.00
N-SAT-159W (C)	–159.00
N-SAT-152W (C)	–152.00
N-SAT-150W (C)	–150.00

ATTACHMENT 3

Angular discrimination performance for FSS and BSS satellite antennas

FIGURE 9

Reference patterns for co-polar and cross-polar components for satellite transmitting antennas in Regions 1 and 3



APS30/30A5-09

FIGURE 11B

Fast roll-off antenna for Regions 1 and 3 Plan revision
(beamlet beamwidth of 0.6°)

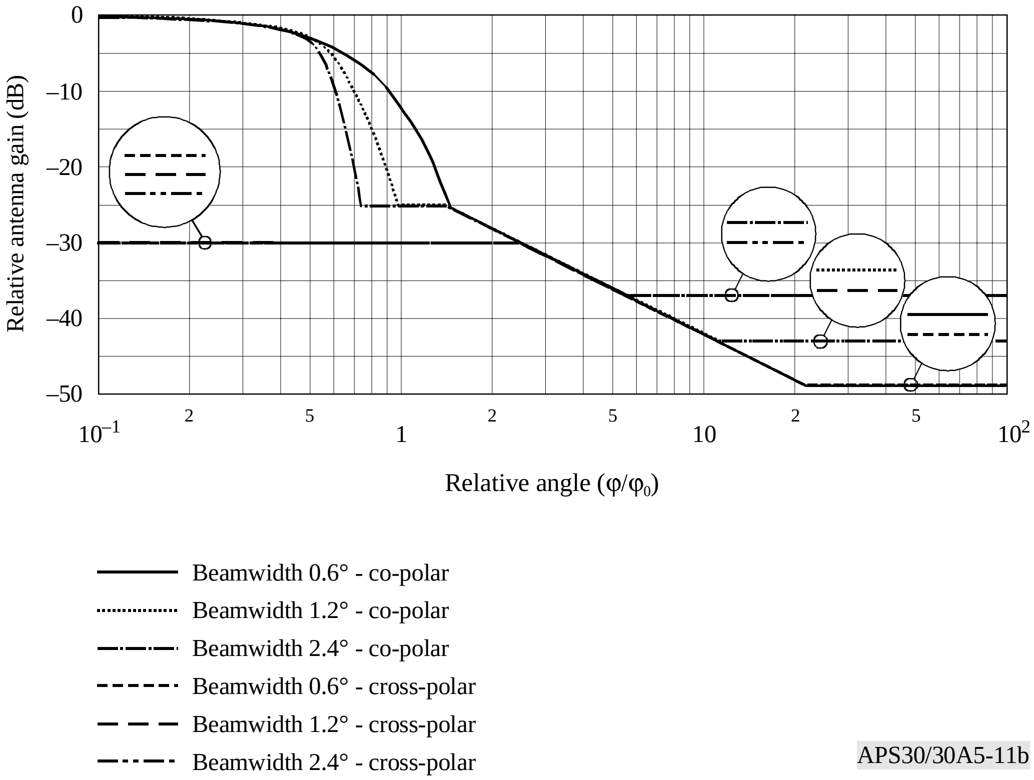
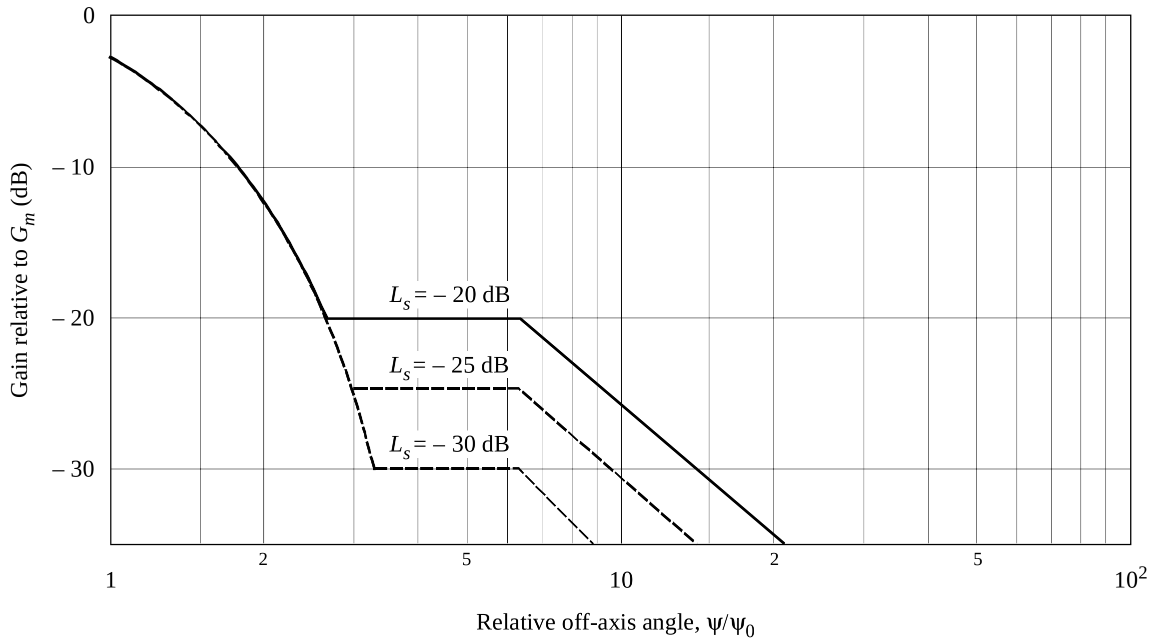


FIGURE 1

Radiation pattern envelope functions



$G(\psi) = G_m - 3(\psi/\psi_0)^2$	dBi	for	$\psi_0 \le \psi \le a\,\psi_0$	(I)
$G(\psi) = G_m + L_s$	dBi	for	$a\,\psi_0 < \psi \le b\,\psi_0$	(II)
$G(\psi) = G_m + L_s + 20 - 25\log(\psi/\psi_0)$	dBi	for	$b\,\psi_0 < \psi \le \psi_1$	(III)
$G(\psi) = 0$	dBi	for	$\psi_1 < \psi$	(IV)

where:

$G(\psi)$: gain at the angle (ψ) from the axis (dBi)

G_m: maximum gain in the main lobe (dBi)

ψ_0: one-half the 3 dB beamwidth in the plane of interest (3 dB below G_m) (degrees)

ψ_1: value of (ψ) when $G(\psi)$ in equation (III) is equal to 0 dBi

L_s: the required near-in-side-lobe level (dB) relative to peak gain

a, b: the numeric values are given below:

L_s	a	b
– 20	2.58	6.32
– 25	2.88	6.32
– 30	3.16	6.32

0672-01

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Italy

PROPOSALS FOR THE WORK OF THE CONFERENCE

PROPOSAL FOR THE DELETION OF ITALY IN RADIO REGULATIONS NOS. S5.112, S5.114 AND S5.117 IN ACCORDANCE WITH WRC-2000 AGENDA ITEM 1.1

Agenda item 1.1 - requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution 26 (Rev.WRC-97)

1 Introduction

WRC-2000 agenda item 1.1 requests administrations to review the footnotes to the Table of Frequency Allocations with the view to delete their country footnotes or to have their country name deleted from footnotes, if no longer required.

2 Background

On request of a group of countries, WARC-79 adopted some “Alternative Allocations” footnotes in order to permit the planning of the mobile maritime service in Region 1 in the MF band. With these footnotes, a primary allocation to the mobile maritime service and an allocation on a permitted basis to the fixed and land mobile services were established, in the concerned bands.

3 Proposal

Taking into account that the subsequent competent Regional Administrative Radio Conference of 1985 established an assignment plan for the mobile maritime service up to 2 160 kHz and the status of permitted service no longer exists, the Italian Administration proposes the deletion of its name in footnotes Nos. S5.112, S5.114 and S5.117 (see Annex).

Annex: 1

ANNEX

MOD I/38/1

S5.112 *Alternative allocation:* in Bosnia and Herzegovina, Cyprus, Denmark, France, Greece, Iceland,~~ Italy,~~ Malta, Norway, Sri Lanka, Turkey and Yugoslavia, the band 2 194-2 300 kHz is allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

MOD I/38/2

S5.114 *Alternative allocation:* in Bosnia and Herzegovina, Cyprus, Denmark, France, Greece, Iraq,~~ Italy,~~ Malta, Norway, Turkey and Yugoslavia, the band 2 502-2 625 kHz is allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

MOD I/38/3

S5.117 *Alternative allocation:* in Bosnia and Herzegovina, Cyprus, Côte d'Ivoire, Denmark, Egypt, France, Greece, Iceland,~~ Italy,~~ Liberia, Malta, Norway, Sri Lanka, Togo, Turkey and Yugoslavia, the band 3 155-3 200 kHz is allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

MOD I/38/4

2 194-3 230 kHz

<table>
<tr><th colspan="3">Allocation to services</th></tr>
<tr><th>Region 1</th><th>Region 2</th><th>Region 3</th></tr>
<tr><td>2 194-2 300
FIXED
MOBILE except aeronautical mobile (R)
S5.92 S5.103 <u>MOD</u> S5.112</td><td colspan="2">2 194-2 300
FIXED
MOBILE
<u>MOD</u> S5.112</td></tr>
<tr><td>2 300-2 498
FIXED
MOBILE except aeronautical mobile (R)
BROADCASTING S5.113
S5.103</td><td colspan="2">2 300-2 495
FIXED
MOBILE
BROADCASTING S5.113</td></tr>
<tr><td>2 498-2 501
STANDARD FREQUENCY AND TIME SIGNAL (2 500 kHz)</td><td colspan="2">2 495-2 501
STANDARD FREQUENCY AND TIME SIGNAL (2 500 kHz)</td></tr>
<tr><td>2 501-2 502</td><td colspan="2">STANDARD FREQUENCY AND TIME SIGNAL
Space Research</td></tr>
<tr><td>2 502-2 625
FIXED
MOBILE except aeronautical mobile (R)
S5.92 S5.103 <u>MOD</u> S5.114</td><td colspan="2">2 502-2 505
STANDARD FREQUENCY AND TIME SIGNAL</td></tr>
<tr><td>2 625-2 650
MARITIME MOBILE
MARITIME RADIONAVIGATION
S5.92</td><td colspan="2" rowspan="2">2 505-2 850
FIXED
MOBILE</td></tr>
<tr><td>2 650-2 850
FIXED
MOBILE except aeronautical mobile (R)
S5.92 S5.103</td></tr>
<tr><td>2 850-3 025</td><td colspan="2">AERONAUTICAL MOBILE (R)
S5.111 S5.115</td></tr>
<tr><td>3 025-3 155</td><td colspan="2">AERONAUTICAL MOBILE (OR)</td></tr>
<tr><td>3 155-3 200</td><td colspan="2">FIXED
MOBILE except aeronautical mobile (R)
S5.116 <u>MOD</u> S5.117</td></tr>
<tr><td>3 200-3 230</td><td colspan="2">FIXED
MOBILE except aeronautical mobile (R)
BROADCASTING S5.113
S5.116</td></tr>
</table>

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Document 39-E
22 March 2000
Original: English

PLENARY MEETING

Note by the Secretary-General

REPORT OF THE RADIOCOMMUNICATION BUREAU
ON THE IMPLEMENTATION OF RESOLUTION 53 (WRC-97)

Attached is the report of the Director of the Radiocommunication Bureau which was prepared in response to Resolution 53 (WRC-97) for consideration and subsequent action by the Conference.

Yoshio UTSUMI
Secretary-General

Attachment: Report of the Radiocommunication Bureau to WRC-2000 on the implementation of Resolution 53 (WRC-97), Updating of the "Remarks" columns in the Tables of Article 9A of Appendix S30A and Article 11 of Appendix S30 to the Radio Regulations

Director, Radiocomunication Bureau

REPORT OF THE RADIOCOMMUNICATION BUREAU TO WRC-2000 ON THE IMPLEMENTATION OF RESOLUTION 53 (WRC-97), UPDATING OF THE "REMARKS" COLUMNS IN THE TABLES OF ARTICLE 9A OF APPENDIX S30A AND ARTICLE 11 OF APPENDIX S30 TO THE RADIO REGULATIONS

1 WRC-97, in revising the BSS and feeder-link Plans for Regions 1 and 3, adopted new texts relating to the symbols in the "Remarks" columns of Article 9A of Appendix S30A and Article 11 of Appendix S30 to the Radio Regulations. It also adopted new entries in the "Remarks" columns of the above-mentioned Articles, on the understanding that, based on the report of the Bureau, the lists of identified administrations will be reviewed and revised, as appropriate, by WRC-2000.

2 During WRC-97, studies of compatibility between the revised Regions 1 and 3 broadcasting-satellite service (downlink and feeder-link) Plans, and other services having allocations in the planned bands in all three Regions, with equal rights and between the revised Regions 1 and 3 Plans and the Region 2 Plans, were performed using data which had been received and processed by the Radiocommunication Bureau at the time of the Conference under relevant provisions of the Radio Regulations.

3 It was not possible, however, during the Conference, to analyse fully the effect of all assignments which were received before 27 October 1997 but which had not been processed at that time. It was therefore decided that, in order to analyse fully the effect of assignments that have not been processed, it was necessary that the Bureau process the assignments for other services which were received prior to WRC-97.

4 The Bureau was therefore instructed to complete the required analyses based on the new Notes 3 to 7 in Section 9A.2 of Article 9A of Appendix S30A and Notes 5 to 7 in Section 11.2 of Article 11 of Appendix S30 added during the Conference.

5 The Bureau was also instructed to publish the results of its revised compatibility calculations after WRC-97, together with a modified "Remarks" column of Article 9A of Appendix S30A and Article 11 of Appendix S30, in the form of a Circular Letter. Within a period of 60 days from the date of that Circular Letter, administrations concerned were to decide whether or not they wish to continue appearing as "affected administrations" in the relevant Table of the above-mentioned Articles. If no reply was received from administrations within that period, it would be taken that there was no need to make any change.

6 Some software packages which were used before and during WRC-97 were enhanced after the Conference to provide better precision in the compatibility analysis. In some cases, the list of affected administrations was also revised due to the increase of precision in the compatibility analysis.

7 As mentioned in paragraph 5 above and in accordance with *resolves* 2 of Resolution 53 (WRC-97), the results of the revised compatibility calculations, together with a modified "Remarks" column of Article 9A of Appendix S30A and Article 11 of Appendix S30 were included in the annexes to Circular Letter CR/135 which was sent to all administrations on 7 January 2000. The contents of these annexes, which are reproduced in this document, are summarized as follows:

- Annex 1 contains an extract of Article 11 of Appendix S30 including the entirely revised Tables 2 and 3 together with a list of Plan assignments for which the “Remarks” column was modified.
- Annex 2 contains an extract of Article 9A of Appendix S30A including the entirely revised Tables 1A and 1B together with a list of Plan assignments for which the “Remarks” column was modified.

In accordance with *resolves* 3 of Resolution 53 (WRC-97), the concerned administrations were requested to examine their respective situation in the relevant Tables within a period of 60 days from the date of that Circular Letter.

8 The Bureau has received comments from four administrations (D, FIN, J and MLA) within the 60 days time limit specified in the Resolution to the above-mentioned Circular Letter, as follows:

The Administration of the Federal Republic of Germany agreed with the updating of the “Remarks” columns in the Tables of Article 9A of Appendix S30A and Article 11 of Appendix S30 to the Radio Regulations.

The Administration of Finland stated that "all occurrences of FIN can be removed from Table 2 of Annex 1 to Circular Letter CR/135".

The Administrations of Japan and Malaysia indicated to the Bureau that they wish to continue appearing as affected or affecting administrations, according to the case, in the relevant Tables of Article 9A of Appendix S30A and Article 11 of Appendix S30 to the Radio Regulations, i.e. retention of the results of the provisional analysis in lieu of those of the revised compatibility calculations published in CR/135 which represent the complete, updated and definitive (with increased precision) results.

The Bureau replied to the Administrations of Japan and Malaysia that their request was not in line with the objectives of *resolves* 3 of Resolution 53 (WRC-97).

This report is therefore submitted to WRC-2000 for its consideration and subsequent action taking into account the information contained in the annexes to this document.

Annexes: 2

ANNEX 1

TABLE 1

Symbol	Criteria
a	§ 3 of Annex 1*
b	§ 4, 5 *a)* and 5 *b)* of Annex 1*
c	§ 6 of Annex 1*

* These paragraphs and this Annex are contained in the Radio Regulations in force at the time of WRC-97.

TABLE 2

Beam name	Channels	Ref. Table 1	Affected administrations*
ARM06400	28, 32, 36	c	CHN G IND INS MLA PAK SNG TON UAE
	40	c	CHN G IND INS PAK SNG TON UAE
AZR13400	33, 37	a	G/BER
	21	c	CAN E HOL USA USA/IT VEN/ASA
	25	c	PAK TON
	29, 33, 37	c	CHN PAK TON UAE
BIH14800	2, 6, 10	c	CAN HOL USA/IT
	14, 18	c	HOL USA/IT
BLR06200	1, 5, 9, 13	b	FIN
	1, 5, 9, 13, 17	c	HOL USA/IT
CPV30100	24	c	ARG HOL USA USA/IT
CZE14400	39	b	AUT
	23	c	CAN HOL USA USA/IT
	27	c	PAK TON UAE
	31, 35, 39	c	CHN PAK TON UAE
ERI09200	27	c	IND MLA PAK SNG TON UAE
	31, 35, 39	c	CHN G IND INS MLA PAK SNG THA TON UAE USA
EST06100	1, 5, 9, 13	b	FIN
	1, 5, 9, 13, 17	c	HOL USA/IT
FSM00000	3, 7, 11	c	HOL J MHL TON USA USA/IT
	15, 19	c	J MHL TON USA USA/IT

* Administrations whose assignment(s) may receive interference from the beam shown in the left-hand column.

G UKDBS	30, 34, 38	a	GUY JMC
GEO06400	22	c	HOL USA/IT
	26	c	IND J MLA PAK SNG TON UAE
	30, 34, 38	c	CHN G IND INS MLA PAK SNG TON UAE USA
HRV14800	1, 5, 9	c	CAN HOL USA/IT
	13, 17	c	HOL USA/IT
IRL21100	14	b	FIN
ISL04900	29	a	JMC
	33, 37	a	GUY JMC
KGZ07000	26	c	IND J MLA PAK SNG TON UAE
	30, 34, 38	c	CHN G IND INS MLA PAK SNG TON UAE USA
KIR00001	3, 7, 11	c	HOL J MEX MHL TON USA USA/IT
KIR00002	15, 19, 23	c	CAN HOL J MHL TON USA USA/IT
LBR2440A	19	c	ARG HOL USA USA/IT
LVA06100	29	b	FIN
	21	c	HOL USA/IT
	25	c	PAK TON
	29, 33, 37	c	CHN PAK TON UAE
MDA06300	4, 8, 12, 16, 20	c	HOL USA/IT
MKD14800	2, 6, 10, 14, 18	c	HOL USA/IT
NMB0250A	21	c	ARG B E HOL MEX USA USA/IT VEN/ASA
POR13300	21	c	HOL USA/IT
ROU13600	3, 7, 11	c	CAN HOL USA USA/IT
	15, 19	c	HOL USA USA/IT
RUS00400	25, 27, 31, 35, 39	b	J
	25	c	G J MLA PAK SNG TON
	27	c	CHN G J PNG SNG THA TON
	31, 35, 39	c	CHN G INS J KOR LAO MLA PNG SNG THA TON USA
SLM00000	1, 5, 9, 13	c	HOL J MHL TON USA USA/IT
SVN14800	4, 8, 12	c	CAN HOL USA/IT
	16, 20	c	HOL USA/IT
TKM06800	23	c	HOL USA/IT
	27	c	IND MLA PAK SNG TON UAE
	31, 35, 39	c	CHN G IND INS MLA PAK SNG THA TON UAE USA
UKR06300	3, 7, 11, 15	b	FIN
	3, 7, 11, 15, 19	c	HOL USA/IT
UZB07100	3, 7, 11, 15, 19	c	HOL USA/IT
YYY00001	1	b	ISR

TABLE 3

Beam name	Channels	Affecting administrations*
AZR13400	25	E
BFA10700	25	E
CPV30100	24	E
CTI23700	22	E
G UKDBS	30, 34, 38	GUY JMC
GNB30400	18	E
ISL04900	29	JMC
	33, 37	GUY JMC
KIR00001	3, 7, 11	USA/IT
POR13300	25	E
ROU13600	3, 7, 11	USA/IT
SRL25900	27	GUY
	31, 35	GUY JMC
	39	JMC
TUV00000	2, 6, 10	USA/IT

* Administrations whose assignment(s) may cause interference to the beam shown in the left-hand column.

List of Plan Assignments for which the "Remarks"column was modified*

1	2	3	4	5		6			7	8	9		10	11		12	13	14	15	16	17	
Admin symbol	Beam identification	Orbital position(°)	Chan-nel	Boresight		Space antenna characteristic			Space antenna	Shaped beam	Space antenna gain		Earth antenna	Polarization		e.i.r.p. (dBW)	Designation of emission	Satellite identification	Group code	Status	Remarks	
				Long.(°)	Lat.(°)	Major(°)	Minor(°)	Orient.(°)			Co-polar	X-polar		Type	Angle(°)						WRC-97	Res.53
AUS	AUS0090A	164.00	1	159.06	–31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7	
AUS	AUS0090B	164.00	1	167.93	–29.02	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7	
BLR	BLR06200	38.00	1	27.91	53.06	1.21	0.60	11.47	R13TSS		45.83		MODRES	CL		58.93	27M0F8W			P	5, 7	5
CHN	CHN19000	122.00	1	114.17	23.32	0.91	0.60	2.88	R13TSS		47.08		MODRES	CR		58.88	27M0F8W			P	5	
E	HISPASA2	–30.00	1	–8.80	35.40	3.00	1.90	45.00	R13TSS		36.90		MODRES	CL		59.00	27M0F8W	HISPASAT-2		A	5, 7	
EST	EST06100	23.00	1	25.01	58.47	0.72	0.60	9.93	R13TSS		48.09		MODRES	CL		58.89	27M0F8W			P	5, 7	5
HRV	HRV14800	34.00	1	16.74	44.54	0.88	0.69	5.30	R13TSS		46.57		MODRES	CL		58.87	27M0F8W			P	5, 7	5
SLM	SLM00000	146.00	1	159.32	–8.40	1.50	1.18	140.48	R13TSS		41.98		MODRES	CL		58.88	27M0F8W			P	5, 7	5
TJK	TJK06900	44.00	1	71.14	38.37	1.25	0.76	159.15	R13TSS		44.65		MODRES	CL		58.85	27M0F8W			P	5, 7	
YEM	YEM26700	11.00	1	48.61	14.42	1.68	1.44	157.35	R13TSS		40.61		MODRES	CL		58.91	27M0F8W			P	7	
	YYY00001	11.00	1	34.99	31.86	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	3, 5, 7	3, 5
BIH	BIH14800	34.00	2	17.77	44.32	0.62	0.60	166.84	R13TSS		48.71		MODRES	CR		58.91	27M0F8W			P	5, 7	5
D	D 08700	–19.00	2	9.60	49.90	1.62	0.72	147.00	R13TSS		43.78		MODRES	CL		60.48	27M0F8W			P	7	
GNB	GNB30400	–30.00	2	–15.00	12.00	0.90	0.60	172.00	R13TSS		47.12		MODRES	CL		58.12	27M0F8W			P	7	
IRL	IRL21100	–33.50	2	–8.20	53.20	0.84	0.60	162.00	R13TSS		47.42		MODRES	CR		59.22	27M0F8W			P	7	
MHL	MHL00000	146.00	2	167.64	9.83	2.07	0.90	157.42	R13TSS		41.75		MODRES	CR		58.95	27M0F8W			P	7	
MKD	MKD14800	23.00	2	21.61	41.56	0.60	0.60	90.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	5, 7	5
YEM	YEM26600	11.00	2	44.00	15.67	0.80	0.60	114.88	R13TSS		47.66		MODRES	CR		58.86	27M0F8W			P	7	
AUS	AUS0040A	152.00	3	96.83	–12.19	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	7	
AUS	AUS0040B	152.00	3	105.69	–10.45	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	7	
AUS	AUS0040C	152.00	3	110.52	–66.28	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	7	
AUS	AUS0070A	164.00	3	158.94	–54.50	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		77	P	7	
E	HISPASA2	–30.00	3	–8.80	35.40	3.00	1.90	45.00	R13TSS		36.90		MODRES	CL		59.00	27M0F8W	HISPASAT-2		A	5, 7	
FSM	FSM00000	146.00	3	151.67	5.42	5.34	1.51	166.52	R13TSS		35.37		MODRES	CL		58.87	27M0F8W			P	5, 7	5
LBR	LBR24400	–33.50	3	–9.30	6.60	1.22	0.70	133.00	R13TSS		45.13		MODRES	CR		58.23	27M0F8W			P	7	
LTU	LTU06100	23.00	3	23.79	55.66	0.70	0.60	176.00	R13TSS		48.21		MODRES	CL		58.91	27M0F8W			P	7	
UKR	UKR06300	38.00	3	31.74	48.22	2.29	0.96	177.78	R13TSS		41.01		MODRES	CL		58.91	27M0F8W			P	5, 7	5
UZB	UZB07100	44.00	3	64.01	41.21	2.67	0.96	163.32	R13TSS		40.37		MODRES	CL		58.87	27M0F8W			P	5, 7	5
VTN	VTN32500	86.00	3	108.00	14.80	3.80	1.90	126.00	R123FR		35.86		MODRES	CL		58.36	27M0F8W			P	7	
AZE	AZE06400	23.00	4	47.47	40.14	0.93	0.60	158.14	R13TSS		46.98		MODRES	CR		58.88	27M0F8W			P	5, 7	
G	G 02700	–33.50	4	–3.50	53.80	1.84	0.72	142.00	R13TSS		43.23		MODRES	CR		60.03	27M0F8W			P	7	
MDA	MDA06300	38.00	4	28.41	46.99	0.60	0.60	90.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	5, 7	5
MLD	MLD3060A	44.00	4	73.10	6.00	0.96	0.60	90.00	R13TSS		46.84		MODRES	CR		58.74	27M0F8W			P	7	
PLW	PLW00000	146.00	4	132.99	5.52	1.29	0.60	55.84	R13TSS		45.55		MODRES	CR		58.85	27M0F8W			P	7	
SVN	SVN14800	34.00	4	15.01	46.18	0.60	0.60	90.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	5, 7	5

* See also Radio Regulations, Vol. 2, ApS30, Article 11, p. 431.

1	2	3	4	5		6			7	8	9		10	11		12	13	14	15	16	17	
Admin symbol	Beam identification	Orbital position(°)	Chan-nel	Boresight		Space antenna characteristic			Space antenna	Shaped beam	Space antenna gain		Earth antenna	Polarization		e.i.r.p. (dBW)	Designation of emission	Satellite identification	Group code	Status	Remarks	
				Long.(°)	Lat.(°)	Major(°)	Minor(°)	Orient.(°)			Co-polar	X-polar		Type	Angle(°)						WRC-97	Res.53
AUS	AUS0090A	164.00	5	159.06	–31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7	
AUS	AUS0090B	164.00	5	167.93	–29.02	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7	
BLR	BLR06200	38.00	5	27.91	53.06	1.21	0.60	11.47	R13TSS		45.83		MODRES	CL		58.93	27M0F8W			P	5, 7	5
BTN	BTN03100	86.00	5	90.44	27.05	0.72	0.60	175.47	R13TSS		48.11		MODRES	CR		58.91	27M0F8W			P	5, 7	
CHN	CHN19000	122.00	5	114.17	23.32	0.91	0.60	2.88	R13TSS		47.08		MODRES	CR		58.88	27M0F8W			P	5	
E	HISPASA2	–30.00	5	–8.80	35.40	3.00	1.90	45.00	R13TSS		36.90		MODRES	CL		59.00	27M0F8W	HISPASAT-2		A	5, 7	
EST	EST06100	23.00	5	25.01	58.47	0.72	0.60	9.93	R13TSS		48.09		MODRES	CL		58.89	27M0F8W			P	5, 7	5
HRV	HRV14800	34.00	5	16.74	44.54	0.88	0.69	5.30	R13TSS		46.57		MODRES	CL		58.87	27M0F8W			P	5, 7	5
SLM	SLM00000	146.00	5	159.32	–8.40	1.50	1.18	140.48	R13TSS		41.98		MODRES	CL		58.88	27M0F8W			P	5, 7	5
TJK	TJK06900	44.00	5	71.14	38.37	1.25	0.76	159.15	R13TSS		44.65		MODRES	CL		58.85	27M0F8W			P	5, 7	
YEM	YEM26700	11.00	5	48.61	14.42	1.68	1.44	157.35	R13TSS		40.61		MODRES	CL		58.91	27M0F8W			P	7	
	YYY00001	11.00	5	34.99	31.86	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	3, 5, 7	3
BIH	BIH14800	34.00	6	17.77	44.32	0.62	0.60	166.84	R13TSS		48.71		MODRES	CR		58.91	27M0F8W			P	5, 7	5
D	D 08700	–19.00	6	9.60	49.90	1.62	0.72	147.00	R13TSS		43.78		MODRES	CL		60.58	27M0F8W			P	7	
GNB	GNB30400	–30.00	6	–15.00	12.00	0.90	0.60	172.00	R13TSS		47.12		MODRES	CL		58.22	27M0F8W			P	7	
IRL	IRL21100	–33.50	6	–8.20	53.20	0.84	0.60	162.00	R13TSS		47.42		MODRES	CR		59.32	27M0F8W			P	7	
MHL	MHL00000	146.00	6	167.64	9.83	2.07	0.90	157.42	R13TSS		41.75		MODRES	CR		58.95	27M0F8W			P	7	
MKD	MKD14800	23.00	6	21.61	41.56	0.60	0.60	90.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	5, 7	5
YEM	YEM26600	11.00	6	44.00	15.67	0.80	0.60	114.88	R13TSS		47.66		MODRES	CR		58.86	27M0F8W			P	7	
AUS	AUS0040A	152.00	7	96.83	–12.19	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	7	
AUS	AUS0040B	152.00	7	105.69	–10.45	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	7	
AUS	AUS0040C	152.00	7	110.52	–66.28	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	7	
AUS	AUS0070A	164.00	7	158.94	–54.50	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		77	P	7	
E	HISPASA2	–30.00	7	–8.80	35.40	3.00	1.90	45.00	R13TSS		36.90		MODRES	CL		59.00	27M0F8W	HISPASAT-2		A	5, 7	
FSM	FSM00000	146.00	7	151.67	5.42	5.34	1.51	166.52	R13TSS		35.37		MODRES	CL		58.87	27M0F8W			P	5, 7	5
LBR	LBR24400	–33.50	7	–9.30	6.60	1.22	0.70	133.00	R13TSS		45.13		MODRES	CR		58.33	27M0F8W			P	7	
LTU	LTU06100	23.00	7	23.79	55.66	0.70	0.60	176.00	R13TSS		48.21		MODRES	CL		58.91	27M0F8W			P	7	
UKR	UKR06300	38.00	7	31.74	48.22	2.29	0.96	177.78	R13TSS		41.01		MODRES	CL		58.91	27M0F8W			P	5, 7	5
UZB	UZB07100	44.00	7	64.01	41.21	2.67	0.96	163.32	R13TSS		40.37		MODRES	CL		58.87	27M0F8W			P	5, 7	5
VTN	VTN32500	86.00	7	108.00	14.80	3.80	1.90	126.00	R123FR		35.86		MODRES	CL		58.36	27M0F8W			P	7	
AZE	AZE06400	23.00	8	47.47	40.14	0.93	0.60	158.14	R13TSS		46.98		MODRES	CR		58.88	27M0F8W			P	5, 7	
G	G 02700	–33.50	8	–3.50	53.80	1.84	0.72	142.00	R13TSS		43.23		MODRES	CR		60.13	27M0F8W			P	7	
MDA	MDA06300	38.00	8	28.41	46.99	0.60	0.60	90.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	5, 7	5
MLD	MLD3060A	44.00	8	73.10	6.00	0.96	0.60	90.00	R13TSS		46.84		MODRES	CR		58.74	27M0F8W			P	7	
PLW	PLW00000	146.00	8	132.99	5.52	1.29	0.60	55.84	R13TSS		45.55		MODRES	CR		58.85	27M0F8W			P	7	
SVN	SVN14800	34.00	8	15.01	46.18	0.60	0.60	90.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	5, 7	5
AUS	AUS0090A	164.00	9	159.06	–31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7	
AUS	AUS0090B	164.00	9	167.93	–29.02	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7	
BLR	BLR06200	38.00	9	27.91	53.06	1.21	0.60	11.47	R13TSS		45.83		MODRES	CL		58.93	27M0F8W			P	5, 7	5
BTN	BTN03100	86.00	9	90.44	27.05	0.72	0.60	175.47	R13TSS		48.11		MODRES	CR		58.91	27M0F8W			P	5, 7	
CHN	CHN19000	122.00	9	114.17	23.32	0.91	0.60	2.88	R13TSS		47.08		MODRES	CR		58.88	27M0F8W			P	5	
E	HISPASA2	–30.00	9	–8.80	35.40	3.00	1.90	45.00	R13TSS		36.90		MODRES	CL		59.00	27M0F8W	HISPASAT-2		A	5, 7	

1	2	3	4	5		6			7	8	9		10	11		12	13	14	15	16	17	
Admin symbol	Beam identification	Orbital position(°)	Chan-nel	Boresight		Space antenna characteristic			Space antenna	Shaped beam	Space antenna gain		Earth antenna	Polarization		e.i.r.p. (dBW)	Designation of emission	Satellite identification	Group code	Status	Remarks	
				Long.(°)	Lat.(°)	Major(°)	Minor(°)	Orient.(°)			Co-polar	X-polar		Type	Angle(°)						WRC-97	Res.53
EST	EST06100	23.00	9	25.01	58.47	0.72	0.60	9.93	R13TSS		48.09		MODRES	CL		58.89	27M0F8W			P	5, 7	5
HRV	HRV14800	34.00	9	16.74	44.54	0.88	0.69	5.30	R13TSS		46.57		MODRES	CL		58.87	27M0F8W			P	5, 7	5
SLM	SLM00000	146.00	9	159.32	–8.40	1.50	1.18	140.48	R13TSS		41.98		MODRES	CL		58.88	27M0F8W			P	5, 7	5
TJK	TJK06900	44.00	9	71.14	38.37	1.25	0.76	159.15	R13TSS		44.65		MODRES	CL		58.85	27M0F8W			P	5, 7	
YEM	YEM26700	11.00	9	48.61	14.42	1.68	1.44	157.35	R13TSS		40.61		MODRES	CL		58.91	27M0F8W			P	7	
	YYY00001	11.00	9	34.99	31.86	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	3, 5, 7	3
BIH	BIH14800	34.00	10	17.77	44.32	0.62	0.60	166.84	R13TSS		48.71		MODRES	CR		58.91	27M0F8W			P	5, 7	5
D	D 08700	–19.00	10	9.60	49.90	1.62	0.72	147.00	R13TSS		43.78		MODRES	CL		60.58	27M0F8W			P	7	
GNB	GNB30400	–30.00	10	–15.00	12.00	0.90	0.60	172.00	R13TSS		47.12		MODRES	CL		58.22	27M0F8W			P	7	
IRL	IRL21100	–33.50	10	–8.20	53.20	0.84	0.60	162.00	R13TSS		47.42		MODRES	CR		59.42	27M0F8W			P	7	
MHL	MHL00000	146.00	10	167.64	9.83	2.07	0.90	157.42	R13TSS		41.75		MODRES	CR		58.95	27M0F8W			P	7	
MKD	MKD14800	23.00	10	21.61	41.56	0.60	0.60	90.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	5, 7	5
MLA	MLA2280A	86.00	10	114.10	3.90	2.34	1.12	45.00	R13TSS		40.26		MODRES	CR		58.66	27M0F8W			P	5, 7	
YEM	YEM26600	11.00	10	44.00	15.67	0.80	0.60	114.88	R13TSS		47.66		MODRES	CR		58.86	27M0F8W			P	7	
AUS	AUS0040A	152.00	11	96.83	–12.19	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	7	
AUS	AUS0040B	152.00	11	105.69	–10.45	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	7	
AUS	AUS0040C	152.00	11	110.52	–66.28	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	7	
AUS	AUS0070A	164.00	11	158.94	–54.50	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		77	P	7	
E	HISPASA2	–30.00	11	–8.80	35.40	3.00	1.90	45.00	R13TSS		36.90		MODRES	CL		59.00	27M0F8W	HISPASAT-2		A	5, 7	
FSM	FSM00000	146.00	11	151.67	5.42	5.34	1.51	166.52	R13TSS		35.37		MODRES	CL		58.87	27M0F8W			P	5, 7	5
LBR	LBR24400	–33.50	11	–9.30	6.60	1.22	0.70	133.00	R13TSS		45.13		MODRES	CR		58.33	27M0F8W			P	7	
LTU	LTU06100	23.00	11	23.79	55.66	0.70	0.60	176.00	R13TSS		48.21		MODRES	CL		58.91	27M0F8W			P	7	
UKR	UKR06300	38.00	11	31.74	48.22	2.29	0.96	177.78	R13TSS		41.01		MODRES	CL		58.91	27M0F8W			P	5, 7	5
UZB	UZB07100	44.00	11	64.01	41.21	2.67	0.96	163.32	R13TSS		40.37		MODRES	CL		58.87	27M0F8W			P	5, 7	5
VTN	VTN32500	86.00	11	108.00	14.80	3.80	1.90	126.00	R123FR		35.86		MODRES	CL		58.36	27M0F8W			P	7	
AZE	AZE06400	23.00	12	47.47	40.14	0.93	0.60	158.14	R13TSS		46.98		MODRES	CR		58.88	27M0F8W			P	5, 7	
G	G 02700	–33.50	12	–3.50	53.80	1.84	0.72	142.00	R13TSS		43.23		MODRES	CR		60.13	27M0F8W			P	7	
MDA	MDA06300	38.00	12	28.41	46.99	0.60	0.60	90.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	5, 7	5
PLW	PLW00000	146.00	12	132.99	5.52	1.29	0.60	55.84	R13TSS		45.55		MODRES	CR		58.85	27M0F8W			P	7	
SVN	SVN14800	34.00	12	15.01	46.18	0.60	0.60	90.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	5, 7	5
AUS	AUS0090A	164.00	13	159.06	–31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7	
AUS	AUS0090B	164.00	13	167.93	–29.02	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7	
BTN	BTN03100	86.00	13	90.44	27.05	0.72	0.60	175.47	R13TSS		48.11		MODRES	CR		58.91	27M0F8W			P	5	
CHN	CHN19000	122.00	13	114.17	23.32	0.91	0.60	2.88	R13TSS		47.08		MODRES	CR		58.88	27M0F8W			P	5	
E	HISPASA2	–30.00	13	–8.80	35.40	3.00	1.90	45.00	R13TSS		36.90		MODRES	CL		59.00	27M0F8W	HISPASAT-2		A	5, 7	
FJI	FJI1930A	152.00	13	179.40	–17.90	1.04	0.98	67.00	R13TSS		44.36		MODRES	CR		58.76	27M0F8W			P	5, 7	
SLM	SLM00000	146.00	13	159.32	–8.40	1.50	1.18	140.48	R13TSS		41.98		MODRES	CL		58.88	27M0F8W			P	5, 7	5
TJK	TJK06900	44.00	13	71.14	38.37	1.25	0.76	159.15	R13TSS		44.65		MODRES	CL		58.85	27M0F8W			P	5	
YEM	YEM26700	11.00	13	48.61	14.42	1.68	1.44	157.35	R13TSS		40.61		MODRES	CL		58.91	27M0F8W			P	7	
	YYY00001	11.00	13	34.99	31.86	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	3, 5, 7	3
GNB	GNB30400	–30.00	14	–15.00	12.00	0.90	0.60	172.00	R13TSS		47.12		MODRES	CL		58.32	27M0F8W			P	7	
IRL	IRL21100	–33.50	14	–8.20	53.20	0.84	0.60	162.00	R13TSS		47.42		MODRES	CR		59.42	27M0F8W			P	7	5

1	2	3	4	5		6			7	8	9		10	11		12	13	14	15	16	17	
Admin symbol	Beam identification	Orbital position(°)	Chan-nel	Boresight		Space antenna characteristic			Space antenna	Shaped beam	Space antenna gain		Earth antenna	Polarization		e.i.r.p. (dBW)	Designation of emission	Satellite identification	Group code	Status	Remarks	
				Long.(°)	Lat.(°)	Major(°)	Minor(°)	Orient.(°)			Co-polar	X-polar		Type	Angle(°)						WRC-97	Res.53
MHL	MHL00000	146.00	14	167.64	9.83	2.07	0.90	157.42	R13TSS		41.75		MODRES	CR		58.95	27M0F8W			P	7	
AUS	AUS0070A	164.00	15	158.94	–54.50	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		77	P	7	
E	HISPASA2	–30.00	15	–8.80	35.40	3.00	1.90	45.00	R13TSS		36.90		MODRES	CL		59.00	27M0F8W	HISPASAT-2		A	5	
FSM	FSM00000	146.00	15	151.67	5.42	5.34	1.51	166.52	R13TSS		35.37		MODRES	CL		58.87	27M0F8W			P	5, 7	5
LBR	LBR24400	–33.50	15	–9.30	6.60	1.22	0.70	133.00	R13TSS		45.13		MODRES	CR		58.43	27M0F8W			P	7	
AZE	AZE06400	23.00	16	47.47	40.14	0.93	0.60	158.14	R13TSS		46.98		MODRES	CR		58.88	27M0F8W			P	5	
BRU	BRU3300A	74.00	16	114.70	4.40	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		57.58	27M0F8W			P	5	
G	G 02700	–33.50	16	–3.50	53.80	1.84	0.72	142.00	R13TSS		43.23		MODRES	CR		60.23	27M0F8W			P	7	
PLW	PLW00000	146.00	16	132.99	5.52	1.29	0.60	55.84	R13TSS		45.55		MODRES	CR		58.85	27M0F8W			P	7	
AUS	AUS0090A	164.00	17	159.06	–31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7	
AUS	AUS0090B	164.00	17	167.93	–29.02	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7	
BTN	BTN03100	86.00	17	90.44	27.05	0.72	0.60	175.47	R13TSS		48.11		MODRES	CR		58.91	27M0F8W			P	5	
E	HISPASA2	–30.00	17	–8.80	35.40	3.00	1.90	45.00	R13TSS		36.90		MODRES	CL		59.00	27M0F8W	HISPASAT-2		A	5	
TJK	TJK06900	44.00	17	71.14	38.37	1.25	0.76	159.15	R13TSS		44.65		MODRES	CL		58.85	27M0F8W			P	5	
	YYY00001	11.00	17	34.99	31.86	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W			P	3, 5	3
BRU	BRU3300A	74.00	18	114.70	4.40	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		57.58	27M0F8W			P	5	
IRL	IRL21100	–33.50	18	–8.20	53.20	0.84	0.60	162.00	R13TSS		47.42		MODRES	CR		59.52	27M0F8W			P	7	
MHL	MHL00000	146.00	18	167.64	9.83	2.07	0.90	157.42	R13TSS		41.75		MODRES	CR		58.95	27M0F8W			P	7	
AUS	AUS0070A	164.00	19	158.94	–54.50	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		77	P	7	
COM	COM2070A	29.00	19	44.10	–12.10	0.76	0.60	149.00	R13TSS		47.86		MODRES	CL		58.26	27M0F8W			P	5	
E	HISPASA2	–30.00	19	–8.80	35.40	3.00	1.90	45.00	R13TSS		36.90		MODRES	CL		59.00	27M0F8W	HISPASAT-2		A	5	
FSM	FSM00000	146.00	19	151.67	5.42	5.34	1.51	166.52	R13TSS		35.37		MODRES	CL		58.87	27M0F8W			P	5, 7	5
LBR	LBR2440A	–33.50	19	–9.30	6.60	1.22	0.70	133.00	R13TSS		45.13		MODRES	CR		58.43	27M0F8W			P	5, 7	5
AZE	AZE06400	23.00	20	47.47	40.14	0.93	0.60	158.14	R13TSS		46.98		MODRES	CR		58.88	27M0F8W			P	5	
G	G 02700	–33.50	20	–3.50	53.80	1.84	0.72	142.00	R13TSS		43.23		MODRES	CR		60.23	27M0F8W			P	7	
MLT	MLT1470A	–13.00	20	14.30	35.90	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		56.18	27M0F8W			P	5, 7	
PLW	PLW00000	146.00	20	132.99	5.52	1.29	0.60	55.84	R13TSS		45.55		MODRES	CR		58.85	27M0F8W			P	7	
AUS	AUS0090A	164.00	21	159.06	–31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7	
AUS	AUS0090B	164.00	21	167.93	–29.02	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7	
BFA	BFA10700	–30.00	21	–1.50	12.20	1.45	1.14	29.00	R13TSS		42.26		MODRES	CR		58.96	27M0F8W			P	7	
ISL	ISL04900	–33.50	21	–19.00	64.90	1.00	0.60	177.00	R13TSS		46.67		MODRES	CL		60.77	27M0F8W			P	7	
ISR	ISR1100A	–13.00	21	34.90	31.40	0.94	0.60	117.00	R13TSS		46.93		MODRES	CL		58.83	27M0F8W			P	5, 7	
POR	AZR13400	–30.00	21	–23.40	36.10	2.56	0.70	158.00	R13TSS		41.91		MODRES	CL		58.01	27M0F8W		21	P	7	5
POR	POR13300	–30.00	21	–8.00	39.60	0.92	0.60	112.00	R13TSS		47.03		MODRES	CL		58.43	27M0F8W		21	P	5, 7	5
G	G UKDBS	–33.50	22	–3.50	53.80	1.84	0.72	142.00	R13TSS		43.20		MODRES	CR		60.10	27M0F8W	UKDBS-3		A	5, 7	
AUS	AUS0070A	164.00	23	158.94	–54.50	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		77	P	7	
BHR	BHR2550A	17.00	23	50.50	26.10	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		55.78	27M0F8W		71	P	5	
ERI	ERI09200	23.00	23	39.41	14.98	1.67	0.95	145.48	R13TSS		42.44		MODRES	CR		58.94	27M0F8W			P	5	
NPL	NPL1220A	50.00	23	83.70	28.30	1.72	0.60	163.00	R13TSS		44.31		MODRES	CL		59.61	27M0F8W			P	5	
SRL	SRL25900	–33.50	23	–11.80	8.60	0.78	0.68	114.00	R13TSS		47.20		MODRES	CR		58.40	27M0F8W			P	7	
ARM	ARM06400	23.00	24	44.99	39.95	0.73	0.60	148.17	R13TSS		48.02		MODRES	CR		58.92	27M0F8W			P	5	
ISL	ISL04900	–33.50	25	–19.00	64.90	1.00	0.60	177.00	R13TSS		46.67		MODRES	CL		60.87	27M0F8W			P	7	

1	2	3	4	5		6			7	8	9		10	11		12	13	14	15	16	17	
Admin symbol	Beam identification	Orbital position(°)	Chan-nel	Boresight		Space antenna characteristic			Space antenna	Shaped beam	Space antenna gain		Earth antenna	Polarization		e.i.r.p. (dBW)	Designation of emission	Satellite identification	Group code	Status	Remarks	
				Long.(°)	Lat.(°)	Major(°)	Minor(°)	Orient.(°)			Co-polar	X-polar		Type	Angle(°)						WRC-97	Res.53
POR	AZR13400	–30.00	25	–23.40	36.10	2.56	0.70	158.00	R13TSS		41.91		MODRES	CL		58.11	27M0F8W		21	P	7	5, 7
POR	POR13300	–30.00	25	–8.00	39.60	0.92	0.60	112.00	R13TSS		47.03		MODRES	CL		58.43	27M0F8W		21	P	5, 7	7
RUS	RUS00400	110.00	25	127.76	57.81	3.59	1.65	165.75	R13TSS		36.73		MODRES	CL		58.93	27M0F8W			P	5, 7	5
G	G UKDBS	–33.50	26	–3.50	53.80	1.84	0.72	142.00	R13TSS		43.20		MODRES	CR		60.10	27M0F8W	UKDBS-3		A	5, 7	
GEO	GEO06400	23.00	26	43.35	42.27	1.11	0.60	161.21	R13TSS		46.23		MODRES	CR		58.93	27M0F8W			P	5, 7	5
KGZ	KGZ07000	44.00	26	73.88	41.32	1.34	0.64	3.53	R13TSS		45.12		MODRES	CL		58.92	27M0F8W			P	5, 7	5
RUS	RUS00400	110.00	27	127.76	57.81	3.59	1.65	165.75	R13TSS		36.73		MODRES	CL		58.93	27M0F8W			P	5, 7	5
ARM	ARM06400	23.00	28	44.99	39.95	0.73	0.60	148.17	R13TSS		48.02		MODRES	CR		58.92	27M0F8W			P	5, 7	5
KAZ	KAZ06600	44.00	28	64.72	46.40	4.31	1.70	172.22	R13TSS		35.79		MODRES	CL		58.89	27M0F8W			P	7	
POR	AZR13400	–30.00	29	–23.40	36.10	2.56	0.70	158.00	R13TSS		41.91		MODRES	CL		58.11	27M0F8W		21	P		5
POR	POR13300	–30.00	29	–8.00	39.60	0.92	0.60	112.00	R13TSS		47.03		MODRES	CL		58.53	27M0F8W		21	P	5	
GEO	GEO06400	23.00	30	43.35	42.27	1.11	0.60	161.21	R13TSS		46.23		MODRES	CR		58.93	27M0F8W			P	5, 7	5
KGZ	KGZ07000	44.00	30	73.88	41.32	1.34	0.64	3.53	R13TSS		45.12		MODRES	CL		58.92	27M0F8W			P	5, 7	5
RUS	RUS00400	110.00	31	127.76	57.81	3.59	1.65	165.75	R13TSS		36.73		MODRES	CL		58.93	27M0F8W			P	5, 7	5
ARM	ARM06400	23.00	32	44.99	39.95	0.73	0.60	148.17	R13TSS		48.02		MODRES	CR		58.92	27M0F8W			P	5, 7	5
KAZ	KAZ06600	44.00	32	64.72	46.40	4.31	1.70	172.22	R13TSS		35.79		MODRES	CL		58.89	27M0F8W			P	7	
POR	POR13300	–30.00	33	–8.00	39.60	0.92	0.60	112.00	R13TSS		47.03		MODRES	CL		58.63	27M0F8W		21	P	5	
GEO	GEO06400	23.00	34	43.35	42.27	1.11	0.60	161.21	R13TSS		46.23		MODRES	CR		58.93	27M0F8W			P	5, 7	5
KGZ	KGZ07000	44.00	34	73.88	41.32	1.34	0.64	3.53	R13TSS		45.12		MODRES	CL		58.92	27M0F8W			P	5, 7	5
RUS	RUS00400	110.00	35	127.76	57.81	3.59	1.65	165.75	R13TSS		36.73		MODRES	CL		58.93	27M0F8W			P	5, 7	5
ARM	ARM06400	23.00	36	44.99	39.95	0.73	0.60	148.17	R13TSS		48.02		MODRES	CR		58.92	27M0F8W			P	5, 7	5
KAZ	KAZ06600	44.00	36	64.72	46.40	4.31	1.70	172.22	R13TSS		35.79		MODRES	CL		58.89	27M0F8W			P	7	
POR	POR13300	–30.00	37	–8.00	39.60	0.92	0.60	112.00	R13TSS		47.03		MODRES	CL		58.63	27M0F8W		21	P	5	
GEO	GEO06400	23.00	38	43.35	42.27	1.11	0.60	161.21	R13TSS		46.23		MODRES	CR		58.93	27M0F8W			P	5, 7	5
KGZ	KGZ07000	44.00	38	73.88	41.32	1.34	0.64	3.53	R13TSS		45.12		MODRES	CL		58.92	27M0F8W			P	5, 7	5
RUS	RUS00400	110.00	39	127.76	57.81	3.59	1.65	165.75	R13TSS		36.73		MODRES	CL		58.93	27M0F8W			P	5, 7	5
ARM	ARM06400	23.00	40	44.99	39.95	0.73	0.60	148.17	R13TSS		48.02		MODRES	CR		58.92	27M0F8W			P	5, 7	5
KAZ	KAZ06600	44.00	40	64.72	46.40	4.31	1.70	172.22	R13TSS		35.79		MODRES	CL		58.89	27M0F8W			P	7	

ANNEX 2

TABLE 1A

Beam name	Channels	Affected administrations*
G 02700	4, 8, 12	GUY JMC
IRL21100	2, 10	GUY JMC
	6	JMC
LBR24400	3	JMC
	7, 11	GUY JMC

* Administrations whose assignment(s) may receive interference from the beam shown in the left-hand column.

TABLE 1B

Beam name	Channels	Affecting administrations*
G 02700	4, 8, 12	GUY JMC
IRL21100	2, 10	GUY JMC
	6	JMC
LBR24400	3	JMC
	7, 11	GUY JMC

* Administrations whose assignment(s) may cause interference to the beam shown in the left-hand column.

List of Plan Assignments for which the "Remarks"column was modified*

1	2	3	4	5	6		7			8	9	10		11	12		13	14	15	16	17	18	19	
Admin symbol	Beam identification	Orbital position°	Chan-nel	Centre frequency	Boresight		Space antenna character			Space antenna	Shaped beam	Space ant. gain		Earth antenna	Polarization		e.i.r.p. (dBW)	Power control	Designation of emission	Satellite identification	Group code	Status	Remarks	
					Long.°	Lat.°	Major°	Minor°	Orient.°			Co-polar	X-polar		Type	Angle°							WRC-97	Res.53
MDA	MDA06300	38.00	20	17691.90	28.41	46.99	0.60	0.60	90.00	MODRSS		48.88		MODTES	CL		84.00		27M0F8W			P	4, 7	4
MLT	MLT1470A	–13.00	20	17691.90	14.30	35.90	0.60	0.60	0.00	MODRSS		48.88		MODTES	CL		84.00		27M0F8W			P	4, 7	4
D	D2-21600	–1.00	21	17711.08	12.60	52.10	0.83	0.63	172.00	MODRSS		47.26		MODTES	CR		84.00		27M0F8W			P	4, 7	4
KGZ	KGZ07000	44.00	22	17730.26	73.88	41.32	1.34	0.64	3.53	MODRSS		45.12		MODTES	CR		84.00		27M0F8W			P	4, 7	4
NPL	NPL1220A	50.00	23	17749.44	83.70	28.30	1.72	0.60	163.00	MODRSS		44.31		MODTES	CR		84.00		27M0F8W			P	4, 7	4
TKM	TKM06800	44.00	23	17749.44	59.18	38.84	2.25	0.99	164.51	MODRSS		40.94		MODTES	CL		84.00		27M0F8W			P	4, 7	4
KAZ	KAZ06600	44.00	24	17768.62	64.72	46.40	4.31	1.70	172.22	MODRSS		35.79		MODTES	CR		84.00		27M0F8W			P	4, 7	4
D	D2-21600	–1.00	25	17787.80	12.60	52.10	0.83	0.63	172.00	MODRSS		47.26		MODTES	CR		84.00		27M0F8W			P	4, 7	4
CTI	CTI23700	–30.00	26	17806.98	–5.80	7.40	1.55	1.43	162.00	MODRSS		40.99		MODTES	CR		84.00		27M0F8W			P	4, 7	4
KGZ	KGZ07000	44.00	26	17806.98	73.88	41.32	1.34	0.64	3.53	MODRSS		45.12		MODTES	CR		84.00		27M0F8W			P	4, 7	4
E	CNR13000	–30.00	27	17826.16	–15.70	28.40	1.54	0.60	5.00	MODRSS		44.79		MODTES	CR		84.00		27M0F8W		22	P	4, 7	4
E	HISPASA2	–30.00	27	17826.16	–8.80	35.40	3.00	1.90	45.00	MODRSS		36.90		MODTES	CR		84.00		27M0F8W	HISPASAT-2	22	A	4, 7	4
TKM	TKM06800	44.00	27	17826.16	59.18	38.84	2.25	0.99	164.51	MODRSS		40.94		MODTES	CL		84.00		27M0F8W			P	4, 7	4
KAZ	KAZ06600	44.00	28	17845.34	64.72	46.40	4.31	1.70	172.22	MODRSS		35.79		MODTES	CR		84.00		27M0F8W			P	4, 7	4
POR	AZR13400	–30.00	28	17845.34	–23.40	36.10	2.56	0.70	158.00	MODRSS		41.91		MODTES	CL		84.00		27M0F8W			P	7	
BFA	BFA10700	–30.00	29	17864.52	–1.50	12.20	1.45	1.14	29.00	MODRSS		42.26		MODTES	CL		84.00		27M0F8W			P	4, 7	4
D	D2-21600	–1.00	29	17864.52	12.60	52.10	0.83	0.63	172.00	MODRSS		47.26		MODTES	CR		84.00		27M0F8W			P	4, 7	4
E	HISPASA2	–30.00	29	17864.52	–8.80	35.40	3.00	1.90	45.00	MODRSS		36.90		MODTES	CR		84.00		27M0F8W	HISPASAT-2	22	A	4, 7	4
KGZ	KGZ07000	44.00	30	17883.70	73.88	41.32	1.34	0.64	3.53	MODRSS		45.12		MODTES	CR		84.00		27M0F8W			P	4, 7	4
TKM	TKM06800	44.00	31	17902.88	59.18	38.84	2.25	0.99	164.51	MODRSS		40.94		MODTES	CL		84.00		27M0F8W			P	4, 7	4
KAZ	KAZ06600	44.00	32	17922.06	64.72	46.40	4.31	1.70	172.22	MODRSS		35.79		MODTES	CR		84.00		27M0F8W			P	4, 7	4
D	D2-21600	–1.00	33	17941.24	12.60	52.10	0.83	0.63	172.00	MODRSS		47.26		MODTES	CR		84.00		27M0F8W			P	4, 7	4
KGZ	KGZ07000	44.00	34	17960.42	73.88	41.32	1.34	0.64	3.53	MODRSS		45.12		MODTES	CR		84.00		27M0F8W			P	4, 7	4
TKM	TKM06800	44.00	35	17979.60	59.18	38.84	2.25	0.99	164.51	MODRSS		40.94		MODTES	CL		84.00		27M0F8W			P	4, 7	4
KAZ	KAZ06600	44.00	36	17998.78	64.72	46.40	4.31	1.70	172.22	MODRSS		35.79		MODTES	CR		84.00		27M0F8W			P	4, 7	4
POR	AZR13400	–30.00	36	17998.78	–23.40	36.10	2.56	0.70	158.00	MODRSS		41.91		MODTES	CL		84.00		27M0F8W			P	7	
BFA	BFA10700	–30.00	37	18017.96	–1.50	12.20	1.45	1.14	29.00	MODRSS		42.26		MODTES	CL		84.00		27M0F8W			P	4, 7	4
D	D2-21600	–1.00	37	18017.96	12.60	52.10	0.83	0.63	172.00	MODRSS		47.26		MODTES	CR		84.00		27M0F8W			P	4, 7	4
E	HISPASA2	–30.00	37	18017.96	–8.80	35.40	3.00	1.90	45.00	MODRSS		36.90		MODTES	CR		84.00		27M0F8W	HISPASAT-2	22	A	4, 7	4
CTI	CTI23700	–30.00	38	18037.14	–5.80	7.40	1.55	1.43	162.00	MODRSS		40.99		MODTES	CR		84.00		27M0F8W			P	4, 7	4
KGZ	KGZ07000	44.00	38	18037.14	73.88	41.32	1.34	0.64	3.53	MODRSS		45.12		MODTES	CR		84.00		27M0F8W			P	4, 7	4
E	CNR13000	–30.00	39	18056.32	–15.70	28.40	1.54	0.60	5.00	MODRSS		44.79		MODTES	CR		84.00		27M0F8W		22	P	4, 7	4
E	HISPASA2	–30.00	39	18056.32	–8.80	35.40	3.00	1.90	45.00	MODRSS		36.90		MODTES	CR		84.00		27M0F8W	HISPASAT-2	22	A	4, 7	4
RUS	RUS00400	110.00	39	18056.32	118.22	51.52					COP	38.40	8.40	MODTES	CR		84.00		27M0F8W			P	3, 4, 7	3, 4
TKM	TKM06800	44.00	39	18056.32	59.18	38.84	2.25	0.99	164.51	MODRSS		40.94		MODTES	CL		84.00		27M0F8W			P	4, 7	4
KAZ	KAZ06600	44.00	40	18075.50	64.72	46.40	4.31	1.70	172.22	MODRSS		35.79		MODTES	CR		84.00		27M0F8W			P	4, 7	4
POR	AZR13400	–30.00	40	18075.50	–23.40	36.10	2.56	0.70	158.00	MODRSS		41.91		MODTES	CL		84.00		27M0F8W			P	7	

* See also Radio Regulations, Vol. 2, ApS30A, Article 9A, p. 596.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Document 40-E
23 March 2000
Original: English

PLENARY MEETING

Note by the Secretary-General

WORLD RADIOCOMMUNICATION CONFERENCE PROCESS

Attached is a report by the Director of the Radiocommunication Bureau pursuant to Resolution 80 (Minneapolis, 1998).

The Conference is invited to consider the issues covered in the attached report.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

Director, Radiocommunication Bureau

WORLD RADIOCOMMUNICATION CONFERENCE PROCESS

Resolution 80 (Minneapolis, 1998)

1 Resolution 80 (Minneapolis, 1998) covered issues relating to the World Radiocommunication Conference process and included *resolves* in respect of methods for preparation and planning, support for regional harmonization of common proposals (with reference to Resolution 72 (WRC-97)) and encouragement for both formal and informal collaboration in the interval between conferences. Comments on these aspects are included in the Report of the Director on activities of the Bureau (Document 41).

2 Resolution 80, also included an instruction to the Director of the Radiocommunication Bureau "to study, with advice from the Radiocommunication Advisory Group, ways of improving the preparations for, and the structure and organization of, world radiocommunication conferences, for consideration by the conference".

3 Pursuant to the above *instructs the Director of the Radiocommunication Bureau*, the issues have been considered by the Radiocommunication Advisory Group at its seventh and eighth meetings (22-26 February 1999 and 17-20 January 2000 respectively). The following comments incorporate the advice from RAG.

4 Agenda setting

4.1 Recent WRCs have had extensive agendas which, in view of the time available, has meant that resources have been stretched both during preparations and at the conference. As a consequence, it has not been possible to reach clear conclusions on some agenda items and they have had to be referred to the next WRC, thereby compounding the problem. Although the decision of PP-98 to allow some increase in the interval between WRCs might help, every effort should be made to exert discipline on the preparation of draft agendas, concentrating on priority items and those for which adequate preparations can be assured.

4.2 Although it may not be possible to identify in advance of the next WRC which agenda items will be particularly complex, consideration should be given to estimating the extent of preparatory work associated with each item, the appropriate forum for conducting that work, and the amount of effort that might be needed at WRC. This would help to identify whether the draft agenda is realistic given the resources likely to be available at the next WRC. It would also help to deal with items that would only be included if Council committed additional resources to the WRC.

4.3 The requirement to identify and take into account the financial implications of potential decisions under each agenda item should be respected.

4.4 At recent conferences, the draft agenda of the future conference has been finalized very late in the conference by a Working Group of the Plenary. Although it will still be necessary to bring together all of the proposals in one group, more emphasis should be placed on the role of committees in identifying agenda items and their urgency, preferably as early in the conference as possible. This would also somewhat alleviate the problems encountered in convening the Working Group of the Plenary in parallel with conference committees, which has made it difficult for all administrations to participate. Nevertheless, every effort should be made to avoid parallel sessions of the group responsible for producing the draft agenda and the main committees.

4.5 The requirements of developing countries and LDCs in particular may not be given sufficient weight in the current process. Consideration should be given to the means by which these requirements could be identified and incorporated into conference agendas.

4.6 It has been argued that limited-agenda (or specialized or single-service) conferences could be more efficient. On the other hand, it might be necessary to convene such conferences in addition to the "regular" conferences, with the associated budgetary and scheduling implications. It is not possible to draw general conclusions on the desirability of convening specialized WRCs. Each conference should consider the relative merits in the light of the issues to be addressed.

4.7 In developing draft WRC agendas, the main emphasis should be on issues leading to treaty text.

5 Financial implications

5.1 Decisions of WRCs often have substantial budgetary implications. It should be noted that No. 489 of Article 34 of the Convention states that “No decision of a conference shall be put into effect if it will result in a direct or indirect increase in expenses beyond the credits that the Council is empowered to authorize.”

5.2 Accordingly, it is proposed that an ongoing mechanism be established in the proceedings of WRCs which clearly links the work of the Budget Control Committee with the Working Group of the Plenary responsible for undertaking agenda-setting activities. Furthermore, it is proposed that representatives of BR and the Finance Department closely track the work of the two groups in order to provide a conference with accurate estimates of the resource implications of WRC decisions. It is further proposed that an amendment to the terms of reference of future budget control committees be made to clearly reflect this approach. As a final point, this would imply that recommended agendas for future conferences would need to identify items that can proceed within budgetary credits and those that could proceed only if additional credits be made available.

6 ITU preparations

6.1 The current arrangements with regards to the convening of the two CPM meetings should be retained for the time being, although the eighth RAG meeting supported a review being initiated of the CPM process. RAG is currently undertaking such a review by means of a correspondence group and conclusions will be considered at the next RAG meeting early in 2001.

6.2 With regard to the allocation and handling of preparatory work, the seventh meeting of RAG reconfirmed the conclusion of the Special Meeting of RAG in September 1997 (see Administrative Circular CA/45). It concluded specifically that, for each issue, a single group (which could be a study group, task group or working party, etc.) should be identified to take responsibility for the preparatory work, inviting input and/or participation from other groups as necessary, and that, as far as possible, existing groups should be used for the above purpose; new groups being established only where this is considered to be necessary.

6.3 Early indications of the likely structure of the next WRC is of considerable assistance in the organization of the preparatory work, in ITU, in regional organizations, and within countries. It also helps in the consultations on chairmanships. Early identification of possible committee and working group chairpersons enables them to prepare more thoroughly. Notwithstanding the responsibilities of the Secretary-General, every effort should be made to reach an informal consensus on conference structure and possible chairpersonships, using RAG, meetings of informal groups, etc., while recognizing that the final decision on these issues rests with WRC itself.

6.4 The informal discussions on WRC preparations are considered to be playing an important role and should be continued, with practical support and advice from the BR and BDT.

7 Regional preparations

7.1 Coordination at the regional level provides a good opportunity to explain issues, exchange views, identify the key issues, and ideally to resolve conflicts. Such coordination can therefore help to ease the pressure on WRC itself. Regional coordination should be continued and strengthened where possible. Where adequate arrangements do not exist for regional coordination in preparation for WRCs, BR should encourage the development of such arrangements and facilitate the convening of regional meetings. The value of the participation of Sector Members in regional coordination meetings is recognized.

7.2 BR staff should participate in such meetings, subject to the availability of resources, to provide information and to assist the ITU Secretariat with conference preparations.

7.3 Coordination between regional organizations should be encouraged. Subject to the availability of resources, BR should facilitate the convening of interregional meetings. Organizers of regional meetings should be encouraged to allow participation by other regional organizations or their representatives. The timetable of regional and interregional meetings should be more widely publicized, if possible using ITU facilities (e.g. website).

7.4 It should be recognized that not all ITU Member States are included in the membership of regional organizations.

8 Working practices during WRCs

8.1 Means of reducing operating costs (such as printing, translation and interpretation) should be explored while maintaining the necessary quality of these activities and fulfilling the obligations of the conference.

8.2 All official meetings should, as far as possible, take place during normal working hours. This would leave room for informal discussions and conflict resolution.

8.3 Chairpersons should exercise the powers available to them under the Rules of Procedure to limit the time to be made available for each discussion, the length and number of interventions, etc.

8.4 The introduction of each proposal should be kept brief, and carried out once only, in the appropriate committee, working group, etc.

8.5 Information documents should not be introduced orally.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to
Document 41-E
10 May 2000
Original: English

PLENARY MEETING

Director, Radiocommunication Bureau

REPORT OF THE DIRECTOR ON THE ACTIVITIES OF THE RADIOCOMMUNICATION SECTOR

1 On page 18 (English version), please replace in the fourth paragraph "(Annex BBB)" by "(Annex 2)".

2 Add Annex 2 as attached.

Annex: 1

ANNEX 2

Rules concerning Article S13 of the RR

In reviewing Sections III and IV of Article **S13**, the Radio Regulations Board noted that modifications were introduced by WRC-97 particularly in relation to the process of considering proposed changes or additions to Rules of Procedure and the opportunity available to administrations to comment on such proposals.

Nos. **S13.14** and **S13.15** in Section III establish procedures for changes to the Rules of Procedure and a sequence for Board consideration, publication, comment by administrations and possible further review or special study. On the other hand, No. **S13.17** in Section IV also refers to preparation of draft modifications or additions to Rules of Procedure.

The Board has concluded that there is a lack of clarity in the procedures to be followed for modifications or additions to Rules of Procedure. It also had regard to the desirability for transparency in considering such proposed modifications or additions.

Accordingly, the Board decided that, until the matter may be considered by WRC-2000, the following procedures should be followed with respect to the application of Nos. **S13.14**, **S13.15** and **S13.17**:

a) Proposals for changes or additions to the Rules of Procedure can emerge from administrations, from the Radiocommunication Bureau, or from the Board itself. Irrespective of the source of proposals, the Board regards No. **S13.17** as requiring that the Bureau should prepare draft modifications or additions to the Rules of Procedure arising from such proposals. In the interests of transparency, the Board considers that such drafts should then be made available for a period of at least four weeks for comment by administrations.

b) The Bureau, in accordance with No. **S13.14**, shall submit to the Board the final drafts of all proposed changes to the Rules of Procedure, as well as the comments received in response to the procedure in § *a)* above.

c) Any need pursuant to No. **S13.15**, for a special study in relation to the Rules of Procedure submitted by an administration or identified by the Board or the Bureau, or the need for any new Rules or modification or addition to the existing Rules of Procedure shall be handled in accordance with the procedure in § *a)* and *b)* above.

PART C

Rules concerning working methods of the Radio Regulations Board

Introduction

These working methods are intended to complement basic provisions which have been included in Article 14 of the Constitution and Article 10 of the Convention, in accordance with the provisions of No. 147 of the Convention (Geneva, 1992), and in accordance with the pertinent provisions of the Radio Regulations (e.g. Articles **S7**, **S13**, **S14**).

1 Board meetings

1.1 Notwithstanding the possibility for the members of the RRB to consult each other as and when required between meetings, by also using modern means of communication, a meeting of the Board will be held approximately every three months. On the basis of a provisional annual meeting plan, the specific date for and duration of the next meeting will be decided at the end of each Board meeting, taking into consideration the foreseeable workload. Any subsequent change of date will only be made with the agreement of all the members.

1.2 An appropriate convening notice for the next meeting shall be prepared by the Executive Secretary of the Board, before the closure of each meeting.

1.3 A specific draft agenda shall be proposed to the members of the RRB by the Executive Secretary, after consultation with the Chairperson, at least three weeks before the next meeting. The draft agenda should include, *inter alia*, the following, as required:

a) approval of the minutes of the previous Board meeting, if not already approved by correspondence;

b) consideration of the Director's report;

c) approval of the new or revised Rules of Procedure (CS95) together with any comments from administrations, if available;

d) consideration of Review of Findings which cannot be resolved by the use of the Rules of Procedure (CV171);

e) consideration of Reports on Harmful Interference (CV140, CV173);

f) consideration of any other matters which cannot be resolved through the application of the Rules of Procedure (CS96);

g) matters which should be referred to the Radiocommunication Conference (CS95, Resolution 1);

h) any item requested by any member of the Board;

i) any item requested by the Director of the Radiocommunication Bureau;

j) miscellaneous (CS97, etc.);

k) approval of the Summary of Decisions.

1.4 Input documentation listed on the draft agenda should be distributed to the members at the latest two weeks before the meeting. Should exceptional circumstances not allow documents to be provided in all required language versions in a timely manner, the original language version shall be made available. Any such documentation becoming available later shall be discussed only if the matter is considered urgent and if all members of the RRB so agree.

1.5 Meeting attendance will be as follows:

– Members

– Executive Secretary/Director of the Radiocommunication Bureau

– Secretary

– Minute writer(s)

– Any staff of the Union, on case-by-case basis, as necessary.

The Director of the Radiocommunication Bureau may be accompanied by any necessary staff of the Bureau on a case-by-case basis.

1.6 The minutes should clearly indicate whether a decision was unanimous or by majority. Minutes should be approved as soon as possible after the meeting of the Board and at the next meeting, at the latest.

1.7 A summary of decisions shall be prepared by the Executive Secretary in a tabular form (subject, decision, follow-up) and approved by the Board at the end of each meeting.

2 Maintenance of the Rules of Procedure

The provisions of Section III and Section IV of Article **S13** of the Radio Regulations will be applied.

3 Review of Findings

The procedure for the review of a Finding or any other decision of the Bureau, as outlined in Article **S14** of the Radio Regulations will be applied.

4 Recommendations on interference

4.1 When an administration has requested the Bureau to investigate the resolution of a case of harmful interference in accordance with CV173, and the case cannot be resolved following the established procedures, a report shall be submitted to the Board at the request of an administration involved, which includes the following:

a) Brief explanation of the case which will include the degree of reported interference, history of the reported interference and the status of notification of the concerned assignments.

b) The statements by the administrations concerned which clarify the views of those administrations.

c) Draft recommendation to those administrations.

4.2 The Board will decide on the appropriate action.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 41-E
14 April 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Director, Radiocommunication Bureau

REPORT OF THE DIRECTOR ON THE ACTIVITIES OF THE RADIOCOMMUNICATION SECTOR

1 Introduction

1.1 General

This report on the activities of the Radiocommunication Sector since the last World Radiocommunication Conference is submitted pursuant to the provisions of CV180 and item 9.1 of the agenda of WRC-2000. It is based largely on reports submitted previously to Council and to the Radiocommunication Assembly.

a) The Radiocommunication Bureau continued to support all Sector activities. The Bureau provided services to administrations and users in application of the Radio Regulations, including the coordination and registration of radio-frequency assignments and satellite orbits. It allocated international identification series and provided maritime mobile information services. It conducted seminars and training sessions for international spectrum management requirements, in close cooperation with the Bureau for Telecommunication Development. The Bureau provided, on behalf of the Radiocommunication Sector, liaison, coordination and assistance to the Telecommunication Development and Telecommunication Standardization Sectors and supported the Radio Regulations Board (RRB).

b) The Radiocommunication Bureau developed operational plans for the Bureau for 1998, for 1999, and for 2000, which were presented to the Radiocommunication Advisory Group. Such plans represent an important tool in attempting to reconcile the growing Radiocommunication Sector workload and the resources available.

c) The Radio Regulations Board provided, through its approved Rules of Procedure, important directives for the application of the Radio Regulations. An important element in the management of the Radiocommunication Sector was the advice from the Radiocommunication Advisory Group.

d) Three main activities characterized the work in the Radiocommunication Bureau: the processing of notifications for space and terrestrial radiocommunication services; the support for the work of the ITU-R Study Groups and the preparatory work for radiocommunication conferences.

1.2 Implementation of Council Resolution 1121

The report of the WRC-97 Budget Control Committee gave a preliminary estimate of the workload and consequential financial implications of tasks assigned by WRC-97 to the Radiocommunication Bureau in addition to its regular work. This evaluation indicated an overall cost of about 10.7 million Swiss francs. These estimates did not include additional work for the ITU-R Study Groups, which had to increase their number of meetings in relation to the above-mentioned additional activities.

Taking into consideration that a significant part of these costs could be absorbed by the existing BR budget, the 1998 session of Council adopted Resolution 1121, thus increasing the budget of the Radiocommunication Bureau by 5.01 million Swiss francs.

The overall cost of WRC-97 post-conference work was established on the basis of 17 activities (see Council Document C98/8(Rev.1)). Among these activities, five IRG and four GTE meetings could be held during the same period (see 12.3 of the present report).

Seventy-four per cent of the 5.01 million has been spent to implement these activities, including the cost of equipment, furniture and premises. The 26 per cent savings are mainly due to recruitment delays and the human resources redeployment policy carried out in the Radiocommunication Bureau in 1998 and 1999. Details on these expenditures are given in **Annex 1**. These savings were reallocated to other ITU projects at the end of 1999.

2 Space services

In the period since WRC-97 there has been a continuing increase in the numbers of filings received by the Radiocommunication Bureau for advance publication, requests for coordination and notification. In respect of coordination requests in particular there has been a progressive increase in filings received and, as a consequence, an increase in the backlog of work in the Bureau. Whilst there has not been a similar growth in receipt of requests for notification of assignments in the MIFR, there has been little opportunity to reduce the backlogs in the processing of such requests. Additional tasks arising from WRC-97 required a diversion of resources from processing notifications to other higher priority tasks, in particular the work flowing from implementation of Resolutions 532 and 533 (WRC-97). For example, the extensive analysis required by Resolution 533 meant that, during a period of 23 months, the Bureau was unable to process any new submissions for modification or notification in application of Articles 4 and 5 of Appendices S30 and S30A respectively.

The increasing workload continues to have a serious effect on the capacity of the Bureau to handle the filings in a timely manner and the backlogs of work in various categories have reached quite unacceptable proportions. Details of activities and the extent of backlogs are noted in the specific categories covered below.

2.1 Advance publication of information pertaining to satellite networks

Immediately following WRC-97 the Bureau had a backlog of 850 filings with a treatment delay of approximately 40 weeks between receipt of the API and publication; well beyond the 12 weeks envisaged in No. S9.2B. The data requirements for API were revised and simplified by WRC-97 and the Bureau subsequently rearranged internal functions and applied more resources to enable this backlog to be reduced. As at the end of 1999 there were 220 cases awaiting publication with an average treatment delay of six weeks.

Whilst the backlog in treatment is now within the limit of three months in S9.2B, the Bureau's observation is that the API stage of processing seems to provide little, if any, benefit to administrations in the overall process of satellite coordination. In addition to the workload involved in API processing, the Bureau notes that administrations send copies to the Bureau of approximately 600 pieces of correspondence monthly flowing from the API process. No action is required, nor taken, by the Bureau on this correspondence. Modification or suppression of the API part of the overall coordination and notification process would seem to be one avenue to reduce the work of the Bureau without disadvantage to administrations.

2.2 Coordination requests pertaining to satellite networks

The processing of requests for coordination (Article S9) is the most important step in the overall processing of new or modified satellite network systems to the point of notification for entry into the Master Register.

Backlogs in processing such filings through the Space Services Department have been, and remain, unacceptable. Full details of requests for coordination in the two-year period to end December 1999 are shown in **Table 1**. Almost 1 400 systems were awaiting publication as at 31 December 1999. This represents close to three years delay based on an average processing volume of 40 per month. This current situation compares with a backlog of approximately 700 systems on hand as at January 1998 with an average processing delay at that time of 83 weeks. This current situation is unacceptable in the context of the more rapid development of new satellite systems. The Bureau has streamlined its internal processing and improved the software capabilities, but current rates of processing remain below the current level of receipt of new requests for coordination. More details of problems and possible remedial steps are included in this report in respect of the implementation of Decision 483 (Council 1999).

TABLE 1

Coordination requests pertaining to satellite networks

Month	Received during month	Published	Number of pages	Earliest date of receipt	Backlog	Treatment delay (weeks)
Jan 98	32	20	X	**28/5/96**	**711**	**83**
Feb 98	23	40	X	**17/6/96**	**694**	**85**
Mar 98	20	44	X	**30/8/96**	**670**	**78**
Apr 98	78	57	X	**24/9/96**	**691**	**79**
May 98	228	30	X	**18/11/96**	**889**	**76**
June 98	46	45	X	**24/12/96**	**890**	**75**
July 98	70	24	X	**22/1/97**	**936**	**75**
Aug 98	6	7	X	**7/2/97**	**935**	**77**
Sep 98	110	26	X	**3/3/97**	**1 019**	**78**
Oct 98	22	19	X	**20/3/97**	**1 022**	**80**
Nov 98	102	15	X	**25/4/97**	**1 109**	**79**
Dec 98	36	19	X	**20/5/97**	**1 126**	**80**
Jan 99	26	16	932	**25/5/97**	**1 136**	**84**
Feb 99	29	14	4 374	**13/6/97**	**1 151**	**85**
Mar 99	52	43	1 914	**28/8/97**	**1 160**	**79**
Apr 99	56	22	2 240	**24/9/97**	**1 194**	**79**
May 99	85	22	1 459	**2/10/97**	**1 257**	**82**
June 99	36	49	2 412	**21/10/97**	**1 244**	**84**
July 99	27	36	3 442	**9/11/97**	**1 235**	**86**
Aug 99	47	30	1 284	**18/11/97**	**1 252**	**89**
Sep 99	46	29	1 376	**25/12/97**	**1 269**	**88**
Oct 99	38	16	3 349	**8/1/98**	**1 291**	**90**
Nov 99	35	61	6 166	**25/2/98**	**1 265**	**88**
Dec 99	99	12	1 832	**13/3/98**	**1 352**	**90**

2.3 Due diligence

Following the adoption of Resolution 49 (WRC-97) the Bureau established appropriate mechanisms, forms and software to implement administrative due diligence. A separate report has been submitted to the Conference (Document WRC2000/32).

2.4 Notification for recording in the Master Register

Processes for notification of space network systems follow procedures in Article S11 as a third stage of the overall satellite network processing framework. There is a backlog of work in this respect also. As at January 1998 the Bureau held 237 notification requests pertaining to the space segment of satellite networks. This represented a processing delay of around 130 weeks from the date of receipt of the request. As at the end of 1999 there were 204 systems awaiting treatment, a backlog of 146 weeks. Similarly there were 350 requests pertaining to earth stations on hand at 1 January 1998 and this was reduced to around 260 by December 1999, which represents a processing delay of 140 weeks.

2.5 Modifications to frequency assignment Plans and conversion of allotment Plan

As of November 1999, the Bureau resumed its activities relating to the technical examination of the requests for modification submitted under Article 4 with the earliest date of receipt of 18 March 1996 as noted in the separate report on Resolution 533 (WRC-97) (Document WRC2000/17). The Bureau suspended normal processing under Article 4 to complete the review required by Resolution 533.

Based on the new criteria adopted at WRC-97 and available tools the Bureau performed the regulatory and technical examinations and published the results in Part A of APS30 and APS30A Special Sections relating to the modifications to the Appendices S30 and S30A Plans submitted by administrations under Article 4 of those Appendices. A total of 38 Special Sections for feeder links were published during the five months from November 1999 to April 2000.

The Bureau will continue to perform the regulatory and technical examinations and publish the remaining cases of the modifications to the Appendices S30 and S30A Plans (109 for downlink and 114 for uplink) in Special Sections. The earliest date of receipt of the network to be published in April 2000 was 2 September 1996 and is expected to be 12 October 1998 at the end of 2000.

2.6 Modifications to frequency assignment Plans (Appendix S30B)

Examination of the notices concerning the FSS Allotment Plan submitted by administrations in application of Article 6 of Appendix 30B continued and the results were conveyed to administrations through Special Sections and Circular and Multi-address Telegrams, as appropriate. In total, 16 systems were processed.

2.7 Resolution 533 (WRC-97) - Implementation of the decisions of WRC-97 relating to Appendices S30 and S30A

The Bureau informed all ITU administrations in its Circular Letter CR/91 of 6 March 1998 that pursuant to the adoption of the revised Plan for the Broadcasting-Satellite Service and the associated feeder link for Regions 1 and 3 by WRC-97, as contained in Appendices S30 and S30A and in accordance with Resolution 533 (WRC-97), the Radiocommunication Bureau was instructed to review the requirements for coordination of the satellite networks submitted under Article 4 of the above-mentioned Appendices including those which were already published in the Special Sections annexed to the Bureau Weekly Circulars since the establishment of the initial Plans at WARCSAT-77 and WARC Orb-88.

According to this Resolution, the Bureau was instructed to apply in its examination of Article 4 submissions of Regions 1 and 3, the new technical planning criteria and reference situation of the revised Plan for Regions 1 and 3, derived, in particular, from the application of the protection ratios used for Equivalent Protection Margin (EPM) analyses at WRC-97 as defined in Annexes 5 and 3 to Appendices S30 and S30A respectively (protection ratios contained in Recommendation ITU-R BO.1297) instead of protection ratios applied at WARCSAT-77 and WARC Orb-88.

The implementation of Resolution 533 (WRC-97) insofar as the revision of the Special Sections related to Broadcasting-Satellite Service (Downlink and Feeder-Link Plans) was concerned, was completed at the end of October 1999. A full report on the outcome is in Document WRC2000/17.

2.8 Resolution 53 (WRC-97) - Updating of the remarks columns of the BSS Plan

WRC-97, in revising the BSS and Feeder-Link Plans for Regions 1 and 3, adopted new texts relating to the symbols in the “Remarks” columns of Article 9A of Appendix S30A and Article 11 of Appendix S30 to the Radio Regulations. It also adopted new entries in the “remarks” columns of the above-mentioned Articles, on the understanding that, based on the report of the Bureau, the lists of identified administrations will be reviewed and revised, as appropriate, by WRC-2000.

It was not possible, however, during WRC-97, to analyse fully the effect of all assignments which were received before 27 October 1997 but which had not been processed at that time.

The Bureau was therefore instructed to complete the required analyses based on the new Notes 3 to 7 in section 9A.2 of Article 9A of Appendix S30A and Notes 5 to 7 in section 11.2 of Article 11 of Appendix S30 added during the Conference.

The Bureau was also instructed to publish the results of its revised compatibility calculations in the form of a Circular Letter.

In accordance with *resolves* 3 of Resolution 53 (WRC-97), the concerned administrations were requested to examine their respective situations in the relevant Tables within a period of 60 days from the date of that Circular Letter.

The Bureau has received comments from four administrations (D, FIN, J and MLA) within the 60 days time-limit specified in the Resolution to the above-mentioned Circular Letter. The detailed report on the implementation of this Resolution is contained in Document WRC2000/39.

2.9 Resolution 532 (WRC-97) - Review and possible revision of BSS Plans

WRC-97, in its Resolution 532 (WRC-97) established the Inter-conference Representative Group with the following tasks:

a) to study the feasibility of increasing the minimum capacity for countries in Regions 1 and 3 to around the equivalent of ten analogue channels;

b) to examine Annex 7 in the light of its studies for possible revision of the BSS Plans and with respect to decisions taken by WRC-97, such as the reduction of the downlink e.i.r.p. Its advice on the relevance of that Annex in providing protection to all services sharing the planned bands, and particularly the Region 2 BSS Plan, should be reported to WRC-99;

c) to consider concerns identified by WRC-97: modifications of the plans for additional requirements and subregional systems should not lead to monopolization of the use of the bands by a country or group of countries. Advice on how to address these concerns should be reported to WRC-99. A detailed report on the implementation of the Resolution is in Document WRC2000/34.

2.10 Council Decision 482 - Cost recovery for satellite network filings

Decision 482 of the Council established a basis for implementing Resolution 88 (Minneapolis, 1998). Accordingly, the Radiocommunication Bureau is taking a number of steps to implement the necessary administrative procedures and to establish a firm basis for meeting further reporting requirements for Council 2000 and subsequent meetings of Council.

On the basis of the current level of Advance Publication notices, processing of coordination requests and cases under Appendices S30 and S30A, it is expected that there will be around 76 cases that will be subject to cost recovery during 2000 for which it will be necessary to:

i) identify the category of filing;

ii) establish the fee (flat fee plus any excess pages);

iii) establish those networks subject to free allowance; and

iv) provide advice to the Finance Department for invoicing and payment.

Appropriate database structure adjustments and a basis for statistical information are also required. Resources for this function have to come from within the existing staff complement of the Bureau. Full information on the implementation of cost recovery has been conveyed to administrations in Circular Letter CR/139.

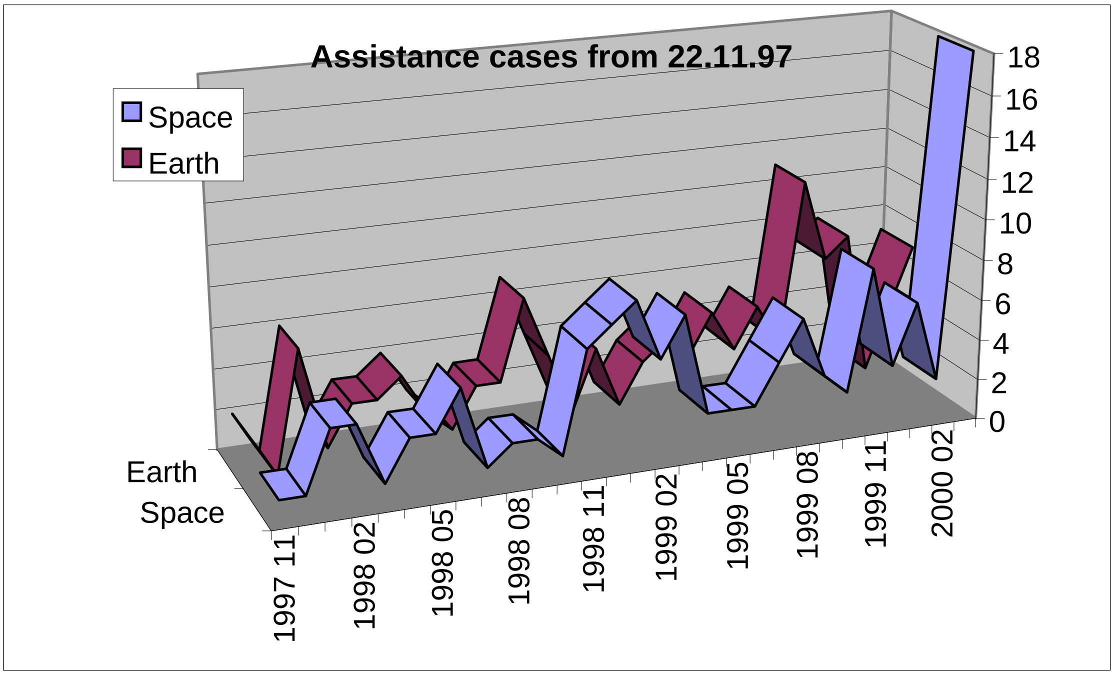
2.11 Special assistance on coordination, notification and plan modification

2.11.1 Assistance cases for non-planned services

Article S13 of the Radio Regulations specifies a wide range of possibilities for assisting administrations when they have difficulties in applying the procedures of Articles S9 and S11. Requests for assistance are received in two main respects, requests for assistance in coordination of space stations under Article S9 and Resolutions 46 and 33, and assistance provided to administrations for coordination of frequency assignments to earth stations operating with GSO or non-GSO satellite(s), with respect to the terrestrial services of other administrations. In the period since WRC-97, a little more than 100 cases were received for each space station and earth station assistance request type, with an average increase of 30 per cent per year. For space station assistance, a substantial increase is foreseen in 2000, especially in the context of an increasing rate of treatment of coordination cases and expected receipt of notification notices.

The volume of cases of assistance for both space stations and earth stations is noted in Figure 1 below.

FIGURE 1



2.11.2 Assistance cases for Appendices S30 and S30A

The Radiocommunication Bureau continued to provide assistance to administrations in application of the Radio Regulations including coordination and detailed information concerning the results of the Bureau's calculations related to the modifications to the Appendices S30 and S30A Plans.

The Bureau received seven assistance cases requested formally or informally by the Administrations of USA, EGY, LUX, S, F, F/EUT and TUR concerning the status of the comments for the networks published in Special Sections to which necessary reply assistance was provided by the Bureau.

The Bureau also received 47 assistance cases from the Administrations of ARM, ARS, BFA, CZE, DBI, GAB, KGZ, MDA, PHL, MLD, QAT, SEN, SWZ, UGA concerning the detailed results of the calculations performed by the Bureau. The Administrations of ARM, QAT, ARS, SWZ and UGA were provided with the result of the calculations as requested.

2.11.3 Assistance cases for Appendix S30B

Four administrations were assisted in application of provisions of Appendix S30B and corresponding Rules of Procedure.

2.12 Software development relating to the space services

The major activity during 1999 was the migration of the SNS notice processing system from the Siemens/IDMS mainframe environment to the Ingres/PC client-server environment. Most of the available IAP resources for space software development were allocated to this task in view of its urgency (non-availability of the Siemens/IDMS system due to Y2K non-compliance). This required the development of most of the notice processing software in the new environment using new PC-based tools. The cutover of the SNS from Siemens to Ingres took place during the first two weeks of December.

In addition to this, resources were allocated to supporting SSD's requirements in carrying out tasks related to Resolutions 532 and 533 (WRC-97). In this context, substantial additions were made to the MSPACEg software, software was developed to load the BSS space plan's files into the SNS database, and the Graphical Interference Management System (GIMS) was modified to generate composite beams.

Various other tasks were carried out related to software distributed to administrations on CD-ROM. The capability to handle notices related to Advance Publication of Information (API) and Resolution 49 (Due Diligence) was added to the capture and publication packages. Many enhancements to GIMS were made, based on a priority list created with input from SSD users. Queries on Resolution 49 notices were added to SNS-Online, which provides Web access to the SNS database. Improvements were made to SNTRACK (internal tool to manage workflow) taking into account the requirements of the SSD users.

2.13 Council Decision 483 - Improving the satellite network notification process

Council Decision 483 recognized the current difficulties being experienced in processing the large volume of satellite network filings in the Radiocommunication Bureau but, in particular, the problems associated with computer software development. Whilst recognizing the work under way within the Bureau to update and improve the efficiency of the software tools, it instructed the Director of the Radiocommunication Bureau:

1) to complete as soon as possible the software development activities listed in paragraph 2.6 of the 1999 Operational Plan for the ITU-R Sector;

2) to provide a means, such as calling information exchange meetings, for enabling administrations and network operators to be both informed of the Bureau's activities and to provide input for further improvements in the overall satellite network notification processing system; and

3) to conduct, in coordination with the Director of the Telecommunication Development Bureau (BDT), workshops for familiarizing developing countries, and in particular least developed countries (LDCs), who hold an interest in satellite notification and in using software and databases developed by the Bureau.

The Bureau has continued, within the limited resources available, to develop software as noted in paragraph 2.12 above and has continued a programme of regional seminars for developing countries (see paragraph 9.1 below).

In addition, in specific recognition of concerns from administrations, the Bureau has:

a) completed a software revision to enable resumption of the regular publication of a Space Network List (SNL) in both paper and electronic forms;

b) published with the BRIFIC a complete listing of all systems still to be processed in the current backlog of filings;

c) made available, free of charge, access to the Space Network Systems (SNS) Online to all registered TIES users. The service was previously only available on subscription;

d) completed software to be used by administrations for validation of requests for coordination under Article S.9 and associated data under Appendix S4 of the Radio Regulations.

The Bureau also conducted an Information Exchange Meeting in Geneva on 21 January 2000 immediately following the Radiocommunication Advisory Group (RAG) meeting. The Information Exchange Meeting explored a range of options for improving satellite coordination and notification processes and noted, in particular, that the greatest scope for improvement would come from changes to the currently complex regulatory framework. The results of the Information Exchange Meeting were covered in CA/75 of 8 February 2000. An outcome of the meeting was to establish an informal correspondence group coordinated by Mr Keith Whittingham of the United Kingdom. This group has generated considerable discussion of possible options for reform of regulatory procedures noting also the objective of Resolution 86 (Minneapolis, 1998). Details of the work of this group and the various papers generated by it can be found on the ITU website at www.itu.int/brconf/sat-net/informal-group/index.html.

3 Terrestrial services

In the period between WRC-97 and WRC-2000, the Bureau examined frequency assignment notices to terrestrial services under two different sets of provisions: under Article 12 of the RR (edition of 1994) for notices received prior to 1 January 1999, and under Article S11 of the RR (edition of 1998) for notices received after 31 December 1998. Also, due to the changes in the processing systems, the Bureau treated notices under two different formats: in FMS format for notices received by 1 October 1999 (excepting the broadcasting service in the VHF and UHF bands where the FMS format was receivable only until 1 April 1999) and in TerRaSys format (for notices to stations in the broadcasting service in VHF and UHF bands as from 1 April 1999, for all other services as from 1 October 1999). This variety of procedures and formats made the processing and the examination of notices rather complex. Nevertheless, the Bureau succeeded in keeping pace with terrestrial notifications as the major part of notices were processed and examined within the statutory limits. At the time of the preparation of this report (15 March 2000), the Bureau was still not in a position to process some types of notices in TerRaSys format (i.e. notices received after 1 October 1999); however, the Bureau expects to commence with the processing of these notices in the near future.

3.1 Coordination requests pertaining to terrestrial services

This activity comprises the processing of coordination requests under No. S9.21 (former Article 14 procedure), including regulatory and technical examinations and publication of the initial and final results in appropriate Special Sections. Table 3-1 summarizes the Bureau's activities in this respect.

TABLE 3-1

Activities related to coordination requests pertaining to terrestrial services

	1997	**1998**	**1999**
No. of received cases	44	13	157
No. of treated cases	44	11	159

At the time of preparation of this report, there was no backlog in this activity.

The Bureau also provided various types of assistance to administrations for coordination of frequency assignments to terrestrial stations with respect to earth stations of other administrations (mainly due to no reply or no decision of the consulted administration). Some 60 cases were treated in this respect, varying from a single frequency assignment in some cases to a substantive number of frequency assignments (more than 100) in other cases.

3.2 Plan modification procedures for terrestrial services

This activity comprises the processing of submissions under various plan modification procedures (APS25, APS26, ST61, GE75, RJ81, GE84, GE85MM, GE85EMA, GE89, RJ88), including the relevant compatibility examinations, where appropriate, and publication of the initial and final results in appropriate Special Sections. Table 3-2 summarizes the Bureau's activities in this respect.

TABLE 3-2

Activities related to plan modification procedures pertaining to terrestrial services

	1997	**1998**	**1999**
No. of received assignments	5 587	5 012	3 374
No. of examined assignments	3 674	5 639	4 250

At the time of preparation of this report, there was a slight backlog in the treatment of the notices governed by Regional Agreements ST61 and GE84, due to the delay in putting into production of all relevant components of the new system for processing of terrestrial notifications (TerRaSys).

In addition to the standard examination procedures, the Bureau published regularly, on a yearly basis, the updated versions of the Plans (Terrestrial Frequency Assignment Plans) on CD-ROM.

3.3 Notification, examination, recording and other regulatory procedures pertaining to terrestrial services

3.3.1 Notification procedure (Articles 12 and S11)

This activity comprises the processing (i.e. reception, registering, validation, correspondence, data correction and publication in the WIC/BR IFIC) of the notices received from administrations, as well as subsequent examination under the relevant provisions of Articles 12/S11 of the Radio Regulations (conformity with the Table of Frequency Allocations and other provisions of the Radio Regulations, and, where appropriate, from the viewpoint of their conformity with the coordination procedures or with a frequency allotment or assignment Plan and/or to other provisions of the Agreement, when applicable). Table 3-3.1 summarizes the Bureau's activities in this respect.

TABLE 3-3.1

Activities related to notification procedures pertaining to terrestrial services

	1997	1998	1999
No. of received notices	33 855	45 603	51 748
No. of examined notices	39 227	24 146	55 586

At the time of preparation of this report, there was a slight backlog in the treatment of the notices in the bands governed by Regional Agreements ST61 and GE84, due to the delay in putting into production of all relevant components of the new system for processing of terrestrial notifications (TerRaSys). There was also a delay in the examination of the notices pertaining to terrestrial services in the bands shared with space services, as these examinations depend on the status of examination of notices to space services.

It is to be noted that the Bureau undertook a comprehensive set of activities, after WRC-97, in order to implement the relevant decisions of WRC-97 related to the notification procedures for terrestrial services, notably:

- the major part of notices received by 31 December 1998 were examined by 31 March 1999, under the relevant provisions of Article 12 of the Radio Regulations, and the March-99 edition of the IFL/CD-ROM (released in April 1999) contained the updated situation (except some cases in the bands shared with space services); all remaining notices of this category were examined by the end of November of 1999 and the December-99 edition of the IFL/CD-ROM (released in January 2000) contained the updated situation;
- all internal procedures were reviewed and many elements of the production chain (registry, validation rules, finding system) have been adapted to the requirements of the Simplified Radio Regulations and the new numbering system was timely introduced in the relevant publications (Preface to the IFL, service documents, etc.);
- the relevant forms of notice were reviewed and redesigned so as to conform with the requirements of revised Appendix S4 to the Radio Regulations, as well as to those of the new processing system TerRaSys, and appropriate circular letters were prepared and sent to administrations containing guidelines as to the use of these forms;
- several categories of recorded frequency assignments were reviewed (e.g. those governed by No. S5.148, by Resolution 8 and by Resolution 412) and the relevant findings were modified and reflected in the March-99 edition of the IFL/CD-ROM. In addition, the findings of the recorded assignments were reformatted, through

appropriate mass-update procedures, so as to conform to the requirements stipulated in the Simplified Radio Regulations, and the December-99 edition of the IFL/CD-ROM contains findings consistent with the provisions of the Simplified Radio Regulations.

In addition to the above activities, the Bureau introduced the new publication, the BR International Frequency Information Circular (IFIC) which integrates, as from 11 January 2000, all former publications related to frequency assignments (the IFL, Frequency Assignment Plans, WIC and Special Sections), as requested by Resolution 30 (WRC-97).

3.3.2 Processing of submissions for HF broadcasting schedules

This activity comprises technical processing of submissions related to HF broadcasting schedules under the procedure of Article 17 of the Radio Regulations (for all schedules in 1997 and 1998) and under the procedure of Article S12 (as from 1 January 1999), including the identification of severe incompatibilities and selection of appropriate bands and frequencies when requested by administrations, and preparation of tentative and final schedules. Table 3-3.2 summarizes the Bureau's activities in this respect.

TABLE 3-3.2

Activities related to preparation of HF broadcasting schedules

	1997	**1998**	**1999**
No. of processed cases	28 357	31 446	17 379

The Bureau undertook a comprehensive set of activities, after WRC-97, in order to implement the relevant decisions of WRC-97 as to the introduction of the new procedure as stipulated in Article S12 and Resolution 535 (WRC-97). In these activities, which comprised the development of new software and establishment of various reference tables, the Bureau obtained valuable assistance from one administration, as well as full cooperation of many regional coordination groups; thanks to such collaboration, the Bureau was able to timely commence with the application of the new procedure. The related processing and the technical examination of notices is now being carried out on a weekly basis resulting in the publication, every month, of the Tentative Schedule on CD-ROM.

3.3.3 Other regulatory procedures pertaining to terrestrial services

The Bureau continued to apply other regulatory procedures described in various Resolutions and Recommendations, although some of them are decreasing in terms of generated workload. Table 3-3.3 summarizes the Bureau's activities in this respect.

TABLE 3-3.3

Activities related to other regulatory procedures pertaining to terrestrial services

	1997	**1998**	**1999**
No. of cases under RS300	50	83	21
No. of cases under RC402	8	35	18

Additional considerations on these two procedures are contained in Document WRC2000/16 (sections 2.5 and 2.7).

3.3.4 Monitoring summaries (regular and special monitoring)

The Bureau continued to process data on regular monitoring, as submitted to it by monitoring stations of the Member States, as well as to conduct the necessary liaison between administrations performing special monitoring programmes under Resolution 205 (in the band 406-406.1 MHz) and the administrations from where unauthorized emissions are generated. Table 3-3.4 summarizes the Bureau's activities in this respect.

TABLE 3-3.4

Treatment of monitoring reports

	1997	**1998**	**1999**
Regular monitoring: No. of observations processed	59 345	60 000	52 664
Special Monitoring under RS205: No. of unauthorized emissions	276	161	125
Special Monitoring under RS205: No. of unauthorized emissions that ceased	107	47	38

The summary reports relating to regular monitoring are now available on the ITU website (starting with Summary No. 273 which covers observations for the period 1 January - 31 March 1997).

3.4 Application of administrative and operational procedures

The Bureau provided various kinds of assistance to administrations and other entities in the application of administrative and operational procedures that constitute a significant part of the Radio Regulations. It also continued to allocate means of identification to administrations, in accordance with the relevant provisions of the Radio Regulations. Table 3-4 contains a summary of the allocated means of identification in the period 1997-2000.

TABLE 3-4

Allocation of means of identifications

	1997	**1998**	**1999**	**2000**[1]
No. of international call sign series	–	–	1 (PSE)	1 (UN)
No. of blocks of ship station selective call numbers	4 (INS, KOR, MLT, PHL)	2 (MLA, VCT)	3 (CYP, INS, J)	–
No. of blocks of coast station identification numbers	3 (HKG, KOR, USA)	1 (EGY)	3 (MAU, EQA, TUN)	–
No. of maritime identification digits	3 (MLT, PNR, TZA)	3 (MDA, F, PNR)	6 (G, DNK, TKM, VCT, KAZ, CHN)	1 (J)

All the blocks of ship station selective call numbers (SSSCN) were exhausted in the first quarter of 1999 and an appropriate note was published in the ITU Operational Bulletin (No. 693 of 1 June 1999). Administrations submitting requests for additional blocks of SSSCN are advised to reuse the

[1] Period 1 January - 15 March 2000.

same five-digit ship station selective call numbers for both SFSC and NBDP (where applicable), or to migrate to the numerical identification system based on MID, and the proposed course of action is generally accepted. See also Document WRC2000/16 (paragraph 3.6).

3.5 Implementation of Conference Resolutions relating to terrestrial services

The Bureau completed essentially all activities referred to in various Resolutions from WRC-97 and from previous conferences that treat issues pertaining to terrestrial services.
Document WRC2000/16 contains reports with respect to Resolutions 13, 27, 28, 73, 300, 339, 340, 344, 535, 537, 703 and 716, as well as Recommendation 402. Paragraph 7.4 of this report contains information on the implementation of Resolution 30. In addition to these reports, the Bureau also undertook a general review of all Resolutions and Recommendations from WARC/WRC, as requested by Resolution 95. Appropriate comments in this respect are summarized in Document WRC2000/15.

3.6 Software development relating to the terrestrial services

1999 had barely begun when it was found that the existing Frequency Management System (**FMS**) would no longer be able to run as of 1 January 2000 because of a “Year 2000” problem with the underlying IDMS Database Management System. The portion of the 1999 Operational Plan related to the development of the new Terrestrial Radiocommunication System (***TerRaSys***) was therefore extensively modified.

The entire FM/TV portion of ***TerRaSys*** was placed into production during 1999. This includes data capture of paper notices, treatment of electronic notices, validation, various (regulatory, technical, plan, etc.) examinations, publication, and so forth.

The terrestrial portion of the BRIFIC CD-ROM was placed into production for FM/TV, with LF/MF available for “beta” testing. As 1999 ended, the remaining services (i.e. non-broadcasting services, such as fixed, mobile, aeronautical, etc.) were made available on the BRIFIC CD-ROM for “beta” testing. Work on the remaining portions of ***TerRaSys*** was under way at the time of preparation of this report.

4 Study Groups

4.1 Activities of the ITU-R Study Groups in preparation for WRC-2000

The preparation for WRC-2000 has involved all ITU-R Study Groups. As regards propagation aspects, a significant contribution has been the revision of the propagation prediction methods for earth station coordination. Also, a considerable amount of work has led to a review of the regulatory conditions relating to the coexistence of non-GSO FSS and GSO FSS systems as well as the work on development of a methodology for calculating the power levels produced by non-GSO FSS systems and sharing criteria and power limits. Joint activities between the concerned Study Groups finalized the studies on the sharing between non-GSO FSS and a wide range of other services including GSO/FSS, GSO/BSS, and FS. Additional studies have addressed high-altitude platform stations (HAPS).

Extensive preparatory work has been carried out to consider requirements for additional frequency spectrum for IMT-2000, for both its terrestrial and satellite components. Methodologies for the spectrum estimation were established in new Recommendations and details of the studies were retained in new Reports. Sharing studies were also conducted in several candidate bands.

4.2 Conference Preparatory Meeting (CPM)

The first Conference Preparatory Meeting (Geneva, 26-27 November 1997) organized preparatory studies for WRC-2000 and identified studies for the following WRC. A structure for the CPM Report to WRC-2000 was agreed together with a preparatory process, working procedures and a chapter structure. The meeting also appointed a Rapporteur for each chapter to assist the Chairperson in managing the development and flow of draft report contributions. The meeting decided that all appropriate regulatory/procedural studies on relevant agenda items would be carried out by the Special Committee on Regulatory/Procedural matters on the basis of proposals from the membership of ITU and the relevant ITU-R Working Party/Task Group/Joint Rapporteur Group. According to Resolution ITU-R 38-1 the results of the studies were submitted as contributions to the work of the second CPM in preparing its report to WRC-2000.

4.3 Special Committee on Regulatory/Procedural Matters

At the first session of the CPM (Geneva, 26-27 November 1997), the Special Committee on Regulatory/Procedural Matters (SC) organized its work in four Rapporteur Groups, which worked mainly by correspondence.

The SC meeting (Geneva, 12-16 July 1999) considered the reports by the four Rapporteurs as well as contributions from administrations and Sector Members. The material in the input documents was consolidated into a Report to the Conference Preparatory Meeting (CPM). The SC Report was used during the CPM together with the draft CPM Report and contributions from administrations and Sector Members to create the Report of the CPM to WRC-2000.

4.4 ITU-R Study Group Chairmen and Vice-Chairmen meetings

The meetings of the Radiocommunication Study Group Chairmen and Vice-Chairmen were organized in the period between the 1997 and 2000 Radiocommunication Assembly, namely 25-28 November 1997, 14-16 December 1998 and 26 November 1999. Further to establishing the Study Group meeting schedule for the relevant study period, the first meeting dealt mainly with the results of WRC-97 and the organization of studies requested for WRC-2000 and led to the establishment of Joint Task Group 4-9-11. The subsequent meetings updated the yearly meeting schedule and considered the Study Group management aspects, i.e. compliance with allocated budget (based on financial progress reports submitted by the Director) and measures addressed to limit documentation costs. The next meeting of the ITU-R Study Group Chairmen and Vice-Chairmen will be held, as usual, following the WRC-2000, in the week 6 to 9 June 2000 in association with the first session of the CPM. Both newly elected Study Group Chairmen and Vice-Chairmen and those leaving office will be participating.

4.5 Support of Study Group activities in the study period 1997-2000 meetings

The Study Group Department provided support to more than 167 meetings with a total of 845 meeting days in the study period 1997-2000 (starting December 97 and ending April 2000). The main meetings were held for the Conference Preparatory Meeting, the Special Committee, Study Groups (12 meetings), Working Parties, Task Groups. Smaller meetings were organized for Joint Rapporteur Groups, Experts' Groups and Handbook Groups.

The total documentation for these meetings consisted of 13 000 documents with approximately 130 000 pages.

Meetings

About 35 meetings have been held, at the invitations of administrations or Sector Members, outside Geneva.

A problem area for meetings in Geneva, as well as outside, is the usual very late arrival of contributions. The Secretariat sometimes has to handle the reproduction of a huge quantity of pages in the few days before the opening of the meeting.

Correspondence and telephone inquiries

Some 220 circular letters have been disseminated in this study period. These letters mainly concern the approval of Questions and Recommendations (CAR), the invitation to Study Group meetings (CACE), the announcement of approved Questions and Recommendations (CACE) and the invitation letters to Working Party, Task Group, Special Rapporteur Group and Handbook Group meetings (LCCE).

Most of the routine correspondence is received by E-mail. BRSGD also answers about 1 000 E-mails/month on various technical and administrative subjects.

Information requests are also received from administrations/Sector Members by telephone.

Quality control

The Radiocommunication Bureau Study Group Department has put considerable effort to ensure adequate support to the above-mentioned meeting activities guaranteeing a high-quality standard in the provided services.

The BR Operational Plan includes some means to assess the quality of the services offered to our “customers”. As regards the support to Study Group activity, a “key performance indicator” has been identified in making received contributions electronically available to participants in the shortest time scale. In the study period concerned BR/SGD has met and exceeded the target fixed in the Operational Plan. In most cases, all contributions supplied in electronic form, have been posted on the WWW not later than 24 hours after receipt by the Secretariat. This databank is made available to all registered TIES (Telecommunication Information Exchange Services) users.

5 Radio Regulations Board

5.1 General

In the period since WRC-97, the Radio Regulations Board has changed both in size and composition. In the period up to the Plenipotentiary Conference in 1998, it comprised nine members as follows:

Name	Country	1997	1998
Mr João C.F. Albernaz	Brazil	Chairperson	
Mr Thormod Bøe	Norway		
Mr Henry Kieffer	Switzerland		
Mr Makoto Miura	Japan		
Mr Gerald L. Mutti	Zambia		
Mr Ryszard G. Struzak	Poland		
Mr Valery Timofeev	Russian Federation	Vice-Chairperson	Chairperson
Mr Kouakou J.-B. Yao	Côte d'Ivoire		Vice-Chairperson
Mr Sanbao Zhu	Republic of China		

As result of a change to the Constitution (CS.93A) and the consequent elections at the Plenipotentiary Conference (Minneapolis, 1998), the composition of the Radio Regulations Board increased to twelve members as noted in the following table. The new Board held its first (15th) meeting 1-5 March 1999.

Name	Country	1999	2000
Mr R.N. Agarwal	India	Vice-Chairperson	Chairperson
Mr P. Aboudarham	France		Vice-Chairperson
Mr James R. Carroll	United States		
Mr Muhammad Javed	Pakistan		
Dr Gabor Kovacs	Hungary		
Mr Carlos Merchan Escalante	Mexico		
Mr Hugh Railton	New Zealand		
Mr Ryszard Struzak	Poland		
Mr John Tandoh	Ghana		
Mr Valery Timofeev	Russian Federation		
Mr Ahmed Toumi	Morocco		
Mr J.-B. Kouakou Yao	Côte d'Ivoire	Chairperson	

5.2 Review of Rules of Procedure

The Board undertook a comprehensive general review of its Rules of Procedure in accordance with principles adopted at its 11th meeting (26-30 January 1998) and, in particular, noting the requirement to align the Rules with new provisions of the Radio Regulations to come into effect (provisional application) from 1 January 1999. The review was undertaken progressively over three meetings of the Board (12th, 13th and 14th) during 1999 and resulted in a comprehensive revision being promulgated in loose-leaf form which is amended from time to time, as necessary, with replacement pages. The new Rules of Procedure (1998 edition) became available early in 1999.

5.3 Working methods - Resolution 84 (Minneapolis, 1998)

The Board gave early consideration to its working methods, having particular regard to Resolution 84 (Minneapolis, 1998) and the desirability of improving transparency in the work of the Board. As a result of consideration at its 15th and 16th meetings, the Board promulgated revised

Rules of Procedure (Part C (rev.1) of the 1998 Consolidated Volume) and these were published by Circular Letter (CR/127 of 3 August 1999). No comments were received from administrations as regards the revised working methods.

In the same context, the Board also considered Rules of Procedure to clarify the application of Article S13 of the Radio Regulations. These Rules were circulated for comment (CCRR/2 of 15 July 1999) and, noting the general support received in comments from administrations, the RRB adopted the new Rules at its 17th meeting (13-17 September 1999).

These new Rules were promulgated by Circular Letter (CR/129 of 3 November 1999) and were incorporated in the 1998 edition of the Rules of Procedure (Part AI, ARS 13 (rev. 2)). The Board has followed the provisions of S13 and these associated Rules of Procedure in its consideration of any proposals for modifications or additions to the Rules of Procedure.

Copies of the relevant parts of the Rules of Procedure relating to the above changes are attached (Annex BBB).

5.4 Issues raised at RRB meetings which may require consideration by WRC-2000

A number of issues have been raised by administrations with the Radio Regulations Board for consideration in terms of application of the Radio Regulations or for review of decisions of the Radiocommunication Bureau in terms of the application of S14. In virtually all cases, the RRB has drawn conclusions or reached decisions that have resolved the issues which have been acceptable to the parties involved. In some cases, however, the RRB has concluded that the Radio Regulations may not specifically, or sufficiently, cover the circumstances of a case, or that there is an ambiguity in the provisions.

In these cases, the RRB concluded that it would be desirable for WRC-2000 to consider the particular issue in question. Cases in this category are noted as follows:

a) At its 15th, 16th and 17th meetings, the RRB considered reports from the Radiocommunication Bureau on progress with applying the provisions of Resolution 49 (WRC-97). The Bureau provided reports to the Board and noted that the overall progress would be reported to WRC-2000 in accordance with provisions of the Resolution.

One of the issues reported to the RRB arose from an exchange of correspondence between the Bureau and the Administration of the Russian Federation on the specific application of *resolves* 3 of Resolution 49 to satellite network systems already in operation and recorded in the MIFR. The RRB gave specific guidance to the Bureau on the application of the Resolution within the context of *resolves* 2 and 3 of Resolution 49 to enable it to continue its work in the period prior to WRC-2000 and in its treatment of space network systems of the Russian Federation.

The RRB concluded, however, that there appeared to be ambiguity in the application of *resolves* 3 and that it would be appropriate to report the matter to WRC-2000. The Board noted that this ambiguity did not raise immediate concerns as it relates to information required to be provided before 21 November 2000.

The issue is included in detail in the Report of the Director to WRC-2000 on the application of Resolution 49 (WRC-97) to enable the Conference to consider the specific issue of the application of *resolves* 3 of the Resolution (see Document WRC2000/32).

b) At its 16th meeting (24-28 May 1999), the RRB considered an issue raised by the Radiocommunication Bureau regarding the application of the coordination procedure of Article 14 (S9.21) to FSS in the band 11.7 to 12.2 GHz in Region 2 in the application of Article S5.488. It noted that there may be some uncertainty as to whether a specific change by WRC-95 to S5.488 may have been intentional or an editorial oversight.

The RRB revised the Rules of Procedure relating to S5.488 at its 13th meeting (6-14 July 1999) which became effective as from 1 January 1999. This revision was based on an understanding that the new text of S5.488, which had no explicit reference to S9.21, means that there is no longer a need for the specific procedures of S9.21 to be applied to FSS networks in the band 11.7-12.2 GHz in Region 2. Since there are now no hard pfd limits applicable to geostationary FSS in this band, no protection is available to terrestrial services from GSO FSS networks for which the coordination information was received in Region 2 after 1 January 1999.

The RRB notes that the matter has been considered by the CPM on the basis of information from the Bureau and from two administrations and that it is included in the CPM Report to the Conference (paragraph 7.6) with some possible options for the Conference to consider.

c) At its 18th meeting (8-12 November 1999), the RRB considered a submission from the Administration of Spain in which it contested a decision of the Radiocommunication Bureau pursuant to the provisions of Article S14. The issue related to the decision of the Bureau to cancel the HISPASAT-2 analogue and digital satellite network at 30° W in application of the provisions of Articles 11 and 9A of Appendices S30 and S30A respectively (eight year regulatory time limit for bringing the network into use).

In its examination of the case and of the associated regulatory provisions, the RRB concluded that the decision of the Bureau was correct but the RRB recognized a potential ambiguity between the text of *resolves* 2 of Resolution 533 (WRC-97) and the above-mentioned provisions of Appendices S30 and S30A. Accordingly, the RRB established arrangements to avoid suspension of the processing of submissions from administrations by the Bureau until WRC-2000, namely for the Bureau to continue, whilst still processing the HISPASAT-2 analogue and digital assignments on a provisional basis pending consideration of the issue by WRC-2000.

d) At its 18th and 19th meetings, the RRB considered the question of application of the Radio Regulations to cases involving inter-satellite links between GSO and non-GSO systems. The matter had been brought to the RRB by the Bureau on the basis that there are no specific technical criteria, calculation methods or associated tools available to the Bureau to undertake an examination of conformity pursuant to Article S11.32.

The RRB agreed that the matter be brought to the attention of Study Group 4 to consider appropriate technical criteria, calculation methods and tools. However, the RRB also concluded that it would be desirable for the matter to be considered by WRC-2000.

The RRB, at its 17th meeting (13-17 September 1999) adopted a Rule of Procedure in the application of S5.392 in respect of inter-satellite links in frequency bands 2 025-2 110 MHz and 2 200-2 290 MHz but, in these cases, it involved specific cases of space services allocated to space research, earth exploration and space operation services and the space-to-space services are limited to data-relay satellite systems.

Accordingly WRC-2000 may wish to consider the most appropriate regulatory approach to be taken for inter-satellite systems operating in a number of bands allocated to the inter-satellite service. This issue is explained in more detail in a separate document with some possible options for consideration (see Document WRC2000/16).

5.5 Backlog in processing satellite network filings

The RRB considered reports from the Bureau to its 17th, 18th and 19th meetings and noted with considerable concern the implications of the backlog in processing satellite network filings, particularly those relating to requests for coordination. At its 19th meeting (21-25 February 2000) the RRB considered possible changes to the Rules of Procedure that could reduce the work involved by the Bureau in meeting requirements of the Radio Regulations. Whilst it noted that the scope for such improvement through changes to the Rules of Procedure is extremely limited, the RRB approved a modification in respect to the practical application of S11.32 and its previously equivalent provisions.

The RRB concluded that necessary improvements can be achieved primarily through changes to the Radio Regulations or appropriate Resolutions and it has urged all administrations to seriously consider proposals for such changes to WRC-2000.

The RRB has noted that some initiatives are emerging following consideration of the situation by regional groups of administrations and by administrations as a result of an Information Exchange Meeting conducted by the Bureau on 21 January 2000 as required by Council Decision 483. The Board had also noted the possible options for reform in Administrative Circular CA/75 of 8 February 2000 and generally supported these options.

The RRB has expressed its hope that proposals to WRC-2000 will be able to better meet the real needs of those responsible for the planning and operation of satellite networks and overcome the problems of the backlog of work in the Bureau.

5.6 Consideration of Resolution 80 (WRC-97)

The RRB considered the steps that may be possible to recognize the concern that led to the adoption of Resolution 80 at WRC-97. It has considered the issue at a number of its meetings since WRC-97.

The RRB has prepared a detailed report for WRC-2000 as required by the Resolution and this Report has been submitted as a separate document (WRC2000/29).

6 Radiocommunication Advisory Group

During the concerned period the RAG held three meetings.

Sixth Meeting (12-16 January 1998)

RAG discussed the relevant results of RA-97 and WRC-97, in particular the need to associate the RA in time and place with the WRC. It reviewed the draft Strategic Plan of ITU as well as the 1998 BR Operational Plan. After some discussion, a number of improvements were suggested. The potential consequences of lack of adequate resources were evaluated. RAG advised giving priority on the ongoing processing of frequency notices. The principles for the application of cost recovery were fully endorsed. RAG also fully endorsed the action taken by the Director to get additional resources from Council to keep current BR staff. In a broader context, RAG reflected on the financial consequences of conference decisions. Considerable discussions were held on the relevant Recommendations on ITU-2000 as well as on RAG’s status in the Constitution and Convention. An ad hoc group on IPR was unable to reach a common position. It was considered necessary to continue discussions within RAG.

Seventh Meeting (22-26 February 1999)

RAG noted the inclusion of provisions setting out its mandate in the Convention. It considered a report by the Chairperson of the Council Working Group on the implementation of cost recovery for satellite notifications. RAG prepared consolidated summaries on its advice concerning ways to reduce WRC’s documentation and on improving the efficiency of WRCs. Following a general discussion, RAG noted with appreciation the completion of a substantial volume of work on publications during 1998. It endorsed the various experiments with advertising and outsourcing. With respect to IPR issues, the meeting endorsed the use of the forms similar to those used in ITU-T to keep policy aligned in the two Sectors.

Eighth Meeting (17-20 January 2000)

RAG endorsed a draft resolution on the status of Associates. It also prepared advice on many amendments to ITU-R Resolutions concerning study group structure, administrative recommendations, IPR policy, rights of Sector Members, appointment of study group and RAG Chairpersons and Vice-Chairpersons, updating of maintained recommendations and the general review of ITU-R Resolutions. RAG encouraged greater emphasis at WRC on the financial implications of WRC decisions. The Director was invited to incorporate this conclusion in his report to WRC-2000. RAG initiated the review of the CPM process by means of a correspondence group. Although a consensus was not achieved, it also raised the idea of associating the Radiocommunication Assembly in time and place with CPM-2. The meeting agreed that RA-2000 should be invited to consider giving RAG the mandate to develop a mechanism for implementing an alternative approval process and to implement that process on an experimental basis. RAG considered the BR draft 2000 Operational Plan. It recognized the enormous problems faced by BR in the Space Services Department and encouraged discussions on possible ways forward. The importance of assistance in spectrum management, particularly in developing countries was stressed. The Director was invited to ensure that this was recognized in the Plan and that every effort be made to find the resources necessary to assist administrations. RAG concluded that the ICG on Satellite Matters was serving a useful purpose. However, it did not consider that there was sufficient justification for creating an ICG on IMT-2000. RAG fully endorsed the merger of Study Group 10 and Study Group 11. However, it noted concerns expressed by TSAG regarding the scope of the new study group. Informal discussions, outside the meeting, resulted in an amended text that could not be considered by RAG due to lack of time. Discussions will continue during RA-2000.

7 Seminars and conference preparation

The Bureau organized five regional radiocommunication seminars in the 1998-1999 period:

- Gabon April 98
- Namibia June 98
- Cuba April 99
- Mali May 99
- Ukraine June 99

A World Radiocommunication Seminar was also held in Geneva in November 1998.

7.1 Preparations for future conferences

7.1.1 The general scope of the WRC agenda is normally established four to six years in advance (CV118, PP-98). In accordance with the standard practices, WRC-97, by its Resolution 722, established a preliminary agenda for WRC-02/03 (initially envisaged for the year 2001). WRC-2000, by its agenda item 7.2, is expected to recommend to Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences.

7.1.2 Chapter 8 of the CPM-99 Report to WRC-2000 contains indications on the progress of studies for future conferences. In addition to these indications, the Bureau wishes to report on other issues that were drawn to the attention of the Bureau with a view to reporting them to WRC-2000. Administrations may wish to take note of this information when considering the proposals concerning the agenda for WRC-03.

a) In May 1999, the Bureau received a letter from the organization *No-Code International* (United States), containing a formal complaint regarding provision No. S25.5, which, in the opinion of that organization, involves discrimination. To remedy the situation, this organization requested placing of the subject matter on the WRC-2000 agenda with a view to deleting No. S25.5 at WRC-2000. That organization was informed that, according to "*resolves* 2.2" of Resolution 722, the consideration of Article S25 may be included in the preliminary agenda for WRC-03, which would enable consideration of No. S25.5.

b) In July 1999, the Bureau was approached by the Transport Division of the Economic Commission for Europe (ECE) concerning the possible course of action that would enable the extension of the scope of the application of No. S5.138 to all three Regions, thus contributing to the harmonization of the construction requirements for road vehicles (in this particular case, use of the frequency 433.92 MHz for automotive radio control of anti-theft systems). The ECE was given appropriate advice in this regard (as WRC-2000 has no explicit mandate to consider the extension of the application of No. S5.138 to all other ITU Regions, appropriate proposals as to the inclusion of this issue in the preliminary agenda for WRC-03 should be submitted to WRC-2000 by the administrations of the ITU Member States).

7.1.3 In addition to the issues regarding possible agenda items for future WRCs, the Bureau wishes to inform the Conference that several Member States belonging to the European Broadcasting Area have initiated the procedure for convening a regional radiocommunication conference for revision of the European Broadcasting Agreement for VHF/UHF broadcasting (Stockholm, 1961). According to that initiative, which is conducted under the provisions of No. 310 of the Convention of ITU, the concerned Member States propose holding of a two-session conference, the second session of which may take place at the seat of the Union in the year 2005 at the latest.

7.2 Implementation of Resolution 30 (WRC-97)

The World Radiocommunication Conference (WRC-97) has resolved, by its Resolution 30 that the publication of the Weekly Circular and the Special Sections on paper, microfiche and diskette formats, be migrated to a CD-ROM format. It also decided 1) that the new publication be produced on a fortnightly basis; 2) that tests should be conducted in cooperation with all administrations before introducing CD-ROM replacing the former formats; 3) that the search software should be capable of easily identifying and extracting to file parts I, II and III of the Weekly Circular and the Special Sections as well as for plan assignments. It also instructed the Director, BR, 1) to consider an alternative name for the Weekly Circular, and 2) to report to the next world radiocommunication conference on the experience gained in the introduction of the CD-ROM format with a view to making any necessary consequential amendments to the RR. Furthermore, it requested the Secretary-General to consider the provision of suitable software and/or hardware for the least developing countries requesting it.

In response to this Resolution, the Bureau undertook a comprehensive set of activities in order to implement the WRC-97 decisions in this respect. The first information on the new publication, with partial data, was presented to the participants in the BR Seminar, in September/October 1998. In December 1998, the Bureau introduced a beta-1 version of the new publication in CD-ROM format (subsequently named as BR International Frequency Information Circular - IFIC), which contained data on the frequency assignments in the broadcasting service in LF, MF, VHF and UHF bands, as well as a database query program (***TerRaQ***) allowing the user to extract the last published data in

Parts 1, 2 and 3 and also Parts A, B and C of the Special Sections (please refer to Circular Letter CR/110 of 4 December 1998). In a parallel activity in 1998, ITU provided some 50 PCs to least developed countries, with installed WindowsNT, so as to enable these countries to use the new software being developed in BR under NT.

Following this initial test in which 34 administrations and users participated, the Bureau commenced with the formal test of the new CD-ROM publication, as requested by "*resolves* 3" of Resolution 30. The formal tests commenced on 15 June 1999 (please refer to Circular Letter CR/123 of 7 June 1999). During the period from 15 June 1999 to 7 September 1999, in which the formal testing was conducted, there was a parallel weekly publication of paper, microfiche and diskette formats in the FMS along with CD-ROM format in ***TerRaSys*** every two weeks (the testing of the LF/MF broadcasting portion was extended up to the end of 1999).

Following the successful completion of the tests, the Bureau effected the production cutover from the former FMS to the new ***TerRaSys***, for the VHF/UHF broadcasting portion, on 29 August 1999. Administrations were informed accordingly (see Circular Letter CR/128 of 9 September 1999) that, as from 7 September 1999, the CD-ROM format became the sole publication format for the frequency assignments in the broadcasting service in the VHF and UHF bands, both those notified under Article S11 of the Radio Regulations, as well as those submitted under the relevant provisions of the Regional Agreements, Stockholm, 1961, Geneva, 1984 and Geneva, 1989.

By its Circular Telegram of 13 January 2000, the Bureau informed administrations that the BR IFIC for Terrestrial Services also contains information on the fixed and mobile services. This information was further confirmed in Circular Letter CR/138 dated 14 February 2000. It is to be noted that, at the time of preparation of this report, the status of the BR IFIC information concerning the fixed and mobile services was still unofficial, pending the formal verification that the data contained therein are correctly converted from the FMS format. This verification was delayed due to the fact that, in the conversion process, a considerable amount of errors were detected and they are now being corrected.

In January 2000, the Bureau introduced BR IFIC for Space Services which contains, in Adobe Portable Document Format (PDF), the files corresponding to Parts 1, 2 and 3 and the various Special Sections (please refer to Circular Letter CR/134, dated 22 December 1999). This is a temporary implementation of Resolution 30. The Bureau will later add to these PDF files an Access database and query software similar to the one used for terrestrial services. As from 11 January 2000, the BR IFIC CD-ROM represents the sole publication format for stations in the space services, for those notified under former Articles 11(S9) and 13(S11) of the Radio Regulations in force, as well as those that are submitted under the relevant provisions of the Radio Regulations or which are subject to the Appendices S30, S30A and S30B Plans.

As from 11 January 2000, when other components were added (i.e. assignments related to the remaining terrestrial services as well as portions related to space services), the new publication in CD-ROM format integrates all radiocommunication services and represents the sole regulatory publication resulting from the application of the relevant provisions of the Radio Regulations and the associated Regional Agreements related to the international management of the frequency spectrum/orbit resource.

Prior to January 2000, the Weekly Circulars were published in paper, microfiche and diskette forms. Additionally, the International Frequency List on CD-ROM (IFL on CD-ROM) and SRS on CD-ROM were published every six months and Frequency Assignment Plans on CD-ROM (Plans on CD-ROM) every year. As a result of the above decisions of the Conference, all these publications are being replaced by a single publication on CD-ROM, which is published every two weeks. As instructed by Resolution 30, the Bureau can provide an index of Parts I, II, III and the Special Sections printed on paper, for those administrations requesting it. So far, no administration has made such a request. Also as instructed by Resolution 30, this data is available on TIES by remote electronic access.

Later in 2000, the Bureau will consider the option of offering the BR IFIC on Digital Versatile Disks (DVD). The main advantage of the DVD format is its storage capacity of 4.7 GB. This will allow the grouping of terrestrial and space services on a single uncompressed DVD, thus eliminating the need to store the CD content on a PC hard drive.

In summary, as from 11 January 2000, BR IFIC on CD-ROM format integrates all radiocommunication services and represents the sole regulatory publication resulting from the application of the relevant provisions of the Radio Regulations and the associated Regional Agreements related to the international management of the frequency spectrum/orbit resource.

8 Publications

8.1 Regulatory publications

Table 8-1 summarizes the Bureau's activities on publications resulting from the application of the Radio Regulations in the period 1997-1999.

TABLE 8-1

Publications resulting from the application of the Radio Regulations

	1997	**1998**	**1999**
Weekly Circulars	50 issues (on paper, microfiche and diskette)	50 issues (on paper, microfiche and diskette)	50 issues (on paper, microfiche and diskette) and 7 issues on CD- ROM
HFBC Schedules	12 issues (on diskettes)	12 issues (on diskettes)	9 issues (on CD-ROM)
IFL	2 issues (on CD-ROM)	2 issues (on CD-ROM)	2 issues (on CD-ROM)
SRS	2 issues (on CD-ROM)	2 issues (on CD-ROM)	2 issues (on CD-ROM)
Terrestrial Plans	1 issue (on CD-ROM)	1 issue (on CD-ROM)	– (incorporated within BR IFIC)
Preface to the IFL	1 edition and 1 update	1 edition and 1 update	7 editions on CD-ROM (with BR IFIC)

8.2 Service documents

Table 8-2 summarizes the Bureau's activities on publications of service documents in the period 1997-1999.

TABLE 8-2

Publication of service documents

	1997	**1998**	**1999**
List IV (Coast Stations)	One supplement	One full edition	Two supplements
List V (Ship stations)	One full edition and three supplements	One full edition and three supplements	One full edition and three supplements
List VI (Radiodetermination and special services)	One edition	Two supplements	Two supplements
List VIIA (Call signs - maritime mobile)	One full edition and three supplements	Four supplements	One full edition and three supplements
List VIIB (Call signs - other than MMS)	One full edition and one supplement	Two supplements	One full edition and one supplement

Lists IV, V, VI and VIIA are, *inter alia*, service documents whose carriage is mandatory for certain categories of ships. In view of the importance of the operational information contained in these Lists, particularly with regard to safety, and bearing in mind that information contained in some of these Lists is also used for other administrative procedures (e.g. eligibility for additional MID), administrations are communicating regularly the necessary amendments to these Lists. It should be further noted that the numbers of printed and sold copies of these Lists are increasing with each new edition.

On the other hand, List VIIB, List of call signs of stations other than amateur stations, experimental stations and stations of the maritime mobile service, is not a service document whose provision is mandatory to any station. The List was conceived primarily in order to identify stations, by their call signs, that are causing harmful interference. At the present time, with the use of some new modulation techniques where information is coded and consequently not readily available for rapid identification of the originating radiation, the List is becoming obsolete. In addition, very few administrations are responding to requests of the Bureau for amending the information concerning their call signs included in this List. The number of printed and sold copies of this List is decreasing with each new edition. The last but one edition of this List (1997) 271 copies were sold out of 1 533 that were printed. In view of the above, and bearing in mind the fact that the information contained in List VIIB could be retrieved from the new publication, the International Frequency Information Circular (IFIC), **the Conference may wish to amend Section I of Article S20 of the Radio Regulations, by deleting provision No. S20.11.**

8.3 Text publications

Good results were achieved in reducing the delays and costs associated with publication of ITU-R texts and in expanding the range of products available electronically (online and CD-ROM).

Table 8-3 summarizes the Bureau's activities on publications of ITU-R texts in the period between WRC-97 and WRC-2000.

TABLE 8-3

ITU-R texts published between WRC-97 and WRC-2000

Publication	Pages/ lang.	Paper	Date published	Online	CD	Comments
Final Acts of WRC-97	650	√	Jun 98	√	√	
Handbooks						
- Computer-aided techniques for spectrum management	225	√	May 99			
- HF broadcasting system design	175	√	Jun 99			
- Technical specifications of ITU-R teletext systems	500	√	Apr 99			
List of Recommendations in force	180	√	98-00	√		3 editions
Maritime Manual	540	√	Jun 99	√	√	
Radio Regulations 1998	1 844	√	98	√	√	
Recommendations						
Draft, pre-published, in-force and superseded			97-00	√		
All Recommendations in force			98-00		√	4 editions
BO Volume 1997	350	√	May 98			
- Supplement 1	16	√	Feb 99			
BR Volume 1997	132	√	98			
- Supplement 1	108	√	Jun 98			
- Supplement 2	62	√	Apr 99			
BS Volume 1997	496	√	Aug 98			
- Supplement 1	166	√	Sep 98			
- Supplement 2	273	√	Aug 99			
- BS.705-1 and BS.1195	212	√	Aug 98			
BT Volume 1997	708	√	Jul 98			
- Supplement 1	468	√	Sep 98			
- Supplement 2	268	√	May 99			
F Part 1 Volume 1997	484	√	Jan 98			
- Supplement 1	124	√	Aug 99			
F Part 2 Volume 1997	232	√	Jan 98			
- Supplement 1	36	√	Aug 99			
F Part 3 Volume 1997	228	√	Jan 98			
- Supplement 1	40	√	Jul 99			
IS Volume 1997	172	√	Mar 98			
M Part 1 Volume 1997	300	√	Apr 98			
- Supplement 1	20	√	Jul 98			
- Supplement 2	14	√	Feb 99			
M Part 2 Volume 1997	376	√	Apr 98			
- Supplement 1	62	√	Feb 99			
M Part 3 Volume 1997	476	√	Apr 98			
- Supplement 1	24	√	Dec 98			
M Part 4 Volume 1997	168	√	May 98			
- Supplement 1	84	√	Dec 98			
M Part 5 Volume 1997	280	√	Aug 98			
- Supplement 1	30	√	Jul 98			
- Supplement 2	16	√	Feb 99			
M Part 6 Volume 1997	32	√	Jul 98			
- Supplement 1	16	√	Dec 98			
P Part 1 Volume 1997	380	√	Mar 98			
- Supplement 1	188	√	Feb 00			
P Part 2 Volume 1997	460	√	Mar 98			
- Supplement 1	317	√	Feb 00			
RA Volume 1997	60	√	Feb 98			
S Volume 1997	800	√	Feb 98			

SA Volume 1997	430	√	Apr 98			
- Supplement 1	70	√	Sep 98			
- Supplement 2	120	√	Mar 00			
SF Volume 1997	192	√	Jan 98			
SM Volume 1997	412	√	Aug 98			
- Supplement 1	44	√	Jul 98			
- Supplement 2	44	√	Mar 99			
SNG Volume 1997	40	√	Feb 98			
TF Volume 1997	140	√	Mar 98			
- Supplement 1	18	√	Sep 98			
V Volume 1997	136	√	Sep 98			
Reports						
New and revised Reports			99-00	√		
BO.1227-2, 2007-1, 2008-1	110	√	Dec 99			
BO.2016	14	√	Mar 99			
BO.2019	35	√	Dec 99			
BT.2017, 2018	35	√	Dec 99			
BT.2020	6		Dec 99			Web only
M.2010-1	30	√	Aug 99			
M.2013, 2014	84	√	Feb 99			
M.2023, 2024	95		Apr 00			Web only
P.2011-1	10		Feb 00			Web only
SM.2012	78	√	Aug 97			
SM.2015	15	√	Mar 99			
Resolutions & Opinions	130	√	Jun 98			
Rules of Procedure & Updates	240	√	Apr 99			3 updates
Total pages published/lang.	15 320					

9 Assistance to Member States

9.1 Assistance to administrations of developing countries

In the period between WRC-97 and WRC-2000, the Bureau provided various kind of assistance to the administrations of developing countries in the following areas:

- in supporting the activities of the national spectrum management units; having in mind the changes in the regulatory structures in many countries; to this end, several missions were undertaken either on request of the administrations of the Member States, or under special missions through BDT. Furthermore, experts from administrations of the less developed countries were granted appropriate fellowships to attend the BR Radiocommunication Seminars. Several experts were also received for individual in-service training on radio regulatory procedures. In 1998, some fifty administrations were provided with appropriate hardware and software to ensure the testing and use of the new BR publication on CD-ROM, the BR International Frequency Information Circular;
- in organizing initial meetings of the regional coordination groups, as requested by Article S12;
- in providing assistance in frequency selection.

9.2 Treatment of cases of harmful interference

The Bureau has treated all reports of harmful interference as matters of urgency, particularly where safety services were involved. All these cases were handled in accordance with the relevant provisions of the Radio Regulations. In several cases, the Bureau was asked to provide assistance in determining the source of interference; such assistance was provided in collaboration with the monitoring stations of the Member States. Table 9-2 summarizes the Bureau’s activities in this respect. The Bureau has not been asked to raise any of these cases to the Radio Regulations Board.

TABLE 9-2

Treatment of cases of harmful interference

	1997	1998	1999
No. of cases received	100	58	45
No. of cases closed	82	98	81

10 Cooperation

10.1 Cooperation with ITU-D

Effective liaison has been maintained with the ITU-D Sector through inter-Bureau contacts and via the Advisory Groups.

The Radiocommunication Bureau has followed the work of ITU-D Study Groups 1 and 2, together with their corresponding Working Parties and Rapporteur Groups. Liaison has concerned topics of common interest to the two Sectors, with the Radiocommunication Bureau drawing attention to those ITU-R Questions and Recommendations of special relevance to developing countries. The Bureau, together with the relevant ITU-R Study Groups, has kept the Development Sector informed of progress in key projects such as IMT-2000, highlighting aspects having significant impact on developing countries. In particular, the Radiocommunication Bureau has assisted the Development Bureau in the organization of IMT-2000 Seminars to help preparations for RA-2000 and WRC-2000.

In relation to the Handbook programme of ITU-D, the Radiocommunication Bureau has kept ITU-D Study Group 2 informed of handbooks produced by, or currently under preparation in, the ITU-R Study Groups.

Collaboration has also been maintained in the area of radiowave propagation where ITU-R Study Group 3 and the Radiocommunication Bureau maintain a keen interest on measurements and propagation modelling in low latitude and tropical regions.

The Radiocommunication Bureau, in conjunction with the Telecommunication Development Bureau, maintains its connections with the International Centre for Theoretical Physics (ICTP) at Trieste which has, as its principal objective, the advancement of science and engineering in developing countries. Projects frequently relate to spectrum management and propagation.

The Radiocommunication Bureau has also supported the distance project organized in the framework of the Virtual Training Centre by the Telecommunication Development Bureau. Counsellors have been made available for distance tutoring as well as for “face-to-face” sessions, contributing to the success of the initiative. On IMT-2000, presentations by ITU Task Force members were given to participants at the September 1999 meeting of ITU-D Study Group 2. This support will continue in the next study period.

In response to Resolution 9 (WTDC-98) which requires the Directors of ITU-D and ITU-R to develop a report on current and foreseen national uses of the radio-frequency spectrum, ITU-R Study Group 1 and ITU-D Study Group 2 have jointly developed a programme of work that leads towards the production of the required report.

As envisaged in the proposed work programme for the Joint Group on Resolution 9, the scope of the proposed work includes 1) collecting selected information from all Member States and all Sector Members of the Radiocommunication and Telecommunication Development Sectors, through the use of a two-part questionnaire distributed jointly by the Radiocommunication and Telecommunication Development Bureaux; 2) using the spectrum management expertise in the Joint Group on Resolution 9 to analyse the collected information; and 3) producing a report that will be reviewed by ITU-R Study Group 1 and ITU-D Study Groups 1 and 2.

See also paragraph 10.5 in this report.

10.2 Cooperation with ITU-T

ITU-R and ITU-T coordination was carried out through ICGs, rapporteurs and liaison statements. Coordination was also carried out between Directors of the Bureaux directly.

Liaison statements have been frequently exchanged throughout the study period, particularly on performance and availability issues (ITU-T Study Group 13), maintenance (ITU-T Study Group 4), synchronous digital hierarchy (SDH)-based network (ITU-T Study Group 15) and radio local area networks (RLAN) (ITU-T Study Group 7). Rapporteurs have actively and timely conveyed relevant information for both Sectors.

A meeting of ICG/SAT (Sophia Antipolis, France, from 10 to 12 August 1999) reviewed and updated the work programme on satellite related aspects of the ITU-T and ITU-R Study Groups and prepared reports on a number of topics including IP/Satellite related matters, service and network convergence and working methods. The RAG meeting reviewed its report and concluded that the ICG/SAT was serving a useful purpose and should be continued. Coordination will be extended to include ITU-D, which has nominated a representative to follow the work of ICG.

Both Sectors have recognized the overlapping issue between the studies of the proposed new ITU-R Study Group on Broadcasting and ITU-T Study Groups 9, 12 and 16. After considerable discussion, RAG agreed that every effort should be made to resolve the problems identified before RA-2000. In reviewing the proposed scope of the broadcasting Study Group, the principles in Annex 1 of Resolution ITU-R 6 would be taken into account. Informal discussions resulted in a possible amendment to the proposed scope of the new Study Group. It was stressed that any change to the proposed scope would have to be linked with appropriate mechanisms, to be adopted by RA-2000, to deal with the overlap of activities between ITU-R and ITU-T on broadcasting-related issues.

RAG also recognized that intersector coordination on IMT-2000 warranted special attention. It was agreed that increased informal coordination between the Chairpersons of the relevant ITU-R and ITU-T Study Groups would be beneficial.

Remaining issues in Resolution ITU-R 6 were also considered to need some revision. A draft baseline revision of Resolution ITU-R 6 can be found in Document RA2000/PLEN/6.

10.4 Cooperation with international and regional organizations

As in the past, the Bureau maintained close cooperation with many international and regional organizations with the following objectives: 1) to promote dialogue amongst bodies having common interests; 2) to help coordination, leading to more effective preparation for events such as WRCs; and 3) to keep ITU-R abreast of relevant activities in other organizations to help planning of work programmes. In these activities, an emphasis was given to the elimination of parallel studies with other organizations; this limits the risk of duplicating studies between ITU-R and other international organizations.

BR ensured liaison and cooperation with the UN Committee on the Peaceful Uses of Outer Space (UN-COPUOS), the International Maritime Organization (IMO), the International Maritime Satellite Organizations (IMSO), Cospas-Sarsat, CICR and ICAO with regard to the application of ITU treaty texts. BR experts also participated in various meetings of these organizations.

The BR also ensured liaison and cooperation with many regional organizations, and particularly with CEPT, CITEL, APT, WMO, ATU, etc., with an emphasis on the activities related to effective preparation for WRC-2000. Appropriate liaison and cooperation was also maintained with EBU, ABU, ASBU, WBU, IEC, ISO, ETSI, RCC, etc. The BR staff also followed URSI activities, RAST and COST Projects of relevance to ITU-R studies.

10.5 Resolution 72 (WRC-97)

WRC-97, by its Resolution 72 (see Annex D), instructed the Director of the Radiocommunication Bureau to consult the regional telecommunication organizations on the means by which assistance could be given to their preparations for future WRCs in a number of areas (organization of regional preparatory meetings, information sessions, development of coordination methods, identification of major issues, facilitation of regional and interregional meetings, convergence of interregional views on major issues) and to submit a report on the consultations to the Plenipotentiary Conference for consideration. WRC-97 also invited the Plenipotentiary Conference to consider the report submitted by the Directors of BR and BDT and take appropriate measures to provide the necessary resources for BR and BDT to provide the necessary assistance to regional telecommunication organizations in the preparations for WRCs.

The Director of the Radiocommunication Bureau wrote to the regional telecommunication organizations and received a number of comments, including several suggestions on how better to support preparatory meetings. Those suggestions included:

- the participation of an ITU official in regional coordination meetings to clarify any contentious or complex issues;
- the dissemination of relevant information through regional offices;
- the provision of regular briefing reports to generate discussion and identify the needs of the region;
- the granting of fellowships for participation in CPMs;
- the holding of informative seminars, particularly for the dissemination of information after a CPM;
- the provision of meeting facilities and technical support for informal groups seeking to consolidate positions.

The Plenipotentiary Conference adopted Resolution 80 on “World Radiocommunication Conference Process”. The PP resolved:

1 that world radiocommunication conference preparations and administration, including budgetary appropriations, should be planned on the basis of two consecutive world radiocommunication conferences; items which are recommended for inclusion in the agenda of the second world radiocommunication conference and for which study work is already under way shall be given priority when finalizing the agenda for that conference;

2 to support the regional harmonization of common proposals, as stated in Resolution 72 (WRC-97), for submission to world radiocommunication conferences;

3 to encourage both formal and informal collaboration in the interval between conferences with a view to resolving differences on new, or conference agenda issues.

It instructed the Director of the Radiocommunication Bureau to study, with advice from the Radiocommunication Advisory Group, ways of improving the preparations for, and the structure and organization of, world radiocommunication conferences, for consideration by the conference.

It also instructed the Secretary-General to encourage the participation of all Member States and Sector Members in addressing this issue.

As recommended in Document WRC2000/15, the Radiocommunication Bureau is of the view that Resolution 72 could now be suppressed.

11 Statistics

11.1 Financial report

DIRECT COSTS (CHF)	1998-1999 budget	1998-1999 expenditures	Balance as at 31-12-1999
Seminars	517 000	485 935	31 065
Radio Regulations Board	717 000	742 652	–25 652
Radiocommunication Advisory Board	226 000	122 830	103 170
ITU-R Study Groups	3 027 000	3 266 928	–239 928
Radiocommunication Bureau	54 321 000	52 374 601	1 946 399
Publications	4 127 000	3 301 844	825 156
Total	62 935 000	60 294 790	2 640 210

PRODUCTION OF DOCUMENTATION COSTS (CHF)	1998-1999 budget	1998-1999 expenditures	Balance as at 31-12-1999
Seminars	80 000	156 222	–76 222
Radio Regulations Board	60 000	254 414	–194 414
Radiocommunication Advisory Board	109 000	97 410	11 590
ITU-R Study Groups	4 195 000	5 391 923	–1 196 923
Radiocommunication Bureau	1 033 000	937 631	95 369
Publications	10 045 000	5 766 745	4 278 255
Total	15 522 000	12 604 345	2 917 655

11.2 Human resources

Distribution of posts by grade

(Established and non-established posts included)

	Elected	D1/D2	Ps	Gs	Total
BRDIR	1			1	2
IAP		1	27	14	42
SSD		1	28	34	63
TSD		1	24	40	65
SGD		2	6	10	18
Total	**1**	**5**	**85**	**99**	**190**
			44%	**52**%	

Distribution by nature of contract

	Permanent	of which (..) MRT	Fixed term	Total
BRDIR	1		1	2
IAP	26	*(1)*	16	42
SSD	30	*(4)*	33	63
TSD	45	*(3)*	20	65
SGD	11	*(1)*	7	18
Total	**113**	*(9)*	**77**	**190**
	59%	**4%**	**40%**	

Also, 39 different short-term staff have been employed in the BR during the same period.

BR Department acronyms:

- BRDIR: Office of the Director
- IAP: Informatics, Administration and Publications Department
- SSD: Space Services Department
- TSD: Terrestrial Services Department
- SGD: Study Groups Department

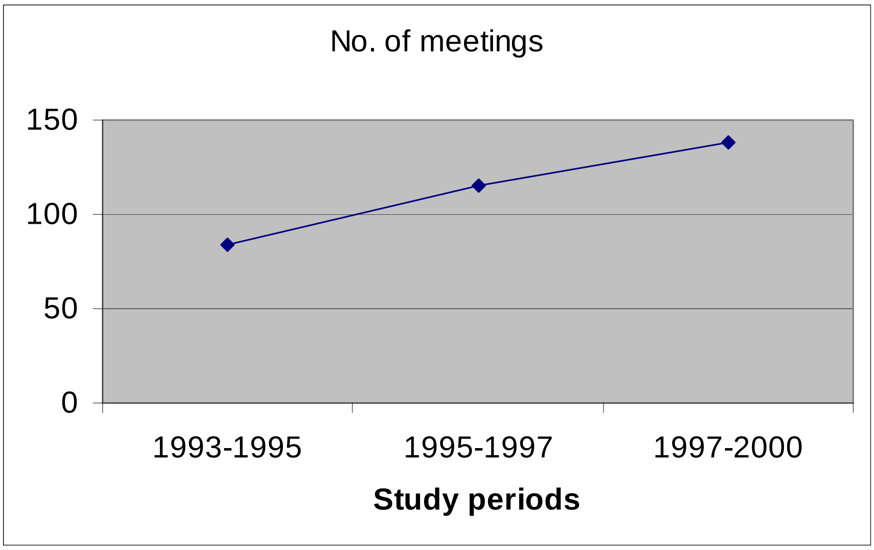
11.3 ITU-R meetings

The following statistics cover the present period between the 1997 and 2000 World Radiocommunication Conferences.

NOTE - Other meetings include JRGs, Experts groups, rapporteur groups, special rapporteur groups, etc.

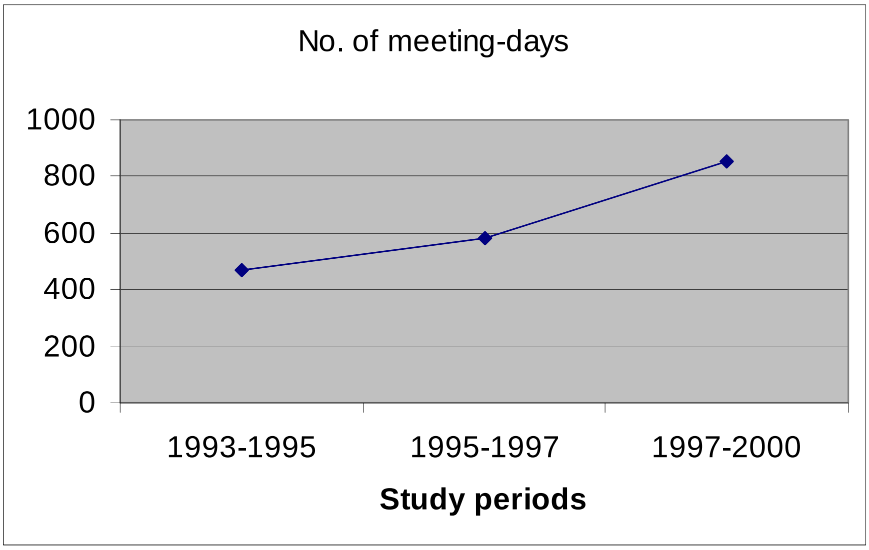
Number of meetings

STUDY GROUP	1	3	4	7	8	9	10	11	10 & 11	TOTAL	Others
Study Groups	2	1	2	2	2	1	2	3	1	**16**	
Working Parties	6	8	13	14	9	12	11	8	5	**86**	
Task Groups	10		4		6		4	7	5	**36**	
TOTAL	**18**	**9**	**19**	**16**	**17**	**13**	**17**	**18**	**11**	**138**	30



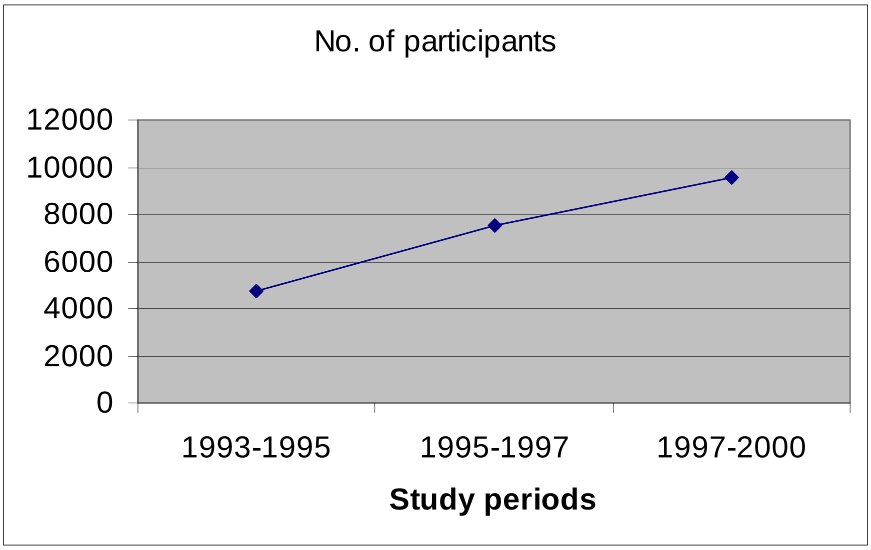
Number of meeting days

STUDY GROUP	1	3	4	7	8	9	10	11	10 & 11	TOTAL	Others
Study Groups	3	2	4	5	5	3	8	10	3	**43**	
Working Parties	42	62	92	85	81	91	57	40	33	**583**	
Task Groups	74		31		65		14	25	16	**225**	
TOTAL	**119**	**64**	**127**	**90**	**151**	**94**	**79**	**75**	**52**	**851**	**99**



Number of participants (all types of participants included)

STUDY GROUP	1	3	4	7	8	9	10	11	10 & 11	TOTAL
Study Groups	164	58	153	76	182	76	164	234	66	**1 173**
Working Parties	415	383	1 205	723	748	860	549	457	306	**5 646**
Task Groups	488		741		1 098		92	197	131	**2 747**
TOTAL	**1 067**	**441**	**2 099**	**799**	**2 028**	**936**	**805**	**888**	**503**	**9 566**



Other meetings of which costs are covered by the ITU-R Study Group budget

	CPM	CVC	SC
No. of meetings	2	3	1
Meeting days	16	8	5
Attendance	1028	105	108

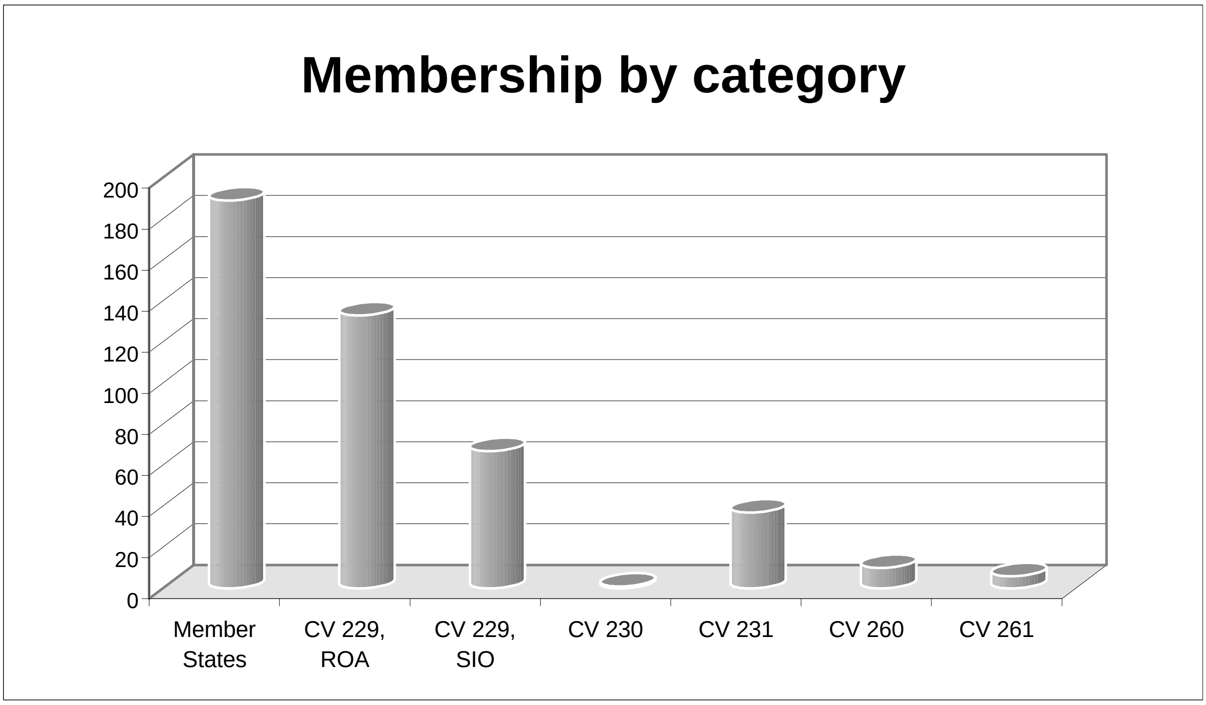
Other meetings of the Radiocommunication Sector

	IRG	GTE	RAG	RRB
No. of meetings	5	4	3	10
No. of meeting days	15	17	14	56
Attendance	380	290	264	78

11.4 Membership

Situation as at 29 February 2000

Member States of the ITU	189	43%
Recognized Operating Agencies ROA (CV 229)	133	30%
Scientific and industrial organizations SIO (CV 229)	67	15%
Other entities dealing with telecommunications matters (CV 230)	1	0.2%
Regional and other international organizations (CV 231)	37	8%
Regional Telecommunication Organizations (CV 260)	10	2%
Intergovernmental Organizations Operating Satellite Systems (CV 261)	6	1%
Subtotal Sector Members	***254***	***57%***
TOTAL, ALL MEMBERS	**443**	


Membership by category
200
180
160
140
120
100
80
60
40
20
0
Member States
CV 229, ROA
CV 229, SIO
CV 230
CV 231
CV 260
CV 261

ANNEX 1

Council Resolution 1121

Table 13.3 below, gives the recapitulation of the cost of additional activities assigned by the 1997 World Radiocommunication Conference to the Radiocommunication Bureau and taking into consideration the additional resources given to the Radiocommunication Sector according to Council Resolution 1121.

		Staff costs		Balance
		Planned	**Actual**	
1	Reduction of the processing delays for coordination requests Art. S9 (S9.30)	1 374 239	790 000	584 239
2	Art. S9 (S9.30): Follow-up of Resolution 46/C publications	0	100 000	–100 000
3	Elimination backlog Art. 13, and S11.28 and S11.29 AP30B resulting work	2 345 878	1 320 000	1 025 878
4	- Resolution PLEN-3/Res. 532 (WRC-97) Review AP30/30A	0	970 000	–970 000
	- IRG and GTE meeting costs	875 000	172 367	702 633
5	Resolution PLEN-4/Res. 533 (WRC-97); Implementation of decisions relating to AP S30/S30A	142 395	90 000	52 395
6	Resolution COM4-15/Res. 64 (WRC-97); incompatibility between BSS (Region 1) and FSS (Region 3)	47 465		47 465
7	Resolution GTPLEN 2-1/Res. 49 (WRC-97) Administrative due diligence	47 465		47 465
8	Resolution COM4-18/Res. 51 (WRC-97); Transitional arrangements on the new API publication	0		0
9	Resolution COM5-18/Res. 132 (WRC-97); Use of non-GSO in the FSS in certain frequency bands	0		0
10	Resolution COM5-19/Res. 538 (WRC-97); Use of the frequency bands AP30/30A by non-GSO in the FSS	0		0
11	Resolution COM5-27/Res. 134 (WRC-97); Use of bands 18.8-19.3/28.6 -29.1 GHz by networks operating in the FSS	0		0
12	Resolution PLEN-1/Res. 644 (WRC-97); Telecommunication for disaster mitigation and relief operations	0		0
13	Resolution COM4-1/Res. 340 (WRC-97) Additional search and rescue information	0		0
14	Resolution COM4-6/Res. 532 (WRC-97) Application of Art. S12	0		0
15	Resolution COM4-14/Res. 533 (WRC-97) HFBC transmitter and receiver statistics	0		0
16	Resolution COM4-16/Res. 29 (WRC-97) WARC-92 extension bands	0		0
17	Resolution COM4-17/Res. 30 (WRC-97) Publication of Weekly Circular	0		0
	Infrastructure (rental of additional office space and additional equipment	180 000	291 678	–111 678
	TOTAL	**5 012 442**	**3 734 045**	**1 278 397**

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 42-E
23 March 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Senegal (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

CHAPTER 1

IMT-2000, maritime and aeronautical issues

Agenda items 1.6 and 1.6.1

1.6 issues related to IMT-2000

1.6.1 review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

Senegal proposes:

SEN/42/1

that each country should conduct a review in order to determine its short-term and long-term spectrum requirements for IMT-2000;

SEN/42/2

that no new spectrum allocation should be made for IMT-2000 during the period 2000-2010;

SEN/42/3

that IMT-2000 spectrum requirements should be met within the existing mobile service allocations;

SEN/42/4

candidate bands for preliminary extension may be identified by WRC-2000, and ITU-R should conduct the necessary feasibility studies for those bands, for approval at the next WRC;

SEN/42/5

that the introduction of IMT-2000 applications should not jeopardize any existing or essential space services;

SEN/42/6

that any constraints imposed on the satellite component of IMT-2000 should not be less stringent than existing regulatory constraints on the MSS.

Agenda item 1.7

1.7 review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting operational, distress and safety communications, taking into account Resolution **346 (WRC-97)**

Senegal proposes:

SEN/42/7

that precautions should be taken by radiotelephone distress communications operators in order to avoid interference;

SEN/42/8

that these frequencies should be reserved solely for distress and safety communications;

SEN/42/9

that each administration should take appropriate measures to prohibit use of these frequencies for ordinary calls;

SEN/42/10

that no amendments should be made to Appendix S27 in the near future;

SEN/42/11

that the HF frequency spectrum allocated to the aeronautical mobile (R) service should be safeguarded and protected.

Agenda item 1.18

1.18 to consider the use of new digital technology for the maritime mobile service in the band 156-174 MHz and consequential revision of Appendix **18/S18**, taking into account Resolution **342 (WRC-97)**

Senegal proposes:

SEN/42/12

that ITU should continue studies with a view to adopting new digital technology to improve efficiency in this band;

SEN/42/13

that until such technology becomes operational, measures should be taken in respect of the Radio Regulations to allow certain channels of Appendix S18/18 to be used in simplex mode in addition to duplex mode, in order to reduce congestion.

CHAPTER 2

Mobile-satellite and radionavigation-satellite services

Agenda item 1.9

1.9 to take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service (MSS) in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions **213 (Rev.WRC-95)** and **220 (WRC-97)**

Senegal proposes:

SEN/42/14

that sharing of the band 1 559-1 610 MHz between MSS and ARNS/RNSS should not be accepted;

SEN/42/15

that no allocation to the MSS should be made in the band 1 559-1 567 MHz;

SEN/42/16

Resolution 220 (WRC-97) should be deleted.

Agenda items 1.15.1, 1.15.2 and 1.15.3

1.15.1 to consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments

Senegal proposes:

SEN/42/17

that in view of the fact that the band 960-1 215 MHz is allocated on a worldwide basis to the aeronautical radionavigation service (ARNS), further studies should be conducted before any additional allocation is made to the RNSS;

SEN/42/18

that adequate spectrum should be made available to GNSS systems.

1.15.2 to consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the bands 1 215-1 260 MHz and 1 559-1 610 MHz

Senegal proposes:

SEN/42/19

that the addition of the space-to-space direction for the RNSS in the bands 1 215-1 260 MHz and 1 559-1 610 MHz, given that analysis of the results of the studies shows that no additional interference will be caused to other services.

1.15.3 to consider the status of allocations to services other than the radionavigation-satellite service (Nos. **S5.355** and **S5.359**) in the band 1 559-1 610 MHz

Senegal proposes:

SEN/42/20

that the discontinuation, by 2015 at the latest, of the operation of fixed services in the frequency bands in Nos. S5.355 and S5.359 of the Radio Regulations.

CHAPTER 3

Non-GSO FSS issues

Agenda items 1.13, 1.13.1 and 1.13.2

1.13 on the basis of the results of the studies in accordance with Resolutions **130 (WRC-97)**, **131 (WRC-97)** and **538 (WRC-97)**

1.13.1 to review and, if appropriate, revise the power limits appearing in Articles **S21** and **S22** in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

1.13.2 to consider the inclusion in other frequency bands of similar limits in Articles **S21** and **S22**, or other regulatory approaches to be applied in relation to sharing situations

Senegal proposes:

SEN/42/21

that the necessary regulatory procedures should be developed to ensure protection of GSO BSS, GSO FSS and FS from interference which could be caused by non-GSO FSS systems operating in those bands;

SEN/42/22

that ITU-R should continue relevant studies in this regard.

CHAPTER 5

Appendices S30 and S30A

Agenda items 1.19, 1.19*bis* and 1.20

1.19 to consider the report of the inter-conference representative group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system

1.19*bis* in accordance with Article S14, to consider objections expressed by administrations with respect to the Radio Regulations Board's Rules of Procedure relating to the application of No. 2674/S23.13 in order for the Bureau to modify its findings in accordance with the conclusions of the Conference

1.20 to consider the issues related to the application of Nos. **S9.8**, **S9.9** and **S9.17** and the corresponding parts of Appendix **S5** with respect to Appendices **S30** and **S30A**, with a view to possible deletion of Articles 6 and 7 of Appendices **S30** and **S30A**, also taking into consideration Recommendation **35 (WRC-95)**

Senegal proposes:

SEN/42/23

the adoption of the draft BSS Plan at WRC-2000 on the basis of national coverage by 10 channels in a continuous band of 400 MHz for Region 1, as already successfully simulated by GTE;

SEN/42/24

that modifications to the Plans which are necessitated by existing systems or coordinated systems for which information has been submitted to ITU under Resolution 49 (WRC-97), or by regional systems which must enjoy priority owing to their importance for the development of the regions which they cover, should be entered in a list in annex to the Master International Frequency Register (MIFR), with a time-limit on the entry;

SEN/42/25

that the provisions of Articles 6 and 7 should be maintained as they stand in Appendices S30 and S30A;

SEN/42/26

the adoption of a new Plan, together with a review of current procedures, necessarily entailing the revision of certain articles of Appendices S30 and S30A.

CHAPTER 6

Fixed and fixed-satellite services

Agenda item 1.8

1.8 to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands

Senegal proposes:

SEN/42/27

that no provision should be adopted authorizing the use of FSS earth stations on board vessels until all technical and regulatory aspects have been resolved, including the identification of the authorities responsible for such stations, and all costs pertaining to the coordination processes should be borne by the responsible administrations concerned.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Kazakstan (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

In 1999, in the Republic of Kazakstan, in the Table of Frequency Allocations, band allocation between the radio services of the Republic of Kazakstan was created within the framework of the TACIS Programme. The conditions of any frequency band use are specified in the notes to this table. Taking into account this circumstance, the Ministry, as a Member State of ITU, proposes the following:

Agenda item 1.1 - requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution 26 (Rev.WRC-97)

Kazakstan proposes to:

MOD KAZ/43/1

S5.55 *Additional allocation:* in Armenia, Azerbaijan, Bulgaria, Russian Federation, Georgia, ~~Kazakstan,~~ Kyrgyzstan, Tajikistan, Turkmenistan and Ukraine, the band 14-17 kHz is also allocated to the radionavigation service on a primary basis.

MOD KAZ/43/2

S5.75 *Different category of service:* in Armenia, Azerbaijan, Belarus, Georgia, ~~Kazakstan,~~ Moldova, Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan, Ukraine and the Black Sea areas of Bulgaria and Romania, the allocation of the band 315-325 kHz to the maritime radionavigation service is on a primary basis under the condition that in the Baltic Sea area, the assignment of frequencies in this band to new stations in the maritime or aeronautical radionavigation services shall be subject to prior consultation between the administrations concerned.

MOD KAZ/43/3

S5.202 *Additional allocation:* in Saudi Arabia, Armenia, Azerbaijan, Belarus, Bulgaria, United Arab Emirates, Georgia, the Islamic Republic of Iran, Jordan, ~~Kazakstan,~~ Latvia, Moldova, Oman, Uzbekistan, Poland, Syria, Kyrgyzstan, Slovakia, the Czech Republic, Romania, Russian Federation, Tajikistan, Turkmenistan, Turkey and Ukraine, the band 136-137 MHz is also allocated to the aeronautical mobile (OR) service on a primary basis. In assigning frequencies to stations of the aeronautical mobile (OR) service, the administration shall take account of the frequencies assigned to stations in the aeronautical mobile (R) service.

MOD KAZ/43/4

S5.290 *Different category of service:* in Afghanistan, Armenia, Azerbaijan, Belarus, China, Japan, ~~Kazakstan,~~ Mongolia, Uzbekistan, Kyrgyzstan, Slovakia, the Czech Republic, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the allocation of the band 460-470 MHz to the meteorological-satellite service (space-to-Earth) is on a primary basis (see No. **S5.33**), subject to agreement obtained under No. **S9.21**.

MOD KAZ/43/5

S5.422 *Additional allocation:* in Saudi Arabia, Armenia, Azerbaijan, Bahrain, Belarus, Bosnia and Herzegovina, Brunei Darussalam, the Central African Republic, the Congo, Côte d'Ivoire, Cuba, Egypt, the United Arab Emirates, Eritrea, Ethiopia, Gabon, Georgia, Guinea, Guinea-Bissau, the Islamic Republic of Iran, Iraq, Israel, Jordan, ~~Kazakstan,~~ Lebanon, Malaysia, Mali, Morocco, Mauritania, Moldova, Mongolia, Nigeria, Oman, Uzbekistan, Pakistan, the Philippines, Qatar, Syria, Kyrgyzstan, Dem Rep. of the Congo, Romania, Russian Federation, Somalia, Tajikistan, Tunisia, Turkmenistan, Ukraine, Yemen, Yugoslavia and Zambia, the band 2 690-2 700 MHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis. Such use is limited to equipment in operation by 1 January 1985.

MOD KAZ/43/6

S5.428 *Additional allocation:* in Azerbaijan, Bulgaria, Cuba, ~~Kazakstan,~~ Mongolia, Poland, Kyrgyzstan, Romania, Turkmenistan and Ukraine, the band 3 100-3 300 MHz is also allocated to the radionavigation service on a primary basis.

MOD KAZ/43/7

S5.454 *Different category of service:* in Armenia, Azerbaijan, Belarus, Bulgaria, Georgia, ~~Kazakstan,~~ Mongolia, Uzbekistan, Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the allocation of the band 5 670-5 725 MHz to the space research service is on a primary basis (see No. **S5.33**).

MOD KAZ/43/8

S5.469 *Additional allocation:* in Armenia, Azerbaijan, Belarus, Bulgaria, Georgia, Hungary, ~~Kazakstan,~~ Lithuania, Moldova, Mongolia, Uzbekistan, Poland, Kyrgyzstan, Slovakia, the Czech Republic, Romania, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the band 8 500-8 750 MHz is also allocated to the land mobile and radionavigation services on a primary basis.

MOD KAZ/43/9

S5.473 *Additional allocation:* in Armenia, Austria, Azerbaijan, Belarus, Bulgaria, Cuba, Georgia, Hungary,~~ Kazakstan,~~ Moldova, Mongolia, Uzbekistan, Poland, Kyrgyzstan. Slovakia, the Czech Republic, Romania, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the bands 8 850-9 000 MHz and 9 200-9 300 MHz are also allocated to the radionavigation service on a primary basis.

MOD KAZ/43/10

S5.478 *Additional allocation:* in Azerbaijan, Bulgaria,~~ Kazakstan,~~ Mongolia, Kyrgyzstan, Slovakia, the Czech Republic, Romania, Turkmenistan and Ukraine, the band 9 800-10 000 MHz is also allocated to the radionavigation service on a primary basis.

MOD KAZ/43/11

S5.545 *Different category of service:* in Armenia, Azerbaijan, Belarus, Bulgaria, Georgia, ~~Kazakstan,~~ Mongolia, Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the allocation of the band 31-31.3 GHz to the space research service is on a primary basis (see No. **S5.33**).

MOD KAZ/43/12

S5.546 *Different category of service:* in Saudi Arabia, Armenia, Azerbaijan, Belarus, Bulgaria, Egypt, United Arab Emirates, Spain, Estonia, Finland, Georgia, Hungary, the Islamic Republic of Iran, Israel, Jordan,~~ Kazakstan,~~ Latvia, Lebanon, Moldova, Mongolia, Uzbekistan, Poland, Syria, Kyrgyzstan, Romania, the United Kingdom, Russian Federation, Tajikistan, Turkmenistan, Turkey and Ukraine, the allocation of the band 31.5-31.8 GHz to the fixed and mobile, except aeronautical mobile, services is on a primary basis (see No. **S5.33**).

MOD KAZ/43/13

S5.550 *Different category of service:* in Armenia, Azerbaijan, Belarus, Bulgaria, Georgia, ~~Kazakstan,~~ Mongolia, Uzbekistan, Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the allocation of the band 34.7-35.2 GHz to the space research service is on a primary basis (see No. **S5.33**).

Agenda item 1.15.1 - to consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments

Kazakstan proposes to:

KAZ/43/14

on direction "space-to-Earth" **to consent** with the frequency band allocation for radionavigation satellites in the frequency range 1 164-1 184 MHz, **on condition that** the radionavigation-satellite earth stations will not be the reason of interference or to limit the development of the aeronautical radionagivation service;

on direction "Earth-to-space" **to consent** with the frequency band allocation for radionavigation satellite in the frequency range 1 300-1 350 MHz. The frequency band 5 000-5 030 MHz is used intensively by radio means and cannot be considered as a version for new allocations for radionavigation satellites.

Agenda item 1.20 - to consider the issues related to the application of Nos. S9.8, S9.9 and S9.17 and the corresponding parts of Appendix S5 with respect to Appendices S30 and S30A, with a view to possible deletion of Articles 6 and 7 of Appendices S30 and S30A, also taking into consideration Recommendation 35 (WRC-95)

Kazakstan proposes to:

KAZ/43/15

support the proposed transformation.

Agenda item 1.21 - to consider the report from the Radiocommunication Bureau on results of the analysis in accordance with Resolution 53 (WRC-97) and take appropriate actions

Kazakstan proposes to:

KAZ/43/16

support the work of the Radiocommunication Bureau; on the other issues of the agenda of the Assembly we support the positions of the Regional Commonwealth in the field of Communications (RCC).

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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28 March 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Namibia (Republic of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

1 Requests for deletion of footnotes (WRC-2000 agenda item 1.1)

Namibia be deleted from footnote S5.160.

MOD NMB/44/1

S5.160 *Additional allocation:* in Botswana, Burundi, Lesotho, Malawi, ~~Namibia,~~ Dem. Rep. of the Congo, Rwanda and Swaziland, the band 41-44 MHz is also allocated to the aeronautical radionavigation service on a primary basis.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Armenia (Republic of), Azerbaijani Republic, Belarus (Republic of), Georgia, Kazakstan (Republic of), Moldova (Republic of), Uzbekistan (Republic of), Kyrgyz Republic, Russian Federation, Tajikistan (Republic of), Turkmenistan, Ukraine

PROPOSALS FOR THE WORK OF THE CONFERENCE

The above countries,

having regard to the need to ensure the smooth operation, future development and enhancement of operating and planned radio services, taking into account technological progress;

considering that decisions at the Conference should be taken on the basis of the need to balance the interests of operating and planned radio services and with due regard to the different technological and economic capabilities of ITU Member States;

seeking to strengthen international cooperation in the development of radiocommunication facilities and systems;

hereby make the following proposals:

Agenda item 1.2

RCC/45/1

We support adoption of the agreed results of the ITU-R studies on additions and amendments to Appendix S3, which would make the appendix more universal and logical, while keeping the same values for all the spurious emission limits for the transmitters of different services and applications.

Agenda item 1.3

RCC/45/2

We support adoption of the improved method of calculating coordination areas around earth stations developed by ITU-R, but nevertheless consider that further studies need to be carried out within ITU-R on the application of the methodology in order to ensure that there is not an unwarranted increase in the number of administrations affected in the coordination process.

We further consider that WRC-2000 should instruct ITU-R to develop a single software program for the calculation of coordination areas around earth stations in order to unify and simplify the coordination process.

Agenda item 1.4

RCC/45/3

We support the use of the frequency bands 31.8-33.4 GHz, 37-39.5 GHz, 40.5-42.5 GHz, 51.4-52.6 GHz, 55.78-59 GHz and 64-66 GHz by high-density systems in the fixed service, subject to the introduction of appropriate limits in order to permit sharing with other services, as specified in the CPM-99 Report.

We also support worldwide allocation of the band 40.5-42.5 GHz to the fixed-satellite service (space-to-Earth) on a primary basis, subject to limitation of aggregate pfd in order to protect the radio astronomy service in the band 42.5-43.5 GHz and the inclusion in the Radio Regulations of criteria to ensure the protection of terrestrial services, in line with the conclusions in the CPM-99 Report.

We consider that a definition of “high-density fixed service system” needs to be drawn up and included in the Radio Regulations.

Agenda item 1.5

RCC/45/4

We propose that no amendments be made to the Radio Regulations in respect of the use of high altitude platform stations in the fixed service, and that the time-frame in Resolution 122 be extended, so that additional studies may be carried out with a view to taking an appropriate decision at a future WRC.

Agenda item 1.6.1

RCC/45/5

With respect to the terrestrial component, we support the studies carried out by ITU, but nevertheless believe that the adoption of a decision on the allocation of additional frequency bands should not be considered before WRC-03, on the basis of practical experience once the commercial operation of IMT-2000 systems has started in existing allocations under No. S5.388 of the Radio Regulations. Thus, the RCC countries propose that no amendments be made at this Conference to the current provisions of the Radio Regulations in relation to additional allocations and frequency bands to be used by first- and second-generation cellular systems for the terrestrial component of IMT-2000, and that studies on such bands be pursued, focusing on the feasibility of their reallocation and use by IMT-2000 systems, with a view to taking an appropriate decision at a forthcoming WRC. It is also proposed that footnote S5.388 and Resolution 212 should be maintained as they stand.

With respect to the satellite component, we also propose that no amendments be made to the provisions of the Radio Regulations in relation to the current MSS allocations and that studies be continued within ITU for their possible identification as the space component for IMT-2000 systems.

We support the use of HAPs as base stations for IMT-2000 systems through the inclusion in the Radio Regulations of an appropriate footnote, as indicated in the CPM-99 Report.

Agenda item 1.6.2

RCC/45/6

We support the conclusion in the CPM-99 Report that there is no need for a global control channel.

Agenda item 1.7

RCC/45/7

We do not see any grounds for reallocating HF bands between the aeronautical mobile (R) and maritime mobile services, but we support the inclusion in the Radio Regulations of additional procedures designed to protect frequencies used for distress and safety communications in response to Resolution 346.

Agenda item 1.8

RCC/45/8

We propose that no amendments be made to the Radio Regulations in relation to the use of FSS stations on board vessels in the frequency bands 3 700-4 200 MHz and 5 925-6 425 MHz, since ITU-R studies have not yet been completed on various technical, regulatory and procedural aspects of such an application, in particular the lack of agreed criteria to ensure the operation and development of FS systems.

Agenda item 1.9

RCC/45/9

With respect to Resolution 220, we consider that the results of ITU-R studies and the CPM-99 Report clearly indicate that no part of the band 1 559-1 610 MHz can be allocated for the mobile-satellite service. Accordingly, we propose that no amendments be made to Article S5 and that Resolution 220 be deleted.

With respect to Resolution 213, we believe that the studies to identify a possible allocation (space-to-Earth) for the mobile-satellite service have not demonstrated the feasibility of allocating any portion of the band 1 350-1 525 MHz for the purpose at this Conference, and we therefore propose that the Radio Regulations should remain unchanged in this respect.

Agenda item 1.10

RCC/45/10

We support the conclusions of the CPM-99 Report on this item with a view to providing the necessary spectrum to accommodate the global maritime distress and safety system (GMDSS) and aeronautical mobile-satellite (R) service systems.

Agenda item 1.11

RCC/45/11

On the basis of the results of studies carried out in ITU-R, we propose that the provisions of the Radio Regulations relating to the existing allocations for non-GSO MSS below 1 GHz should not be modified and that new allocations for this service should not be adopted in that band.

As regards Resolution 219, we propose that the allocation of the band 405-406 MHz should not be modified, in view of the need to protect operation and development of the meteorological aids service in that band. Resolution 219 should be deleted.

Agenda item 1.12

RCC/45/12

We support the conclusion of CPM-99 to the effect that this agenda item may be resolved by means of ITU-R recommendations and does not require any amendment of the Radio Regulations. Resolution 121 may be deleted.

Agenda item 1.13

RCC/45/13

While understanding that a decision on the allocation of frequencies for non-GSO FSS is both important and necessary, we nevertheless propose that appropriate provisions be included in the Radio Regulations to give priority to the operation and development of GSO FSS and BSS systems in the planned bands.

We support including in the Radio Regulations the criteria indicated in the CPM-99 Report to protect operating and planned systems in the fixed service.

Agenda item 1.14

RCC/45/14

We support use of the frequency band 15.43-15.63 GHz by non-GSO MSS feeder links, subject to appropriate amendment of the Radio Regulations to limit the number of systems operating in this band to those in respect of which advance publication information is received by the Bureau before the end of WRC-2000, and to limiting pfd from such systems in the band 15.35-15.4 GHz in line with the conclusion in the CPM-99 Report in order to protect radio astronomy.

Agenda item 1.15.2

RCC/45/15

We support allocation of the frequency bands 1 215-1 260 MHz and 1 559-1 610 MHz to the radionavigation-satellite service (space-to-space) by modifying the Table of Frequency Allocations and inserting a footnote ensuring that there are no constraints for the development of existing or planned RNSS systems in these bands, as per Option A in the CPM-99 Report.

Agenda item 1.15.3

RCC/45/16

We propose a two-stage approach in respect of use of the band 1 559-1 610 MHz by the fixed service: maintaining primary status for FS until 2005, secondary status for FS from 2005 to 2015, followed by deletion of the FS allocation. The corresponding amendments should be made to footnotes S5.355 and S5.359.

Agenda item 1.16

RCC/45/17

We support the idea of a single worldwide frequency allocation above 71 GHz and the proposals formulated by the CEPT countries (Document WRC-2000/13, proposals EUR/13/154-188).

Agenda item 1.17

RCC/45/18

We support the 18.6-18.8 GHz allocation for the Earth exploration-satellite service on a primary basis in Regions 1 and 3, subject to inclusion in the Radio Regulations of the criteria specified in the CPM-99 Report to enable sharing with FS and FSS.

Agenda item 1.18

RCC/45/19

We support amendments to the Radio Regulations aimed at introducing and developing digital technologies in the maritime mobile service in the band 156-174 MHz, and the continuation of studies on the subject within ITU-R.

Agenda item 1.19

RCC/45/20

The studies that have been carried out since the end of WRC-97 show that it is basically feasible to establish a BSS plan providing each country with the equivalent of at least 10 analogue TV channels.

The studies have shown that the most complex replanning problem is the problem of compatibility of the new BSS plan with other services, in particular FSS, using the planned frequency band with equal rights. In order to resolve the problem of compatibility between the plan and other services, when developing the plan one has to either take existing services into account in the planning process or give the assignments in the new plan priority status in relation to other services.

It is proposed that the following principles be adopted for establishment of the BSS plan:

1) Provide all Regions 1 and 3 countries with a capacity at least equivalent to 10 analogue TV channels, while maintaining the proportions used in establishing the 1977 and 1997 Plans. The existing number of channels must be maintained for countries having more than 10 channels in the 1997 Plan.

2) Planning should be based primarily on national coverage. At the same time, account should be taken of the wishes of neighbouring countries for the allocation of unified orbital positions for the possible establishment of multinational systems.

3) In the planning, only digital transmission methods are to be used.

4) Where possible, specific requests of countries concerning orbital positions, frequency channels and feeder-link frequency band should be accommodated.

5) Planning must maintain and protect: plan frequency assignments which have been brought into service, and for which the date of bringing into service has been confirmed; plan frequency assignments which have not yet been brought into service but for which the date of bringing into service has been determined by a notice under Article 5 of Appendices S30/S30A and for which, where appropriate, information has been submitted in accordance with Resolution 49 (WRC-97). These assignments shall not claim greater protection than in the 1997 Plan.

6) Equitable access to the BSS orbit/spectrum resource shall be ensured, to which end in the planning a common arc for Regions 1 and 3 shall be maintained as was adopted in establishing the 1977 and 1997 Plans.

7) Countries’ requests concerning the establishment of subregional systems should be accommodated where possible. In this process, allocation of the orbit/spectrum resource to subregional systems shall not constrain allocation of the necessary resource to national systems.

8) Compatibility of the plan shall be ensured with other services in all three Regions having frequency assignments recorded in the frequency register, i.e. only with those which are compatible or have been coordinated with the existing (1997) or initial (1977) Plans.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Malaysia

PROPOSAL FOR THE WORK OF THE CONFERENCE

CONTRIBUTION TO RESOLUTION 86 (MINNEAPOLIS, 1998) - COORDINATION AND NOTIFICATION PROCEDURES FOR SATELLITE NETWORKS

With reference to the above-mentioned subject, the Malaysian Administration would like to submit, for review in accordance with Resolution 86 (Minneapolis, 1998), the following proposal on modification to footnote S5.502 of the Radio Regulations.

The Malaysian Administration proposes to modify footnote S5.502 of the Radio Regulations as follows:

MOD MLA/46/1

S5.502 In the band 13.75-14 GHz, the e.i.r.p. of any emission from an earth station in the fixed-satellite service ~~shall~~ should be at least 68 dBW~~, and should not exceed 85 dBW, with a minimum antenna diameter of 4.5 m~~. In addition the e.i.r.p., averaged over one second, radiated by a station in the radiolocation or radionavigation services towards the geostationary-satellite orbit shall not exceed 59 dBW.

Reasons:

1 The recent suppression of the Rules of Procedure concerning footnote S5.502 under Circular Letter CR/122 no longer considers an e.i.r.p. exceeding 85 dBW as the basis for an unfavourable finding.

2 The proposal to delete the requirement of a minimum antenna diameter of 4.5 m was made in view of the recent suppression of the Rules of Procedure concerning footnote S5.502 under Circular Letter CR/122.

This suppression indicates that fixed-satellite services operating in the frequency band 13.75-14 GHz are no longer required to accord any protection to the radiolocation or radionavigation services. Thus, administrations should be allowed to use a smaller antenna since interference due to side-lobe performance is minimal compared to higher transmitting power.

3 On the proposal of a “soft” limit instead of a “hard” limit on the e.i.r.p. requirement of at least 68 dBW in the frequency band 13.75-14 GHz, the Malaysian Administration believes that it should be an obligation of the responsible administration to meet this requirement.

Transmission of an e.i.r.p. level lower than 68 dBW would only result in unacceptable interference into ones own system. Instead, a reduction in power level would contribute less interference into other services operating in the same band. Thus, if a system is able to operate with an e.i.r.p. level lower than 68 dBW in the band 13.75-14 GHz, then they should be allowed to do so since this does not carry any negative impact on other services.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 47-E
29 March 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Malaysia

PROPOSAL FOR THE WORK OF THE CONFERENCE

CONTRIBUTION TO RESOLUTION 86 (MINNEAPOLIS, 1998) - FOOTNOTE S5.556A OF THE RADIO REGULATIONS

With reference to the above-mentioned subject, the Malaysian Administration would like to submit for review a proposal to disregard the power flux-density limit of footnote S5.556A of the Radio Regulations during the technical examination of satellite filings submitted prior to the implementation of this footnote.

The Malaysian Administration proposes that the Bureau disregard the power flux-density limit of footnote S5.556A of the Radio Regulations during the technical examination of satellite filings in the inter-satellite service (ISS) frequency bands of 54.25-56.9 GHz, 57-58.2 GHz and 59-59.3 GHz submitted prior to the implementation of footnote S5.556A based on the ITU trend of non-retroactive impact. It is therefore proposed that footnote S5.556A be modified as follows:

MOD MLA/47/1

S5.556A Use of the bands 54.25-56.9 GHz, 57-58.2 GHz and 59-59.3 GHz by the inter-satellite service is limited to satellites in the geostationary-satellite orbit. The single-entry power flux-density at all altitudes from 0 km to 1 000 km above the Earth’s surface produced by a station in the inter-satellite service, for all conditions and for all methods of modulation, shall not exceed –147 dB(W/m^2/100 MHz) for all angles of arrival. This limitation shall not be applicable to satellite filings submitted prior to the implementation of this footnote.

Reasons:

1 WRC-97 approved the addition of footnote S5.556A of the Radio Regulations. This footnote permits only the operation of geostationary-satellite (GSO) networks in the ISS band of 54.25-56.9 GHz, 57-58.2 GHz and 59-59.3 GHz. In addition, a limitation on the power flux-density produced by a station operating in these bands in the inter-satellite service was also implemented.

The Malaysian Administration fully supports the limitation of GSO networks in the ISS frequency bands of 54.25-56.9 GHz, 57-58.2 GHz and 59-59.3 GHz. However, we request that the Bureau disregard the power flux-density limitation for satellite filings submitted prior to the implementation of footnote S5.556A based on the ITU trend of non-retroactive impact.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Document 48-E
29 March 2000
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PLENARY MEETING

Malaysia

PROPOSAL FOR THE WORK OF THE CONFERENCE

CONTRIBUTION TO RESOLUTION 86 (MINNEAPOLIS, 1998) - INTER-SATELLITE LINK BETWEEN GSO AND NON-GSO SYSTEMS

With reference to the above-mentioned subject, the Malaysian Administration requests that WRC-2000 establish a competent study group to address and develop a method to calculate interference probability for communication in the inter-satellite link (ISL) between geostationary (GSO) and non-GSO systems.

MLA/48/1

The Malaysian Administration requests that WRC-2000 establish a competent study group to address and develop a method to calculate interference probability for communication in the inter-satellite link (ISL) between geostationary (GSO) and non-GSO systems.

Reasons: Due to the unavailability of a method to calculate the interference probability for communication in the ISL between GSO and non-GSO systems, satellite filings with communication links between GSO and non-GSO are being penalized by the Bureau with the following statement:

“These frequency assignments are not subject to the coordination procedure and are included in this publication for **information purposes only**.”

Prior to the establishment of such a method, the Bureau should not give any conclusive findings that would penalize the notifying administrations.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 49-E
29 March 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Malaysia

PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda item 1.8 - to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands

With reference to the above-mentioned subject, the Malaysian Administration supports the CPM's view on the use of the bands 3 700-4 200 MHz and 5 925-6 425 MHz by earth stations on board vessels (ESVs) to provide wideband services to cruise liners, passenger ships, naval vessels, seismic research, petroleum vessels and other deep draft vessels.

However, the Malaysian Administration believes that the request to study for possible extension of the bands for ESV operation should not be conducted until the results of the compatibility of sharing the bands 3 700-4 200 MHz and 5 925-6 425 MHz between ESV and other systems is established.

Therefore, the Malaysian Administration would like to submit for review, the following proposal.

MLA/49/1

The Malaysian Administration proposes that the implementation of the bands 3 700-4 200 MHz and 5 925-6 425 MHz for use by ESVs be given the utmost priority.

Only upon the successful implementation of the ESV service in this band with the assurance that no harmful interference would be caused to other systems, should the study for potential extension to the other frequency bands for ESV operation be carried out.

Reasons:

1 The proposed system utilizing the bands 3 700-4 200 MHz and 5 925-6 425 MHz has not been implemented and is still undergoing a rigorous developmental process. Thus, it is important to ensure that the operation and technical limits of the ESV system is sufficient for the protection and future growth of other systems operating in the same frequency bands.

2 It is vital to evaluate the severity of the impact of ESVs into other systems sharing the same service (especially existing systems) in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, prior to conducting the study on expansion to other frequency bands.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 50-E
20 April 2000
Original: French/ English/ Spanish

ISTANBUL, 8 MAY – 2 JUNE 2000

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4	SG	ICAO information paper	PL
5	SG	Information on the occupancy by the fixed and mobile services in the additional HF bands allocated by WARC-92 to the broadcasting services	PL
6	ARS	Proposal for the work of the Conference	PL
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DOCUMENT NUMBER	*SOURCE*	*TITLE*	*DESTINATION*
15	SG	General review of Resolutions and Recommendations of WARC/WRC	PL
16	SG	Report of the Radiocommunication Bureau on experiences in the application of the radio regulatory procedures and other related matters	PL
17	SG	Report on the implementation of Resolution 533 (WRC-97)	PL
18	S	Proposal for the work of the Conference	PL
19	LTU	Proposal for the work of the Conference	PL
20	APT	Common proposals for the work of the Conference	PL
21	UAE	Proposals for the work of the Conference	PL
22	UAE	Proposals for the work of the Conference	PL
23	UAE	Proposals for the work of the Conference	PL
24 + Add.1 + Corr.1	CAN	Proposals for the work of the Conference	PL
25 + Corr.1	MRC	Common Arab proposals (This document was prepared under the auspices of the League of Arab States and is presented by the Kingdom of Morocco on behalf of the Members of League of Arab States)	PL
26	NMB	Proposals for the work of the Conference	PL
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29	SG	Resolution 80 (WRC-97) - Report by the Radio Regulations Board	PL
30	UZB	Proposals for the work of the Conference	PL
31	CUB	Proposals for the work of the Conference	PL
32	SG	Report on administrative due diligence applicable to some satellite communication services	PL
33 + Add.1	RUS	Proposals for the work of the Conference	PL

DOCUMENT NUMBER	***SOURCE***	***TITLE***	***DESTINATION***
34 + Addenda + Corrigenda	SG	Review and possible revision of the 1997 broadcasting-satellite service Plans for Regions 1 and 3	PL
35 + Add.1 to Add.13	B	Proposals for the work of the Conference	PL
36	SG	Director, Radicommunication Bureau – Preparation of the Radio Regulations	PL
37	F	Proposals for the work of the Conference	PL
38	I	Proposals for the work of the Conference	PL
39	SG	Report of the Radiocommunication Bureau on the implementation of Resolution 53 (WRC-97)	PL
40	SG	World Radiocommunication Conference Process	PL
41	BR	Report of the Director on the activities of the Radiocommunication Sector	PL
42	SEN	Proposals for the work of the Conference	PL
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47	MLA	Proposal for the work of the Conference	PL
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49	MLA	Proposal for the work of the Conference	PL
50	BR	List of documents issued (1 - 50)	-

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Addendum 1 to Document 51-E
19 May 2000
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COMMITTEE 5

Malaysia

PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda item 1.16 - to consider the allocation of frequency bands above 71 GHz to the Earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution 723 (WRC-97)

With a view to accommodating the need for additional frequency bands above 71 GHz to satisfy user requirements for passive sensing of the Earth's environmental conditions, the Malaysian Administration would like to submit for review the following proposal as a compromise solution to space stations with frequencies in the proposed modified band, for which complete Appendix S4 coordination information or notification information, is considered as having been received by the Bureau by the end of WRC-2000.

MLA/51/2

The Malaysian Administration proposes that space stations with frequencies in the proposed modified bands, for which complete Appendix S4 coordination information or notification information, is considered as having been received by the Bureau by the end of WRC-2000, shall be permitted the following:

a) to resubmit the relevant Appendix S4 information, while retaining the original dates of receipt;

b) the resubmitted Appendix S4 coordination information or notification information shall be excluded from the cost-recovery procedures;

c) the Bureau shall allow sufficient time to the responsible administration for the preparation to resubmit the Appendix S4 coordination information or notification information.

Reasons:

a) A non-retroactive impact on space stations with frequencies in the proposed modified band, for which complete Appendix S4 coordination information or notification information, is considered as having been received by the Bureau by the end of WRC-2000.

b) The resubmitted Appendix S4 coordination information or notification information should not be treated as a new filing. Thus, cost-recovery procedures should not apply.

c) In view of the proposed change in direction of the frequency bands 71-74 GHz and 81-84 GHz, a new set of the design budgets for these space stations would have to be created.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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29 March 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Malaysia

PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda item 1.16 - to consider the allocation of frequency bands above 71 GHz to the Earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution 723 (WRC-97)

With reference to the above-mentioned subject, the Malaysian Administration recognizes the importance of proper consideration of science service issues and is aware of the need for additional frequency bands above 71 GHz to satisfy user requirements for passive sensing of the Earth's environmental conditions.

However, the Malaysian Administration believes that any modifications to the Table of Frequency Allocations should not have any impact to space stations with frequencies in the proposed modified band, for which complete Appendix S4 coordination information, or notification information, is considered as having been received by the Bureau by the end of WRC-2000.

Therefore, the Malaysian Administration would like to submit for review, the following proposal.

MLA/51/1

The Malaysian Administration proposes that any modifications to the Table of Frequency Allocations should not have any impact to space stations with frequencies in the proposed modified band, for which complete Appendix S4 coordination information, or notification information, is considered as having been received by the Bureau by the end of WRC-2000.

Reasons:

1 There would be a severe impact to the development process of space stations, which have already submitted to the Bureau Appendix S4 coordination information or notification information, frequencies in the proposed modification bands.

Furthermore, the trend in ITU is based on non-retroactive impact. Hence, the space stations, which have submitted the Appendix S4 coordination information or notification information, should not be affected by any future modification to the Radio Regulations.

2 In view of the current trend of wideband transmissions for multimedia applications and technological advancement, it is inevitable that the frequency bands above 71 GHz for the fixed-satellite service will be used in the near future.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to Document 52-E
9 May 2000
Original: English

COMMITTEE 5

Australia

PROPOSALS FOR THE WORK OF THE CONFERENCE

In Australian proposal, AUS/52/1, replace the reference "Australia supports APT proposals ASP/20/1 to ASP/20/7" by "Australia supports APT proposals ASP/20/68 to ASP/20/74".

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 52-E
30 March 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Australia

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.6.1 - IMT-2000 terrestrial component

1 Introduction

The issue is the need to identify global additional frequency bands for the terrestrial component of IMT-2000, beyond those identified in No. S5.388, to satisfy future spectrum requirements, which have been based on projected market demand.

2 Proposals

AUS/52/1

Australia supports APT proposals ASP/20/1 to ASP/20/7.

Reasons: In reaching its conclusions on the preference for the two bands identified, Australia has taken into account further detailed study of the future requirements in major Australian centres, the possible transition options for current second generation systems to third generation and the extensive use of alternate bands elsewhere in Region 3 and the other Regions for other services. The Australian studies, based on traffic estimates at 2010, have shown that the geographic area where the peak demand may be needed is limited to the dense central business districts of cities with populations in excess of 3 to 4 million. Outside the central business district the spectrum demand falls at least 50%. This allows for reasonable geographic sharing arrangements to be put in place on a national basis.

ADD AUS/52/2

RESOLUTION ZZZ (WRC-2000)

Implementation of IMT-2000 and requirements for further studies

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that ITU-R has recommended the 1-3 GHz range as the most suitable for IMT-2000;

b) that WARC-92 identified the bands 1 885-2 025 MHz and 2 110 -2 200 MHz, intended for use on a worldwide basis for IMT-2000, including the bands 1 980-2 010 MHz and 2 170-2 200 MHz for the satellite component of IMT-2000 in No. **S5.388** and under the provisions of Resolution **212 (Rev.WRC-97)**;

c) that WRC-2000 has updated the identification of frequency bands suitable for IMT-2000 including the identification of additional spectrum for advanced mobile spectrum in the context of IMT-2000;

d) that all or portions of the bands identified for IMT-2000 are currently used by either first or second generation mobile services or other radiocommunication services;

e) that Recommendation ITU-R M.1308 addresses the evolution of existing mobile communication systems to IMT-2000;

f) that the sharing implications between services sharing the bands identified for IMT-2000 in [Nos. **S5.388**, **S5.AAA** and **S5.BBB**] have not been fully studied;

g) that administrations may have differing requirements for IMT-2000 spectrum allocations and other services sharing the bands identified;

h) that the amount of spectrum for IMT-2000 identified by WRC-2000 may not completely satisfy the expected requirements of all administrations;

i) [that WRC-02/03 will have on its agenda the review of radiolocation allocations in the band 2 700-3 400 MHz under agenda item 2.6,]

noting

a) that all or parts of the 1 710-1 785/1 805-1 885 MHz bands in Regions 1 and 3 and 1 850-1 910/1 930-1 990 in Region 2 are used by administrations for second generation mobile communication systems and the operators of such systems may wish to use these bands for IMT-2000;

b) that community sensitive services such as broadcasting-satellite services are in operation or planned by several Region 1 and Region 3 administrations in the band 2 500-2 690 MHz which will affect the possibility for development of that band for IMT-2000 for those administrations;

c) that the differential requirements between the areas of maximum demand and the areas outside the central business districts of large cities may offer previously untested sharing opportunities;

d) that not all administrations may need, or be able to implement, all of the IMT-2000 extension bands identified at this Conference due to the existing services,

recognizing

a) that administrations might decide to make available, according to their own market demand and using their own timeframe, only portions of the frequency bands identified for IMT-2000 and might also impose operational and technical constraints on IMT-2000 in order to facilitate co-frequency sharing with other existing services;

b) that administrations might take into account the results of the ITU-R work as mentioned in *requests ITU-R* 1 and 2 before introducing IMT-2000 systems in the additional bands,

resolves to invite administrations

to make available, based on market demand, extension bands, up to the projected requirements of 160 MHz; for the terrestrial component of IMT-2000 to meet the forecasted growth of these systems, giving due consideration to the benefits of harmonized utilization of the spectrum for the terrestrial component of IMT-2000, taking into account the use of these bands by the other services to which these bands are allocated,

requests ITU-R

1 to study the feasibility of sharing appropriate bands listed as candidate bands in the CPM Report to WRC-2000 as suitable for IMT-2000, in particular the 2 520-2 670 MHz band, and to report to WRC-02/03 on the results of this study, and on the need for identifying additional usable spectrum for IMT-2000 in these bands;

2 to develop frequency arrangements for operation of IMT-2000 in the spectrum identified in [Nos. **S5.388, S5.AAA** and **S5.BBB**] of this Conference, aiming to accommodate the evolution of first and second generation mobile communication systems to IMT-2000,

further resolves

1 that these studies should be commenced forthwith;

2 that these frequency arrangements should be published by ITU-R in one or more Recommendations.

Reasons: While the CPM Report to WRC-2000 identified some of the difficulties applying in the bands considered suitable for IMT-2000, the sharing implications for the other services allocated in these bands could be examined further to see what sharing opportunities can be employed by administrations when implementing IMT-2000 and to see if there are further suitable bands that can be identified for IMT-2000.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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30 March 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Australia

PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda item 1.13.1 - proposed modification to Section VI of Article S22

1 Introduction

Annex 7 to Chapter 3 of the CPM Report provides three options for possible modification to Section VI of Article S22. Australia has considered all of these options and makes the following conclusions:

- Option 1 - This option will not provide protection from interference to the new non-GSO FSS networks from high e.i.r.p. GSO earth stations.
- Option 2 - This option establishes sharing criteria which limits off axis e.i.r.p. to facilitate sharing between non-GSO and GSO networks.
- Option 3 - This option would require incorporation by reference from a yet to be developed Recommendation, require action by a future conference and is therefore not viable.

2 Proposal

AUS/53/1

Australia proposes option 2 of Annex 7 of Chapter 3 of the CPM Report.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Australia

PROPOSAL FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.13.1 - CRITERIA AND PROCESS FOR RESOLUTION OF POSSIBLE MISAPPLICATION OF NON-GSO FSS SINGLE-ENTRY LIMITS IN ARTICLE S22 [Rev.WRC-2000]

1 Introduction

The CPM had a clear intention to disallow misapplication of single-entry limits. The CPM Report acknowledges this in *considering i)* of the example Resolution WWW and in § 3.1.2.4.10 invites administrations to make proposals on how to regulate possible misapplication of single-entry limits.

The most common understanding of the term “misapplication” is that the single-entry criteria should not be applied in a given case where it is attempted to split a satellite network into two or more parts in such a manner that each part meets the single-entry criteria and thus gets through the hurdle of single-entry limits, whereas without such splitting, the network consisting of the sum total of these parts would have been disallowed by application of single-entry limits. See Attachment 1 for the example of splitting.

While the example in Attachment 1 is sufficient for understanding the basic issue and to identify that there is a problem, a little more thought is needed to develop a regulation to overcome the resultant difficulty in effective application of single-entry limits. This is because there are other ways to bypass single-entry limits. At least one other way to bypass single-entry limits is to combine, at the implementation stage, networks of what may appear at the filing stage to be two different corporate entities filing two different networks. See Attachment 2 for the example of combining.

2 Considerations for finding a solution

It is therefore necessary that the regulatory solutions focus not just on “the splitting of networks” but “combining of networks” as well. While disallowing “splitting or combining of networks” as a regulatory threshold criterion though, reasonable allowance needs to be made for the fact that some applications will use two or more different networks at certain times. The key then is to define certain limits in a way that will allow single-entry criteria to work effectively in practice, while at the same time allowing certain practical combinations of networks up to a point, from time to time.

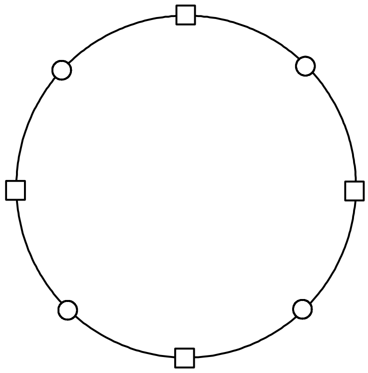
3 Way forward

Australia has developed a draft regulatory text needed to define and deal with such misapplication in attached Resolution QQQ and its Annex 1. See proposal at Annex A.

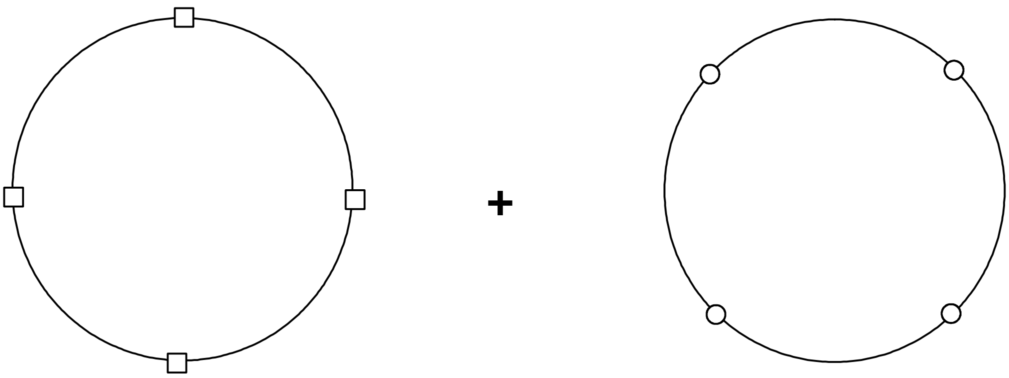
ATTACHMENT 1

Example of splitting

Before splitting: The whole network - as a single network - does not meet single-entry limits



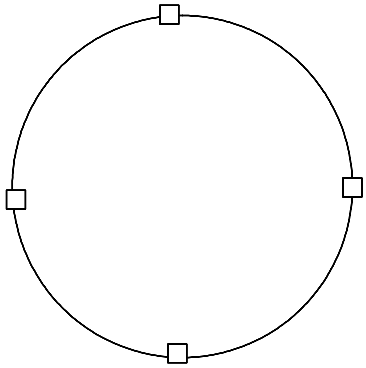
After splitting: When broken into two (or more) parts, each part network meets single-entry limits.



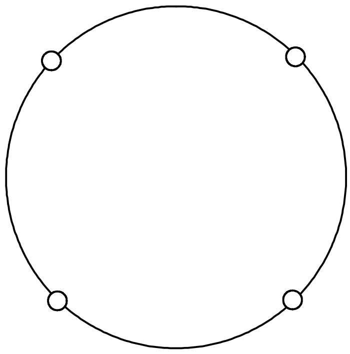
ATTACHMENT 2

Example of combining

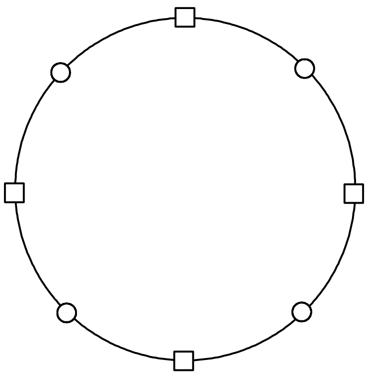
At filing stage (before combining): XYZ Ltd. owns network A. Network A meets single-entry limits.



At filing stage (before combining): ABC Ltd. owns network B. Network B meets single-entry limits.



At implementation stage (after combining): XYZ Ltd. and ABC Ltd. combine networks A and B to implement end-to-end non-GSO services full-time (if filed as such, the total of networks A and B will fail to meet the single-entry limits).



ANNEX A

Proposed new Resolution QQQ

ADD AUS/54/1

RESOLUTION QQQ (WRC-2000)

CRITERIA AND PROCESS FOR RESOLUTION OF POSSIBLE MISAPPLICATION OF NON-GSO FSS SINGLE-ENTRY LIMITS IN ARTICLE S22 [Rev.WRC-2000]

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the non-GSO FSS single-entry limits in Article **S22** [Rev.WRC-2000] are based on certain assumptions as acknowledged in *considering d)* of Resolution [**WWW** in the CPM Report for WRC-2000];

b) that [as per section 3.1.2.4.10 of the CPM Report] these single-entry limits can be misapplied;

c) that misapplication of single-entry limits should be avoided,

noting

a) that the Resolution [**WWW**] [CPM Report for WRC-2000] in *considering i)* also calls for misapplication of single-entry limits to be avoided;

b) [that the CPM Report for WRC-2000 in section 3.1.2.4.10 calls for misapplication of single-entry limits to be avoided and the CPM Report invites administrations to make proposals to that effect],

recognizing

a) that misapplication of single-entry limits can reduce the number of competing non-GSO FSS systems;

b) that misapplication of single-entry limits can lead to differing regulatory regime for non-GSO FSS systems meeting limits with respect to non-GSO FSS systems capable of misapplying such limits;

c) that misapplication of single-entry limits can disadvantage non-GSO FSS systems meeting, and intending to always meet, single-entry limits in Article **S22** [Rev.WRC-2000],

resolves

1 that misapplication of single-entry limits shall not be permitted;

2 that BR shall determine if and when misapplication of single-entry limits has occurred or will occur based on the process described in Annex 1;

3 that BR shall take necessary steps to avoid misapplication of single-entry limits as described in this Resolution;

4 that all concerned administrations, [and Sector Members], when so requested by BR to provide information or assistance as needed by BR for analysing or resolving the situation arising out of possible misapplication of single-entry limits in accordance with this Resolution, should provide requested information and assistance;

5 that BR, shall develop and apply a Rule of Procedure in the interim period to implement the process in this Resolution and in Annex 1 to prevent misapplication of single-entry limits occurring or recurring;

6 that the Rule of Procedure shall be submitted to the next competent conference for consideration;

7 that BR shall develop and submit appropriate text to the next competent conference to incorporate such a Rule of Procedure within the Radio Regulations;

8 that the administrations and Sector Members concerned should, in the spirit of cooperation, take adequate steps to ensure that the repetition of a situation resolved by BR does not recur,

requests

the Secretary General of ITU to note this Resolution in the context of Article 1 of the ITU Convention.

ANNEX 1 TO RESOLUTION QQQ (WRC-2000)

Process to be followed by BR in developing and implementing a Rule of Procedure to avoid misapplication of non-GSO FSS single-entry limits in Article S22 [Rev.WRC-2000]

1 In determining the following, BR will take all information available to it, or made available to it, into account in arriving at a decision or at a course of action to ensure that the requirements of Resolution **QQQ** are met.

2 For the purpose of determining if misapplication of non-GSO FSS single-entry limit has occurred or will occur, BR will take a view that two or more non-GSO FSS networks, each meeting single-entry limits in Article **S22** [Rev.WRC-2000], and filed as separate networks with ITU, will be deemed to be separate networks each meeting single-entry limits, except where:

a) one of these non-GSO FSS networks uses or proposes to use the whole or part of the other non-GSO FSS network(s)' space resources for more than [10%] of time; or

b) one of these non-GSO FSS networks uses or proposes to use more than [20%] of other non-GSO FSS network(s)' space resources for more than [5%] of time within any period of [30] days.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Australia, Korea (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.13.1

COORDINATION PROCEDURE BETWEEN NON-GSO FSS AND GSO FSS SERVICES HAVING VERY LARGE ANTENNAS

1 Introduction

WRC-97 adopted provisional equivalent power flux-density down ($epfd_{down}$) limits for systems in a non-geostationary orbit (non-GSO) in certain frequency bands in the fixed-satellite service (FSS) in order to facilitate sharing with FSS networks in the geostationary orbit (GSO).

The Conference Preparatory Meeting (CPM) reported that:

"Some links with very large earth station antennas may not be adequately protected by the $epfd_{down}$ limits proposed in Annex 1. The following points were agreed regarding GSO FSS networks having earth stations with very large antennas:

- Transmissions to earth stations with very large antennas need to be protected, and thus it may be desirable that they be treated separately. A coordination procedure would be one possible mechanism to ensure this protection.
- Downlink transmissions to very large GSO earth station antennas are most sensitive to interference. This sensitivity is more related to the availability degradation than to the potential for synchronization loss (i.e. the 100% $epfd_{down}$ value).
- For very large GSO earth station antennas, the following factors would facilitate achieving mutually satisfactory coordination:
  – Non-GSO interference $epfd_{down}$ levels at or near the maximum are likely to occur over only a small proportion of the Earth's surface.
  – The locations of interference $epfd_{down}$ levels at or near the maximum are likely to differ from one non-GSO system to another.
- Coordination would be triggered for GSO FSS networks having very large earth station antennas meeting all of the following conditions:

- Earth station antenna maximum isotropic gain (APS4/C.10 *c)* 2)) of 64 dBi or higher for the band 10.7-12.75 GHz and 68 dBi or higher for the bands 17.8-18.6 GHz and 19.7-20.2 GHz, which corresponds to approximately 18 metres.
- G/T_l of 44 dB/K or higher, where G is earth station antenna maximum isotropic gain and T_l (APS4/C.10 *c)* 5)) is the lowest total system receiving noise temperature which includes the earth station noise temperature, retransmitted uplink noise, cross-polarization noise, inter-modulation noise, and any other internal link noise sources. The link noise temperature as defined herein excludes external noise sources.
- Space station emission bandwidth (APS4/C.7 *a)*) of 250 MHz or higher for the band 10.7-12.75 GHz and 800 MHz or higher for the bands 17.8-18.6 GHz and 19.7-20.2 GHz.

• In addition to the conditions indicated in the preceding point, the coordination trigger should contain the condition of the $epfd_{down}$ level radiated by the non-GSO FSS system into the earth station employing the very large antenna considered when this earth station is pointed to the wanted GSO satellite. Two $epfd_{down}$ values in each band would be needed and exceeding either $epfd_{down}$ would trigger coordination. Coordination would be triggered if the $epfd_{down}$ exceeds:

- either –174.5 dB(W/(m^2 · 40 kHz)) for any percentage of time or [x] dB(W/(m^2 · 40 kHz)) for [y]% of the time in the frequency band 10.7-12.75 GHz;
- either –151 dB(W/(m^2 · MHz)) for any percentage of time or [x'] dB(W/(m^2 · MHz)) for [y']% of the time in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz.

These $epfd_{down}$ threshold criteria would be sufficiently conservative to trigger coordination. A reference to these $epfd_{down}$ thresholds is needed in Appendix S5.

• Based on the responses to Circular Letter CR/115, setting the threshold size of very large GSO earth station antennas at 64 dBi in the band 10.7-12.75 GHz and 68 dBi for the bands 17.8-18.6 GHz and 19.7-20.2 GHz clearly indicates that there would be few cases requiring coordination.

• Additional regulatory and procedural conditions (e.g. due diligence provisions) may be needed to reduce the number of cases requiring coordination.

• The conditions required to initiate coordination would be that the notifying administration provide the specific earth station location (APS4/C.10 *b)*) and satellite location (APS4/C.10 *a)*) and that BR check that all conditions required to initiate coordination are met.”

The CPM was unable to agree on the values for the $epfd_{down}$ triggers and further studies have been performed within Study Group 4 to develop these values.

Subsequent studies have demonstrated that neither the WRC-97 provisional equivalent power flux-density ($epfd_{down}$) limits and associated percentages of time adequately protect existing fixed-satellite service (FSS) networks in geostationary-satellite orbit (GSO) with very large earth station antennas.

Working Party 4A has agreed the following text for inclusion in the WP 4A Chairperson’s Report and the ITU-R SG 4 Chairperson’s Report to RA-2000:

“Studies demonstrated that neither WRC-97 provisional equivalent power flux-density ($epfd_{down}$) limits and associated percentages of time nor the proposed modifications agreed during ITU-R studies adequately protect existing fixed-satellite service (FSS) networks in geostationary-satellite orbit (GSO) with very large earth station antennas. Coordination triggers based on the characteristics of the satellite network using the GSO were agreed by ITU-R and confirmed by CPM-99. In addition to the GSO network triggers, it was decided to include the condition of the $epfd_{down}$ radiated by the non-GSO FSS system. CPM-99 proposed that two values would be needed in each band and that exceeding either $epfd_{down}$ value would trigger coordination, requesting that WP 4A carry out studies to enable further advice to be given to RA-2000 on the issue of coordination triggers for very large earth station antennas (CPM Report, section 3.1.2.1.2 e)).

On the basis of additional studies, WP 4A agreed that coordination should be triggered if the $epfd_{down}$ radiated by the non-GSO FSS system exceeds the following values:

- –174.5 dB(W/(m^2 · 40 kHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude, or
  –202 dB(W/(m^2 · 40 kHz)) for any percentage of the time for non-GSO systems with any satellites operating above 2 500 km altitude in the frequency band 10.7-12.75 GHz;
- –157 dB(W/(m^2 · MHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude, or
  –185 dB(W/(m^2 · MHz)) for any percentage of the time for non-GSO systems with any satellites operating above 2 500 km altitude in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz.

It was agreed that the first trigger in each band would apply to non-GSO systems operating in low-Earth orbit and that the second trigger in each band would apply to non-GSO systems in other orbits. This solution has the advantage that it reflects the expected interference situation and eases the burden on BR to identify affected administrations and perform the necessary calculations. WP 4A also agreed that the trigger applying to non-GSO systems in low-Earth orbit in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz should be reduced from –151 dB(W/(m^2 · MHz)) to –157 dB(W/(m^2 · MHz)).”

2 Proposals

Proposed coordination procedure between non-GSO FSS transmitting space stations and GSO receive earth stations with very large antennas

These proposals are based on the example of modifications to the Radio Regulations given in Annex 3 to Chapter 3 of the CPM Report. The text has been changed only where it is necessary to reflect the output of Study Group 4, Working Party 4A.

ARTICLE S9

Sub-Section IIA – Requirement and request for coordination

ADD AUS/KOR/55/1

S9.7A a1)[12bis, 13bis] for a specific earth station within a geostationary-satellite network in the fixed-satellite service in certain frequency bands in respect of a non-geostationary-satellite system in the fixed-satellite service;

ADD AUS/KOR/55/2

S9.7B a2) [12bis, 13bis] for a non-geostationary-satellite system in the fixed-satellite service in certain frequency bands in respect of a specific earth station within a geostationary-satellite network in the fixed-satellite service;

ADD AUS/KOR/55/3

12*bis* **S9.7.A.1** and **S9.7.B.1** The coordination of a specific earth station under **S9.7A** or **S9.7B** shall remain within the authority of the administration having this station located on its territory.

ADD AUS/KOR/55/4

13*bis* **S9.7.A.2** and **S9.7.B.2** Coordination information relating to a specific earth station received by the Bureau prior to [date to be established by WRC-2000] is considered as complete **S9.7A** or **S9.7B** information from the date of receipt of complete information of the associated satellite network under **S9.7** provided that the characteristics of the specific earth stations are within the parameters of any typical earth station included in the GSO FSS network coordination request.

(MOD) AUS/KOR/55/5

~~12~~13*ter* **S9.8.1** and **S9.9.1** Application of this provision with respect to Articles 6 and 7 of Appendices **S30** and **S30A** is suspended pending a decision of WRC-99 on the revision of these two Appendices.

Reasons: GSO FSS earth stations with very large antennas may not be adequately protected by the $epfd_{down}$ limits contained in Table MOD S22-1 and case-by-case coordination of systems operating co-frequency, co-directional links in the space-to-Earth direction would then be required. The proposed ADD S9.7A and ADD S9.7B would require coordination between non-GSO FSS transmit satellites and GSO FSS receive earth stations with very large antennas. By referring to coordination provisions under S9.7A and S9.7B, the request for coordination would be sent by the requesting administration to the Bureau under S9.30. The Bureau would act under S9.34 to identify administrations with which coordination may need to be effected and publish the information in the Weekly Circular. Since coordination between a non-GSO FSS space station and very large GSO FSS earth stations is a new type of coordination that does not currently exist in Article S9, it is necessary to add two new entry points in Article S9:

- One entry point to enable the non-GSO space station administration to request coordination with administrations having specific very large earth station antennas located on their territory.

- Another entry point to enable the reciprocal coordination to take place, i.e. the possibility for an administration planning to implement a specific very large GSO earth station stations located on their territory to request coordination with administrations having non-GSO FSS transmit space.

ARTICLE S22

Space services[1]

MOD AUS/KOR/55/5*bis*

TABLE **S22-4**1

ADD AUS/KOR/55/6

[1] For certain receive earth stations, see also ADD **S9.7A** and ADD **S9.7B**.

Reasons: Case-by-case coordination is required by the proposed modifications in ADD S9.7A and ADD S9.7B.

ARTICLE S11

Section II – Examination of notices and recording of frequency assignments in the Master Register

MOD AUS/KOR/55/7

S11.32A *c)* with respect to the probability of harmful interference that may be caused to or by assignments recorded with a favourable finding under Nos. **S11.36** and **S11.37** or **S11.38**, or recorded in application of No. **S11.41**, or published under Nos. **S9.38** or **S9.58** but not yet notified, as appropriate, for those cases for which the notifying administration states that the procedure for coordination under No. **S9.7, S9.7A or S9.7B** could not be successfully completed (see also No. **S9.65**);[10] or

MOD AUS/KOR/55/8

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[10] **S11.32A.1** The examination of such notices with respect to any other frequency assignment for which a request for coordination under Nos. **S9.7, S9.7A or S9.7B** has been published under No. **S9.38** but not yet notified shall be effected by the Bureau in the order of their publication under the same number using the most recent information available.

Reasons: The insertion of a coordination trigger related to epfd$_{down}$ level radiated by the non-GSO FSS system into the earth station employing the very large antenna considered when this earth station is pointed to the wanted GSO satellite provides a mechanism to examine the notice with respect to the probability of harmful interference that may be caused to or by above-listed assignments, and therefore S11.38 and S11.41 are applicable.

MOD to Appendix S4

The required characteristics for coordinating specific very large GSO earth stations with non-GSO FSS transmit space stations could be items for “Notification or coordination of a GSO network (including Appendix **S30B**)” or “Notification or coordination of an earth station”.

ANNEX 2B

Table of characteristics to be submitted for space and radio astronomy services

(The modifications in either column two or column three need to be incorporated into the full table.)

C – Characteristics to be provided for each group of frequency assignments for a satellite antenna beam or an earth station antenna

MOD AUS/KOR/55/9

Items in Appendix	Notification or coordination of a geostationary-satellite network (including Appendix S30B)	Notification or coordination of an earth station
C.1		
C.2.a	X	X
C.2.b		
C.3.a	X	X
C.3.b		
C.4	X	X
C.5a	X	
C.5.b		X
C.5.c		
C.6	X	X
C.7.a	X[11]	X[11]
C.7.b	C[11]	C[11]
C.7.c	C[11]	C[11]
C.7.d	C	C
C.8.a	X[7]	C[8]
C.8.b	X[7]	X[7]
C.8.c	X[6]	X[6]
C.8.d	X[2]	
C.8.e	X[6]	X[6]
C.8.f		
C.8.g	C[4]	C[4, 5]
C.8.h		

C.8.i		
C.8.j		
C.9.a	C	
C.9.b		
C.9.c		
C.10.a	X[11]	C[11]
C.10.b	X[11]	C[11]
C.10.c.1	X[11]	C[11]
C.10.c.2	X[11]	C[11]
C.10.c.3	X	
C.10.c.4	X	
C.10.c.5	X[11]	C[11]
C.10.c.6		
C.11.a	X	
C.11.b		
C.11.c		
C.11.d		
C.12		
C.13		
C.14		

X Mandatory information

O Optional information

C This information need only be furnished when it has been used as a basis to effect coordination with another administration

[11] Information mandatory for coordination under No. ADD **S9.7A**.

NOTE - Additional characteristics to be provided may include A.4.c, A.1.e.1, A.1.e.2, C.4, B.5 and C.5.b. As a result of decisions that may be made at WRC-2000, these additional characteristics may replace C.10.a, C.10.b, C.10.c.1, C.10.c.2 and C.10.c.5 in the notification or coordination of an earth station column.

Reasons: This is consequential to ADD S9.7A and ADD S9.7B. Administrations will need to submit specific earth station information for earth stations associated with geostationary-satellite networks in the fixed-satellite service meeting the conditions in the proposed addition to Appendix S5.

MOD AUS/KOR/55/10

D – Overall link characteristics

(The modifications in either column two or column three need to be incorporated into the full table.)

Items in Appendix	Notification or coordination of a geostationary-satellite network (including Appendix S30B)	Notification or coordination of an earth station
D.1	X	
D.2.a	X[11]	C[11]
D.2.b	X	

X Mandatory information

O Optional information

C This information need only be furnished when it has been used as a basis to effect coordination with another administration

[11] Information mandatory for coordination under No. ADD **S9.7A**.

Reasons: This is consequential to ADD S9.7A and ADD S9.7B and will be required when simple frequency-changing transponders are used on the space station.

APPENDIX S5

TABLE S5-1 (*continued*)

ADD AUS/KOR/55/11

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
No. **S9.7A** GSO earth station/ non-GSO system	A specific earth station in a geostationary-satellite network in the fixed-satellite service in respect of a non-geostationary-satellite system in the fixed-satellite service	The following frequency bands: 10.7-11.7 GHz (space-to-Earth) 11.7-12.2 GHz (space-to-Earth) in Region 2 12.2-12.75 GHz (space-to-Earth) in Region 3 12.5-12.75 GHz (space-to-Earth) in Region 1 17.8-18.6 GHz (space-to-Earth) and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) the frequency bands overlap; and ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations and meets all of the following conditions: a) Earth station antenna maximum isotropic gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; b) G/T_1 of 44 dB/K or higher;	i) compare frequency bands; ii) use the maximum antenna gain of the specific receive earth station (Appendix **S4** C.10 *c)* 2)), the lowest equivalent satellite link noise temperature (Appendix **S4** C.10 *c)* 5)), and the space station emission bandwidth (Appendix **S4** C.7 *a)*) in the geostationary-satellite network as given in Appendix **S4** data; and iii) use the $epfd_{down}$ radiated by the non-GSO FSS system into the earth station employing the very large antenna when this antenna is pointed towards the wanted GSO satellite	The threshold/condition for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit

TABLE S5-1 (*continued*)

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
			c) space station emission bandwidth of 250 MHz or higher for the frequency bands 10.7-12.75 GHz or 800 MHz or higher for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; iii) the $epfd_{down}$ from the satellite system using the non-geostationary orbit exceeds: a) –174.5 dB(W/(m^2 · 40 kHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude, or –202 dB(W/(m^2 · 40 kHz)) for any percentage of the time for non-GSO systems with any satellites operating above 2 500 km altitude in the frequency band 10.7-12.75 GHz;		

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
			b) either –157 dB(W/(m^2 · MHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude, or –185 dB(W/(m^2 · MHz)) for any percentage of the time for non-GSO systems with any satellites operating above 2 500 km altitude in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz.		

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
No. **S9.7B** non-GSO system/ GSO earth station	A non-geostationary-satellite system in the fixed-satellite service in respect of a specific earth station in a geostationary-satellite network in the fixed-satellite service	The following frequency bands: 10.7-11.7 GHz (space-to-Earth) 11.7-12.2 GHz (space-to-Earth) in Region 2 12.2-12.75 GHz (space-to-Earth) in Region 3 12.5-12.75 GHz (space-to-Earth) in Region 1 17.8-18.6 GHz (space-to-Earth) and 19.7-20.2 GHz (space-to-Earth)	Conditions: i) the frequency bands overlap; and ii) the satellite network using the geostationary-satellite orbit has specific receive earth stations and meets all of the following conditions: a) Earth station antenna maximum isotropic gain greater than or equal to 64 dBi for the frequency bands 10.7-12.75 GHz or 68 dBi for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; b) G/T_1 of 44 dB/K or higher;	i) compare frequency bands; ii) use the maximum antenna gain of the specific receive earth station (Appendix **S4** C.10 *c)* 2)), the lowest equivalent satellite link noise temperature (Appendix **S4** C.10 *c)* 5)), and the space station emission bandwidth (Appendix **S4** C.7 *a)*) in the geostationary-satellite network as given in Appendix **S4** data; and	The threshold/condition for coordination do not apply to typical receive earth stations operating in satellite networks using the geostationary-satellite orbit

Reference of Article S9	Case	Frequency bands (and Region) of the service for which coordination is sought	Threshold/condition	Calculation method	Remarks
			c) space station emission bandwidth of 250 MHz or higher for the frequency bands 10.7-12.75 GHz or 800 MHz or higher for the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz; iii) the $epfd_{down}$ from the satellite system using the non-geostationary orbit exceeds: a) –174.5 dB(W/(m^2 · 40 kHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude, or –202 dB(W/(m^2 · 40 kHz)) for any percentage of the time for non-GSO systems with any satellites operating above 2 500 km altitude in the frequency band 10.7-12.75 GHz;	iii) use the $epfd_{down}$ radiated by the non-GSO FSS system into the earth station employing the very large antenna when this antenna is pointed towards the wanted GSO satellite	

TABLE S5-1 (*continued*)

Reference of Article S9	**Case**	**Frequency bands (and Region) of the service for which coordination is sought**	**Threshold/condition**	**Calculation method**	**Remarks**
			b) –157 dB(W/(m^2 · MHz)) for any percentage of time for non-GSO systems with all satellites only operating at or below 2 500 km altitude, or –185 dB (W/(m^2 · MHz)) for any percentage of the time for non-GSO systems with any satellites operating above 2 500 km altitude in the frequency bands 17.8-18.6 GHz and 19.7-20.2 GHz		

Reasons: This is consequential to ADD **S9.7A** and **S9.7B**.

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PLENARY MEETING

Australia

PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda item 1.13 - proposed modification to footnote No. S5.502

1 Introduction

The band 13.75-14 GHz is allocated on a co-primary basis to the fixed-satellite service and the radiolocation service.

Radio Regulation No. S5.502, prescribes sharing conditions based on a minimum e.i.r.p. requirement of +68 dBW for fixed-satellite service earth stations coupled with the maximum e.i.r.p. restriction on the radiolocation service.

Some systems operating in the fixed-satellite service may be able to share successfully with the radiolocation service whilst using an e.i.r.p. of less than the +68 dBW required by No. S5.502. In order to facilitate this sharing and yet ensure that the radiolocation service is protected against claims by the fixed-satellite service that interference is caused by the radiolocation service it is proposed:

- to suppress the minimum e.i.r.p. restriction prescribed in No. S5.502, but
- to retain the limitation of the minimum antenna diameter, and
- to prescribe that systems operating in the fixed-satellite service with an e.i.r.p. of less than +68 dBW be unable to claim protection from interference by the radiolocation service.

2 Proposal

Australia proposes the following specific modification of No. S5.502:

MOD AUS/56/1

S5.502 In the band 13.75-14 GHz, the e.i.r.p. of any emission from an earth station in the fixed-satellite service ~~shall~~should be at least 68 dBW, and should not exceed 85 dBW~~,~~. The earth station shall transmit with a minimum antenna diameter of 4.5 m. The fixed-satellite service shall not claim protection against harmful interference caused by the radiolocation service where the fixed-satellite service uses an e.i.r.p. of less than +68 dBW. In addition the e.i.r.p., averaged over one second, radiated by a station in the radiolocation or radionavigation services towards the geostationary-satellite orbit shall not exceed 59 dBW.

Reasons: A minimum e.i.r.p. restriction is overly prescriptive for some fixed-satellite service systems and its removal could lead to more efficient frequency spectrum utilization. However the radiolocation service requires ongoing protection from claims of interference to systems in the fixed-satellite service that use less than +68 dBW. Australia believes that the above proposal could satisfy the requirement of all the services allocated to this frequency band. Australia also believes that further studies are required before any further changes are made to the sharing criteria.

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PLENARY MEETING

Australia

PROPOSAL FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.21

1 Introduction

Circular Letter CR/135 of 7 January 2000 contains the results of the Radiocommunication Bureau's analysis in connection with Resolution 53 (WRC-97). The results reported in that circular letter demonstrate that all assignments of Australia entered in the Appendix S30 Plan will neither cause interference to, nor require interference protection from, assignments of other services or other Regional Plans. Therefore, Australia proposes that the assignment table contained in Article 11 of Appendix S30 should be revised to remove the comments against its assignments which were included in the "Remarks" column of that table pending the completion of Resolution 53 (WRC-97).

Australia would support similar treatment for national assignments of other administrations that are entered in the Appendix S30/S30A Plans (except in cases where the assignment is qualified by a comment in the "Remarks" columns pertaining to the need to accept interference from, or not to cause interference to, other assignments).

2 Proposal

See modification to the assignment table in Article 11 of Appendix S30 on the following page.

Assignment Table in Article 11 of Appendix S30

In the Table associated with Article 11 of Appendix **S30** remove “Remarks” column entries for the Australian assignments as indicated below.

MOD AUS/57/1

1	2	3	4	5		6			7	8	9		10	11		12	13	14	15	16	17
Admin. Symbol	Beam identification	Orbital position(°)	Chan-nel	Boresight Long.(°)	Lat.(°)	Space antenna characteristic Major(°)	Minor(°)	Orient.(°)	Space Antenna	Shaped beam	Space antenna gain Co-polar.	X-polar.	Earth antenna	Polarization Type	Angle(°)	e.i.r.p. (dBW)	Designation of emission	Satellite identification	Group code	Status	Re-marks
AUS	AUS0090A	164.00	1	159.06	−31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	~~7~~
AUS	AUS0090B	164.00	1	167.93	−29.02	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	~~7~~
AUS	AUS0040A	152.00	3	96.83	−12.19	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	~~7~~
AUS	AUS0040B	152.00	3	105.69	−10.45	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	~~7~~
AUS	AUS0040C	152.00	3	110.52	−66.28	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	~~7~~
AUS	AUS0070A	164.00	3	158.94	−54.50	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		77	P	~~7~~
AUS	AUS0090A	164.00	5	159.06	−31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	~~7~~
AUS	AUS0090B	164.00	5	167.93	−29.02	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	~~7~~
AUS	AUS0040A	152.00	7	96.83	−12.19	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	~~7~~
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AUS	AUS0090A	164.00	9	159.06	−31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	~~7~~
AUS	AUS0090B	164.00	9	167.93	−29.02	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	7
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AUS	AUS0090A	164.00	13	159.06	−31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	~~7~~
AUS	AUS0090B	164.00	13	167.93	−29.02	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	~~7~~
AUS	AUS0040A	152.00	15	96.83	−12.19	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	
AUS	AUS0040B	152.00	15	105.69	−10.45	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	
AUS	AUS0040C	152.00	15	110.52	−66.28	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	
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AUS	AUS0090A	164.00	17	159.06	−31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	~~7~~
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AUS	AUS0040A	152.00	19	96.83	−12.19	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	
AUS	AUS0040B	152.00	19	105.69	−10.45	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	
AUS	AUS0040C	152.00	19	110.52	−66.28	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	
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AUS	AUS0090A	164.00	21	159.06	−31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	~~7~~
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AUS	AUS0040A	152.00	23	96.83	−12.19	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	
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AUS	AUS0040C	152.00	23	110.52	−66.28	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	
AUS	AUS0070A	164.00	23	158.94	−54.50	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		77	P	~~7~~

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

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PLENARY MEETING

Australia

PROPOSAL FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.21

1 Introduction

Circular Letter CR/135 of 7 January 2000 contains the results of the Radiocommunication Bureau's analysis in connection with Resolution 53 (WRC-97). The results reported in that circular letter demonstrate that all assignments of Australia entered in the Appendix S30 Plan will neither cause interference to, nor require interference protection from, assignments of other services or other Regional Plans. Therefore, Australia proposes that the assignment table contained in Article 11 of Appendix S30 should be revised to remove the comments against its assignments which were included in the "Remarks" column of that table pending the completion of Resolution 53 (WRC-97).

Australia would support similar treatment for national assignments of other administrations that are entered in the Appendix S30/S30A Plans (except in cases where the assignment is qualified by a comment in the "Remarks" columns pertaining to the need to accept interference from, or not to cause interference to, other assignments).

2 Proposal

See modification to the assignment table in Article 11 of Appendix S30 on the following page.

Assignment Table in Article 11 of Appendix S30

In the Table associated with Article 11 of Appendix **S30** remove “Remarks” column entries for the Australian assignments as indicated below.

MOD AUS/57/1

1	2	3	4	5		6			7	8	9		10	11		12	13	14	15	16	17
Admin. Symbol	Beam identification	Orbital position(°)	Chan-nel	Boresight Long.(°)	Lat.(°)	Space antenna characteristic Major(°)	Minor(°)	Orient.(°)	Space Antenna	Shaped beam	Space antenna gain Co-polar.	X-polar.	Earth antenna	Polarization Type	Angle(°)	e.i.r.p. (dBW)	Designation of emission	Satellite identification	Group code	Status	Re-Marks
AUS	AUS0090A	164.00	1	159.06	−31.52	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	~~7~~
AUS	AUS0090B	164.00	1	167.93	−29.02	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		78	P	~~7~~
AUS	AUS0040A	152.00	3	96.83	−12.19	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	~~7~~
AUS	AUS0040B	152.00	3	105.69	−10.45	0.60	0.60	0.00	R13TSS		48.88		MODRES	CR		58.88	27M0F8W		76	P	~~7~~
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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

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PLENARY MEETING

Australia

PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA FOR WRC-03 - PROPOSED MODIFICATIONS TO RESOLUTION 722 (WRC-97)

1 Introduction

WRC-2000 agenda item 7.2 requests WRC-2000 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its view on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences.

2 Proposals

Australia proposes that the following items be included in Resolution **722 (WRC-97)**:

ADD AUS/58/1

• to take into account ITU-R studies in accordance with Resolution **342 (WRC-97)** and consider the use of new digital technology for the maritime mobile service in the band 156-174 MHz and consequential revision of Appendix **S18**;

Reasons: This item is needed to complete the work of agenda item 1.18 (WRC-2000) which could not be completed until relevant studies on ITU-R are complete.

ADD AUS/58/2

• to consider results of the ITU-R studies conducted in accordance with Resolution **207 (Rev.WRC-2000)** [to mitigate HF interference in the bands allocated to the maritime mobile and aeronautical mobile (R) service];

Reasons: Australia and other countries in the Asia-Pacific region suffer harmful interference in the HF communications bands from unauthorized operators. To combat this interference, which is affecting aviation and maritime operational and emergency channels as well as other services, Australia has proposed modifications to Resolution 207 requiring ITU-R to study possible solutions to mitigate this interference.

ADD AUS/58/3

- to consider an additional allocation on a worldwide basis for EESS active radio altimeters in the band 5 460-5 570 MHz;

Reasons:

- TOPEX/POSEIDON currently operates over the frequency range 5.15-5.47 GHz;
- compatibility studies were conducted in JWP 7-8R and WP 7C to extend the radio spectrum for high-resolution radar altimeters;
- these studies have considered the feasibility of sharing between EESS active and other services above the band 5 250-5 460 MHz currently allocated to EESS (active). This has drawn attention to the drafting of a new Recommendation on sharing in the band 5 250-5 570 MHz between the EESS active and space research active services and other services allocated in this band;
- sharing studies have shown the potential for sharing between spaceborne altimeters and proposed Hiperlan systems above 5 460 MHz.

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WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Indonesia (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

FIXED AND FIXED-SATELLITE SERVICES

(WRC-2000 agenda item 1.4)

1 Introduction

The near future systems in telecommunications are as exciting as well as demanding in satisfying the need of broadband connectivity, domestically and internationally. Evolutionary development of satellite technologies from geostationary-satellite systems to non-geostationary multi-orbit constellations (of low-Earth orbit (LEO) and medium-Earth orbit (MEO) satellite constellations) is followed by high altitude platform stations (HAPS). Terrestrial technological development to satisfy demand for broadband systems are the developing wireless high density applications in fixed services (HDFS). Both HAPS and HDFS systems are exploring millimetre waves.

Wireless links are increasingly being used for broadband services because they can be designed quickly and are cheaper to install and operate compared to the high cost and slow process of burying copper or fibre lines. Wireless technology promises a significant drop in the cost-to-capacity ratio, because of the decline in the cost of radio links while its capacity is increasing. (It is predicted that the cost per radio and per channel in the year 2005 will be around 50% and 10% respectively of that in 1998).

Indonesia's vision

Indonesia is of the opinion that the two systems, HDFS and HAPS, are the coming systems for serving population centres and suburban areas. In Indonesia and in many other countries, millimetre waves are still practically unused, however, to anticipate growth of the demand in the not too distant future, advanced planning is required.

HDFS relates to WRC-2000 agenda item 1.4:

to consider issues concerning allocations and regulatory aspects related to Resolutions **126 (WRC-97)**, **128 (WRC-97)**, **129 (WRC-97)**, **133 (WRC-97)**, **134 (WRC-97)** and **726 (WRC-97)**;

2 APT Member countries common proposals

APT Member countries (Asia Pacific Telecommunity with 31 members) at its fourth meeting of the APT Preparatory Group for WRC-2000 (APG2000-4) considered a number of frequency bands above 30 GHz for high-density applications in the fixed service (HDFS). Indonesia supports these proposals.

For appropriate sharing criteria to protect the fixed service from other services to which they are allocated, the same bands should be established in each band.

Three groups of the common proposals submitted by APT are related to:

- Resolution 126 (WRC-97), allocation of the band 31.8-33.4 GHz for HDFS, review of pfd limits in Table S21-4 to SRS and ISS, and modification of S5.547 and S5.547A;
- Resolution 133 (WRC-97), allocation of the band 37-40 GHz, and 40.5-42.5 GHz, review of pfd limits in this band for non-GSO and GSO systems by insertion of text applied to Table S21-4, including review of Resolution 133 (WRC-97); and
- allocation of the bands above 50 GHz for HDFS and adding a footnote S5.ZZZ (output power densities at 55.78-59 GHz).

In essence, the practical approach of the sharing criteria of the band 37-42.5 GHz, is a “soft” segmentation of the said band, whereby HDFS is protected or permitted to have preferred pfd values below 40 GHz and FSS is protected, or to have preferred values above 40 GHz.

3 Proposals

In light of the above, Indonesia proposes:

INS/59/1

Revise Resolution **133 (WRC-97)** and consider the pfd limits of FSS and other services sharing the band for the protection and the dense and ubiquitous deployment of high-density applications of FS in the 37-40 GHz band, while allowing certain FSS uses of this band, such as feeder links, that would not otherwise constrain HDFS applications.

Reasons: The band 37-40 GHz is recommended to be used for dense and ubiquitous development of HDFS. FSS could still use this band for feeder links and other specific uses, however, dense use for high-density application of FSS in this band ought to be discouraged.

INS/59/2

Revise Resolution **134 (WRC-97)** for the purpose of studies in defining the sharing criteria between FSS and FS and other services, to support the ubiquitous deployment of high-density application of FS in the band 40.5-42.5 GHz, as a matter of urgency, while allowing certain FS uses of this band that would not otherwise constrain ubiquitous FSS earth stations.

Reasons: The band 40.5-42.5 GHz is recommended to be used for dense and ubiquitous development of FSS. High-density application of FS could still use this band, however, its dense use in this band ought to be discouraged.

Hence, ubiquitous development of high-density application of both FS and FSS could be planned harmoniously in the bands 37-40 GHz and 40.5-42.5 GHz respectively, without constraining either.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Indonesia (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

MSS ALLOCATION BELOW 1 GHz

(WRC-2000 agenda items 1.11 and 7.2)

Introduction

This administration has submitted, in the past, proposals for additional allocations for MSS below 1 GHz. We understand that many administrations were not yet ready to agree to such allocations, as they wanted assurance that the Little LEO system will not cause harmful interference to their terrestrial services, although recognizing the benefits of the system for complementing the crucial needs for accessibility to their national telecommunication network.

Taking into account the wishes of most administrations for more studies to be done, this administration has withdrawn its original proposal to have WRC-2000 consider an additional uplink allocation at this Conference, and proposes to postpone its consideration until the next available World Radiocommunication Conference, WRC-02/03. Indonesia further retains the other proposals to have further studies for a feeder-link allocation in the 1.4 GHz, and an additional allocation for the downlink in the 405-406 MHz band.

The Little LEO, a non-voice-non-geostationary (NVNG) low-Earth orbiting satellite constellation allows better penetration to remote areas using simple terminals or handhelds. The system will be capable of providing various new non-voice or slow data rate communications services, at the same price to both urban and rural areas, applicable to individuals, businesses of all sizes, governments and organizations. More importantly, it provides the same access for all citizens, rural as well as urban population. This is crucial to developing countries, where their networks are generally not well developed, in providing facilities to under-served urban areas as well as unserved rural areas.

Behind the policy of rural community empowerment are the potentialities of the vast majority of rural people if they were given equal opportunities to their urban counterparts. In fact, the biggest problem for developing countries is not between the metropolitan areas in industrialized and developing countries, but more between the metropolitan areas and the rural areas in their own country. The social and economic gap between urban and rural areas is due to the disparity in facilities, and further disturbs the distribution of resources in favour of the high-growth areas. Information and communication services are expected to break their isolation from the rest of the world, enhancing their knowledge and skills. The Internet and e-commerce facilities supposed to be established in the centre of the villages, are expected to provide new potential for village communities in raising their living standards - and even to become rich because of better deals for their products (vegetables, poultry, handicraft, and other agro-industrial products) with the outside world.

Having considered the above reasons, and supporting the common proposals from the Asia-Pacific Member States endorsed during the fourth meeting of the APT Preparatory Group for WRC-2000 (APG-2000/4), Indonesia proposes the following:

INS/60/1

Further studies on sharing between the mobile-satellite services below 1 GHz for narrow-band data applications and the terrestrial services, in particular digital trunked systems, are required to ascertain that it will not cause harmful interference to these terrestrial services, before additional allocations for the uplink of the mobile-satellite service in part of the 450-460 MHz band or other suitable bands could be proposed to WRC-02/03 for its consideration.

Reasons: The CPM99-2 Report concluded with favourable findings for the additional uplink allocations in the 450-470 MHz band. However, it also mentioned that more study is required for sharing between digital trunked systems and MSS (section 2.3.2.3).

Modify the relevant parts of Resolution 214 (Rev.WRC-97) referring to WRC-99 with WRC-02/03, as follows:

MOD INS/60/2

RESOLUTION 214 (Rev.WRC-~~97~~2000)

Sharing studies relating to consideration of the allocation of bands below 1 GHz to the non-geostationary mobile-satellite service

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

resolves

2 that WRC-~~99~~02/03 be invited to consider, on the basis of the results of the studies conducted within ITU-R and the studies referred to in *resolves* 1 above, additional allocations on a worldwide basis for the non-GSO MSS below 1 GHz;

~~4 that WRC-99 be invited to consider a review of the technical and regulatory constraints on non-GSO MSS allocations in the bands below 1 GHz, taking into account *considering d)*,~~

invites ITU-R

2 as a matter of urgency, to carry out studies in preparation for WRC-~~99~~02/03, ~~including a review of the operating constraints referred to in *noting c)* necessary to protect the existing and planned development of all of the services to which the bands below 1 GHz are allocated,~~ having regard to *noting d)*;

3 as a matter of urgency, to ~~carry out~~ continue studies in preparation for WRC-~~99~~02/03 with respect to interference mitigation techniques, such as the dynamic channel activity assignment system described in Recommendation ITU-R M.1039-1, necessary to permit the continued development of all of the services to which the bands are allocated;

5 to bring the results of these studies to the attention of WRC-~~99~~02/03 and the relevant preparatory meetings,

Reasons:

1 *Resolves* 4 is no longer required since this issue will be addressed at WRC-2000;

2 Review of the constraints under *invites ITU-R* 2 and as stated in *noting c)*, is no longer required as constraints on the duration of single transmission and the period between consecutive transmission from an individual MSS mobile earth station have been taken into account in the previous studies, and has demonstrated its adequateness to confine the additional interference within the 10% criteria. However, continued studies as referred to in *invites ITU-R* 2 and 3 could still be retained.

Continued studies for the feeder-link allocations in the 1.4 GHz band for the operation of MSS below 1 GHz are required pursuant to Resolution 127 (WRC-97). Consideration for its additional allocation at WRC-02/03 is required.

Modify *resolves* 4 of Resolution 127 (WRC-97) as follows:

MOD INS/60/3

4 to invite ~~a future competent conference~~WRC-02/03* to consider, on the basis of completion of studies referred to in *resolves* 1, 2 and 3, additional allocations for feeder links on a worldwide basis for non-GSO MSS systems with service links below 1 GHz,

Reasons: As a logical consequence of the studies carried out under Resolution 127 (WRC-97).

A study in ITU-R indicates that the frequency band 1 429-1 432 MHz could be suitable for use by non-GSO MSS feeder downlinks and the frequency band 1 390-1 393 MHz could be suitable for use for non-GSO feeder uplinks (Document 8D/TEMP/58(Rev.1)).

Modify *resolves to give the view* 3 of Resolution 722 (WRC-97), as follows:

MOD INS/60/4

3 to consider the results of the studies related to the following with a view to considering them for inclusion in the agenda of WRC-02/03, and as required in the agendas of other future conferences:

3.5 allocations on a worldwide basis for feeder links in bands around 1.4 GHz to the non-GSO MSS with service links operating below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolution **127 (Rev.WRC-~~97~~2000)**;

Reasons: *Resolves* 3.5 is a logical consequence of the studies carried out under Resolution 127 (WRC-97). As for the other *resolves* points, it is necessary for WRC-2000 to review its necessity to include it in the WRC-02/03 agenda.

Previous ITU-R studies under Resolution 127 (WRC-97), showed that sharing in the 1 390-1 393 MHz and 1 429-1 432 MHz bands was theoretically feasible, but the study group requested hardware testing to be performed to validate the theory. These tests will be complete prior to WRC-02/03 at which time allocations should be considered.

Continued studies are required for the possibility of additional downlink allocations in the band 405-406 MHz (space-to-Earth) for the MSS service, for its consideration of WRC-02/03.

Add *resolves to give the view* 3.5*bis* to Resolution 722 (WRC-97), as follows:

ADD INS/60/5

3.5*bis* additional allocations on a worldwide basis for downlinks in the 401-406 MHz band to the non-GSO MSS, taking into account the results of ITU-R studies conducted in response to Resolution 219 (WRC-97);

Reasons:

1 Member States in the Asia-Pacific Region endorsed a review of (not suppress) Resolution 219 (Rev.WRC-97). Section 2.3.3.1 of the CPM99-2 Report states that co-channel sharing between MSS and MetAids is not possible. However, sufficient studies have not been done to consider the possible transition of the meteorological aids service out of the band 405-406 MHz, which could minimize the impact on the meteorological aids service, while taking into account requirements for the implementation of non-GSO MSS, as well as considering a transition plan, pursuant to *resolves to invite ITU-R* 2 and 3.

2 The second paragraph of section 2.3.3.1 states that ITU-R has also completed studies regarding the use of the MetAids band and developed a draft revision to Recommendations ITU-R SA.1258-1 and ITU-R SA.1165-1. The studies conducted by several administrations and by WMO considered the worldwide spectrum requirements in this band for radiosonde systems in the MetAids service and for data collection systems in the EESS and the MetSat service.

3 The summary of section 2.3.3.3 states that operation of the MSS in the band 405-406 MHz is considered as not being feasible in the foreseeable future, based on assessments and studies carried out by ITU-R. Studies on improved technology and operational techniques may result, in the long term, in more efficient use of these bands, and may enable future review of requirements for the band 401-406 MHz. Some administrations are continuing studies in this area.

Modify the relevant parts of Resolution 219 (WRC-97) referring to WRC-99, as follows:

MOD INS/60/6

RESOLUTION 219 (Rev.WRC-~~97~~2000)

Studies relating to consideration of the allocation to the non-geostationary mobile-satellite service in the meteorological aids band 405-406 MHz and the impact on primary services allocated in the adjacent bands

The World Radiocommunication Conference (~~Geneva, 1997~~Istanbul, 2000),

noting

b) that Resolution **214 (Rev.WRC-~~97~~2000)** also addresses sharing studies relating to consideration of the allocation of bands below 1 GHz to the non-GSO MSS,

resolves

that WRC-~~99~~02/03 be invited to consider, based on the outcome of *resolves to invite ITU-R* above, the possibility of allocating the band 405-406 MHz to the MSS, including any appropriate transition plan,

Reasons: No other changes are required, taking into account Reasons 1, 2 and 3 to INS/60/5.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 61-E
5 April 2000
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PLENARY MEETING

Indonesia (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

APPENDIX S7, AGENDA ITEM 1.3

1 Introduction

Agenda item 1.3 (ITU-R studies in respect of Appendix S7 of the Radio Regulations), § 7.2.2.2 of the CPM Report, indicates that some issues should be studied further. These include, among others:

a) refinements to propagation mode (2) to address elevation angle dependency and the displacement of the centre of propagation mode (2) contour from the coordinating earth station;

b) methods to address propagation mode (1) water vapour density for both radio climatic Zones B ("cold" sea) and C ("warm" sea).

The purpose of Appendix S7 is to set the coordination trigger for determining whether coordination is required between an earth station and a terrestrial station. The method of calculation is based on conservative assumptions for propagation path and for the unknown terrestrial parameters and, therefore, on an unfavourable assumption with regard to interference potential. The above assumptions and conditions result in calculation distances and coordination areas that are larger than actually required, causing more work and unnecessary coordination.

In order to improve this time-consuming process, the relevant technical parameters which are available in ITU-R Recommendations and/or actual technical parameters should be used.

2 Results of studies

Studies have been carried out by the Radiocommunication Bureau, and some of these parameters appear in Recommendations and Reports.

a) Elevation angle of the earth station:

The elevation angle of the earth station plays an important role in determining the coordination distance relating to the rain propagation path.

In rain-scatter propagation mode (2), the rain attenuation is determined by specific attenuation γ_R and diameter of the rain cell d_C.

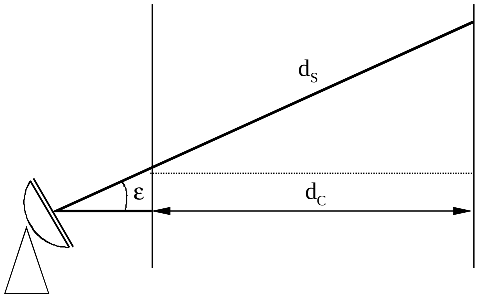
The specific attenuation (dB/km) due to rain cells is given by:

$$\gamma_R = k\,R^{\alpha} \tag{1}$$

and the rain cell is:

$$d_C = 3.3\,R^{-0.08}\ \text{km} \tag{2}$$

The effective diameter of the rain cell depends on the path d_S (km). Thus,



CMR/61-01

$$d_S = \frac{d_C}{\cos\varepsilon}$$

$$d_S = \frac{3.3}{\cos\varepsilon} R^{-0.08} \tag{3}$$

where:

θ = elevation angle of the earth station (in degrees)

R = rain rate (mm/h)

k = factor as function of frequency

For attenuation Γr outside the rain cell between the edge of the cell and a point at distance d, an exponential decrease is assumed, as follows:

$$\Gamma_R = \frac{\gamma_R r_m}{\cos\varepsilon}\left(1 - e^{-d/r_m}\right)(\text{dB})$$

r_m is the scale length of attenuation (in km)

where:

$$r_m = 600\,R^{-0.5}\,10^{-(R+1)^{0.19}}\ \text{km}$$

Factor e^{-d/r_m} is very small $\left(e^{-d/r_m} \approx 0\right)$ and can be ignored

Thus,

$$\Gamma_R = \frac{\gamma_R r_m}{\cos\varepsilon}$$

$$= (k\,R^{\alpha})\,600\,R^{-0.5}\,[10^{-(R+1)}]^{0.19} / \cos\varepsilon$$

$$= 600 \quad k\,R^{\alpha-0.5}\,[10^{-(R+1)}]^{0.19} / \cos\varepsilon$$

The above analysis shows that the effective diameter of the rain cell and attenuation outside the common volume are a function of the elevation angle of the earth station.

It is therefore suggested that equations II-10 and II-12 in the suggested new draft text for Appendix S7 (draft Recommendation ITU-R SM.[Document 1/1004] be replaced by:

INS/61/1

$$d_S = \frac{3.3\,R^{-0.08}}{\cos\varepsilon}$$

INS/61/2

$$\Gamma_2 = \frac{600\,k}{\cos\varepsilon} R^{(\alpha-0.05)} \times \left[10^{-(R+1)}\right]^{0.19}$$

respectively.

b) Water vapour density γ_W:

The distinction between Zone B (“cold” sea) and Zone C (“warm” sea) is due to the difference in water vapour density γ_W in each zone.

According to Recommendation ITU-R P.836, for Zone C the value γ_W varies from 1 to 10 g/m^3, and for Zone B from 15 to 25 g/m^3 (see Attachment 1). Based on the above values, it is suggested that the value of γ_W = 10 g/m^3 for Zone C and γ_W = 20 g/m^3 for Zone B. Thus:

INS/61/3

$\gamma_{Wds} = \gamma_W\ (10.0)$ for Zone C (I-13c)

and

INS/61/4

$\gamma_{Wds} = \gamma_W\ (20.0)$ for Zone B (I-13c1)

c) Determination of the centre of propagation mode (2) contour:

It is found that the centre of propagation mode (2) contour is the distance Δd (km) from the earth station along the azimuthal angle of the earth station (in the horizontal plane). The distance Δd can be calculated using:

INS/61/5

$$(\Delta d)_{Te} = 5.88 \times 10^{-5}\,(d_r - 50)\cot\varepsilon$$

for a transmitting earth station

INS/61/6

$$(\Delta d)_{Re} = 5.88 \times 10^{-5}\,d_r \cot\varepsilon$$

for a receiving earth station

where:

d_r = coordination distance for propagation mode (2)

ε = elevation angle of the earth station

We can see that the distance Δd (see Attachment 2) is a function of d_r.

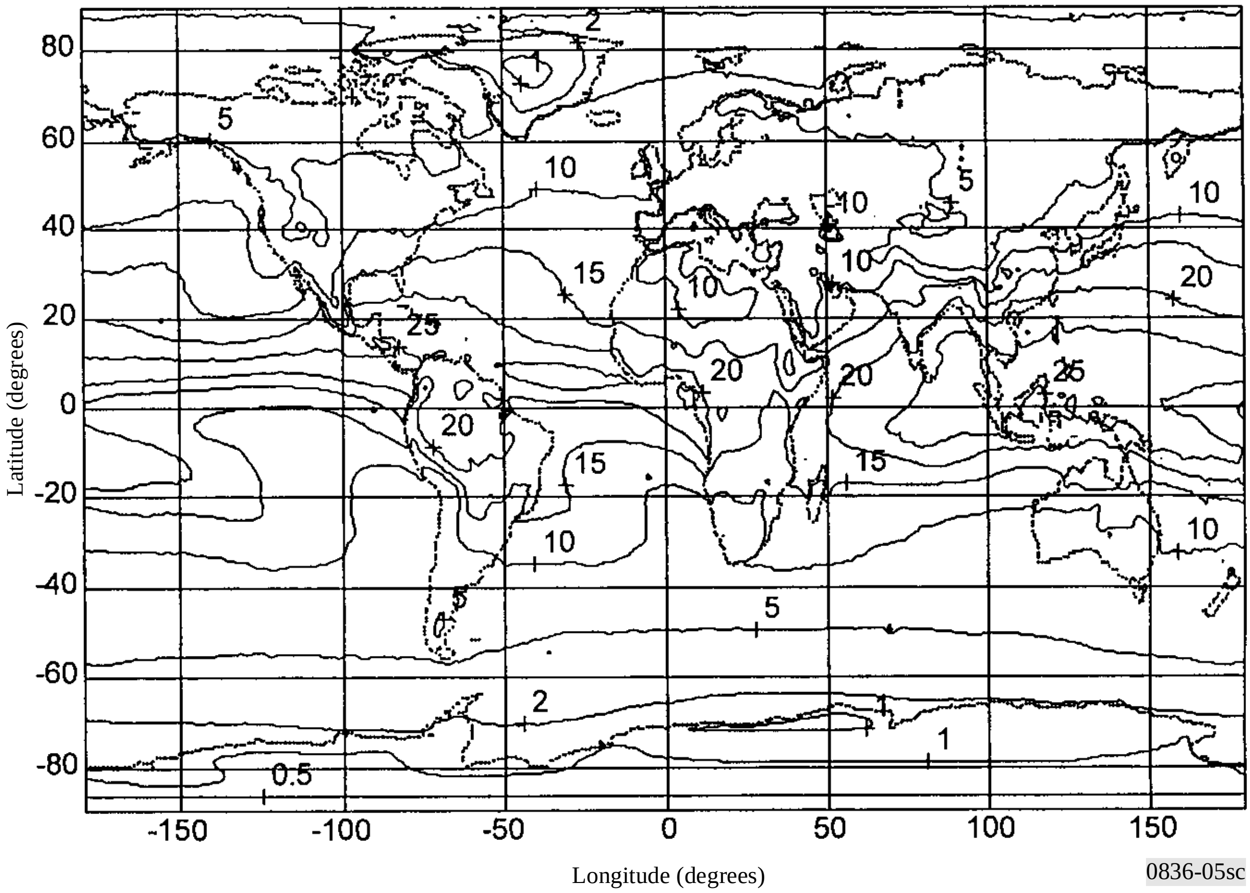
It is suggested that equation II-23 in the suggested new draft text for Appendix S7 be replaced by the above two equations.

Attachments: 2

ATTACHMENT 1

FIGURE 5

September, October, November: surface water vapour density (g/m³)



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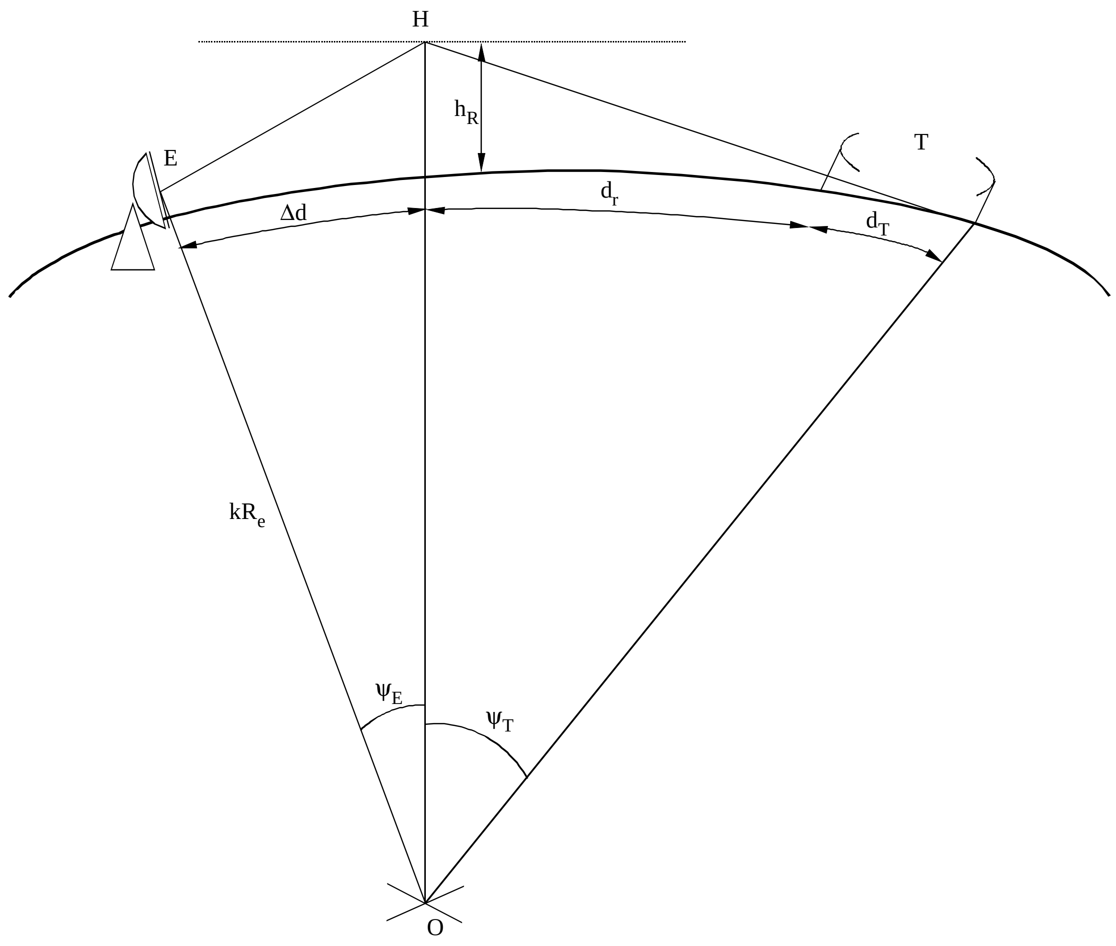
ATTACHMENT 2



CMR/61-02

$$\Psi_E = \frac{\Delta d}{k\,R_e}\ \text{rad}$$

k = refraction index
Re = radius of the Earth
d_r = rain coordination distance
d_T = terrestrial station distance

$$\Psi_T = \frac{d_r}{k\,R_e}$$

$$\cos\Psi_T = \frac{k\,R_e}{OH} \quad \rightarrow \quad OH = \frac{k\,R_e}{\cos\Psi_T}$$

$$h_R = OH - k\,R_e$$

$$= \frac{k\,R_e}{\cos\Psi_T} - k\,R_e$$

$$h_R = k\,R_e\left(\frac{1}{\cos\Psi_T} - 1\right)$$

$$\tan\varepsilon \approx h_R/\Delta\,d$$

$$\Delta d = \frac{h_R}{\tan \varepsilon} = \frac{k\, R_e}{\tan \varepsilon}\left(\frac{1}{\cos \Psi_T} - 1\right)$$

$$\Delta d = \frac{k\, R_e}{\tan \varepsilon}\frac{(1 - \cos \Psi_T)}{\cos \Psi_T}$$

ψ_T is very small,

$$\cos \Psi_T = 1 - \Psi_T{}^2 / 2$$

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$$\Delta d = \frac{k\, R_e}{\tan \varepsilon}\left(\frac{d_r}{k\, R_e}\right)^2 \Big/ 2 \qquad = \qquad \frac{d_r{}^2}{2\, kR_e \tan \varepsilon}$$

if $d_T = 50\,\text{km}$
$k = 4/3$
$R_e = 6\,370\,\text{km}$

$$\Delta d_1 = \frac{(d_r - 50)^2}{17\,000}\cot \varepsilon$$

The above formula is for an earth station with respect to a receiving terrestrial station.

For the case of a receiving earth station, the following equation should be used:

$$\Delta d_2 = \frac{d^2}{12\,000}\cot \varepsilon \quad (\Delta d_2 \text{ must be greater than } \Delta d_1 - \text{see figure})$$

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Addendum 1 to Document 62-E*
12 May 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

COMMITTEE 4

Uruguay (Eastern Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

The Administration of Uruguay hereby makes the following proposal for the work of the World Radiocommunication Conference (WRC-2000) under agenda item 1.1 with respect to the footnote contained in Article S5:

MOD URG/62/2

S5.390 In Argentina, Brazil, Chile, Colombia, Cuba, Ecuador, ~~and~~ Suriname and Uruguay, the use of the bands 2 010-2 025 MHz and 2 160-2 170 MHz by the mobile-satellite services shall not cause harmful interference to stations in the fixed and mobile services before 1 January 2005. After this date, the use of these bands is subject to coordination under No. **S9.11A** and to the provisions of Resolution **716 (WRC-95)**.

MOD URG/62/3

S5.481 *Additional allocation:* in Germany, Angola, China, Ecuador, Spain, Japan, Morocco, Nigeria, Oman, Democratic People's Republic of Korea, Sweden, Tanzania, ~~and~~ Thailand and Uruguay, the band 10.45-10.5 GHz is also allocated to the fixed and mobile services on a primary basis.

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* Pursuant to Resolution 26 (Rev.WRC-97) the secretariat notes that this contribution was received on 12 May 2000.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 62-E*[*]
3 April 2000
Original: Spanish

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Uruguay (Eastern Republic of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

The Administration of Uruguay hereby makes the following proposal for the work of the World Radiocommunication Conference (WRC-2000) under agenda item 1.1 with respect to the footnote contained in Article S5:

MOD URG/62/1

S5.480 *Additional allocation:* in Brazil, Costa Rica, Ecuador, Guatemala, Honduras, ~~and~~ Mexico and Uruguay, the band 10-10.45 GHz is also allocated to the fixed and mobile services on a primary basis.

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[*] Pursuant to Resolution 26 (Rev.WRC-97), the secretariat notes that this contribution was received on 3 April 2000.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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3 April 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Norway

PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.1

In accordance with WRC-2000 agenda item 1.1, administrations should review the footnotes to the Table of Frequency Allocations in the Radio Regulations with the view to delete their country footnotes or to have their country's name deleted from footnotes, if the footnotes are no longer required.

Norway therefore proposes modifications, as follows, to the following footnotes:

MOD NOR/63/1

S5.112 *Alternative allocation:* in Bosnia and Herzegovina, Cyprus, Denmark, France, Greece, Iceland, Italy, Malta, ~~Norway,~~ Sri Lanka, Turkey and Yugoslavia, the band 2 194-2 300 kHz is allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

Reasons: This footnote is no longer required by Norway.

MOD NOR/63/2

S5.114 *Alternative allocation:* in Bosnia and Herzegovina, Cyprus, Denmark, France, Greece, Iraq, Italy, Malta, ~~Norway,~~ Turkey and Yugoslavia, the band 2 502-2 625 kHz is allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

Reasons: This footnote is no longer required by Norway.

MOD NOR/63/3

S5.117 *Alternative allocation:* in Bosnia and Herzegovina, Cyprus, Côte d'Ivoire, Denmark, Egypt, France, Greece, Iceland, Italy, Liberia, Malta, ~~Norway,~~ Sri Lanka, Togo, Turkey and Yugoslavia, the band 3 155-3 200 kHz is allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

Reasons: This footnote is no longer required by Norway.

MOD NOR/63/4

S5.495 *Additional allocation:* in Bosnia and Herzegovina, Croatia, Denmark, France, Greece, Liechtenstein, Monaco, ~~Norway,~~ Uganda, Portugal, Romania, Slovenia, Switzerland, Tanzania, Tunisia and Yugoslavia, the band 12.5-12.75 GHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a secondary basis.

Reasons: Norway does not use this band for either the fixed or the mobile services any more.

INTERNATIONAL TELECOMMUNICATION UNION

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PLENARY MEETING

Note by the Secretary-General

IATA INFORMATION PAPER

I have the honour to bring to the attention of the Conference, at the request of the International Air Transport Association (IATA), the annexed information paper.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

Introduction

The International Air Transport Association (IATA) represents 269 international air carriers, or more than 95% of the world's scheduled international carriers. The air transport industry carries more than 1.6 billion passengers per annum and this is expected to grow to 2.3 billion by the year 2010. Equally importantly the industry carries 40% by value of the world's manufactured exports. The growing world economy requires an air transport industry capable of delivering passengers and goods on time. In 1998 the air transport industry provided at least 28 million jobs for the world's workforce and USD 1.360 trillion in gross annual output. The airline industry is the prime engine of international travel and tourism, one of the fastest growing sectors of the world economy, representing some 12% of the world's Gross Domestic Product.

To support the continued growth in the world economy, aviation must continue to introduce new technologies to maintain and improve safety and efficiency and reduce the ATC delays and the environmental impact of its operations. These new technologies can only be implemented if the spectrum presently used by aviation is protected from interference from other users and access is guaranteed.

General concerns

WRC-2000 has the task of balancing a number of important public interest concerns. The growth of air transport and the benefits it delivers to the communities that it serves is in part attributable to the work of ITU assuring the industry of sufficient spectrum to allow it to operate safely.

Aviation relies on adequately protected frequencies as a tool to be able to do its job safely and efficiently. A large part of the mobile telecommunication industry uses spectrum as a direct revenue producing commodity. These respective uses of the spectrum need to be addressed in an equitable and balanced manner according due priority to community needs.

Safe operations are the basis of the viability of the aviation industry. It is also the prime issue for States, acting through ICAO. It is the reason why States insist on global standards agreed in advance of the introduction of any technologies. This internationally agreed certification process is extremely rigorous and as a prerequisite requires consideration of all known failure modes including interference to communication and navigation signals. There is no "call waiting" facility during short finals. A "lost call" for an aircraft can be disastrous.

There is growing concern towards the tendency of the modern spectrum management process to make allocation decisions in the expectation that subsequent studies will justify these decisions. This is not the way States demand that aeronautical authorities approach their task. The aviation industry urges States to apply the same rigour for allocation of spectrum as they require for certification of aircraft systems. Decisions should never by taken before studies are completed.

IATA's position is:

- The system currently in place forms a vital part of the world's capital infrastructure and continues to be necessary for many users, including civil aviation. As the world's economy globalizes, the integrity of this public system needs to be maintained by protecting it from interference.
- There must be a balance between those users of frequencies that resell and profit from that action and those that use them for other purposes. This includes the frequencies for safety of life functions in aviation operations.

- The next generation of aviation radio systems, now being introduced, has been predicated on interference-free operation, and has been certificated for safe use on that basis.
- This certification process is thorough, rigorous, and in advance, as required by States, and is appropriate given that lives are at stake. Those same standards must apply to allocation decisions that affect these services.
- The new technologies, such as satellite-based communications systems, have the potential to reduce congestion through improved air traffic control, reduce delays and make air travel safer.
- A number of studies have been mandated to investigate and review these issues. No decisions can be made until those studies have been completed, and it can be shown that interference problems can be resolved in a manner satisfactory to all interested parties.

WRC-2000 agenda item 1.1 - requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution 26 (Rev.WRC-97)

Country footnotes Nos. S5.181, S5.197 and S5.259 were inserted by WARC Mob-87 in the three bands concerned with the provision of instrument landing systems (ILS) (RR Nos. S1.104, S1.105 and S1.106). The footnotes allocated the bands to the mobile service on a secondary basis, with the express provision that mobile service stations "shall not be introduced in the band until it is no longer required for the aeronautical radionavigation service by any administration which may be identified in the application of the procedure invoked under No. **S9.21**".

The ICAO standardized ILS is an operational system used universally for precision landing and guidance down to and along the runway. Stations of the mobile service up to 100 km from the airport have the potential to cause harmful interference to aircraft using any component of the ILS system. The use of these frequencies for mobile services is, therefore, severely constrained, particularly in areas where there is a widespread use of ILS.

In the years since WARC Mob-87, ILS services have continued, and even increased in some areas. **There is no expectation that the need for ILS will diminish**. **As the need for ILS will continue, there is no practical value in maintaining these footnotes.** The allocation should be restored to an exclusive basis, as it was prior to 1987.

Airline position: agenda item 1.1

The aviation industry supports the deletion by WRC-2000 of footnotes S5.181, S5.197 and S5.259.

WRC-2000 agenda item 1.6.1 - frequencies for IMT-2000

It is claimed that IMT-2000 will require additional spectrum between 1 and 3 GHz for mobile services. One of the bands identified to allow for this increased demand is the aeronautical radionavigation band at 2 700-2 900 MHz. Deployment is understood to be in those urban areas where the highest number of channels is required. These are the same areas where the highest concentrations of airport radar using the band are located.

The band 2 700-2 900 MHz is used for primary radar surveillance systems to ensure safe separation of aircraft. At airports, where the density of air traffic is high, they maintain safe and efficient landing rates. Airport congestion has become critical in many parts of the world, and delays have become a major political issue.

Primary radar is also used to monitor and to detect intruder aircraft flying into controlled areas without an approved flight-plan, as well as for meteorological and law enforcement purposes. The band is also used for national defense and security purposes. **In many urban areas the band is fully occupied.**

Theoretical studies and simulations on sharing reported to ITU-R have not produced conclusive evidence to support sharing between radar and terrestrial mobile stations. Before any sharing can be recommended, the operational and regulatory aspects (including the provision of a safety case) must also be addressed in accordance with agreed international standards. A minimum requirement is a safe framework of operation that includes agreed procedures for the expeditious and effective removal of interference.

The assurances necessary to protect this safety-critical service are not capable of realization without thorough examination, which cannot be achieved in time to enable a decision at WRC-2000. The aviation industry should be involved at all stages in any study being undertaken to determine the safety case for any sharing of the 2 700-2 900 MHz band. **Until that time, it cannot support any allocation to mobile services.**

IMT-2000 also includes satellite components proposed to use frequencies allocated to the MSS. In the case of the mobile satellite bands to be used by aeronautical services at 1.5-1.6 GHz, it is necessary that the special considerations, in particular those defined in No. S5.357A, for use of these bands are preserved intact.

Airline position: agenda item 1.6.1

No allocation to be made to mobile services in the aeronautical radionavigation service band 2 700-2 900 MHz at WRC-2000.

A comprehensive examination of the technical, operational and regulatory aspects (safety case) to be carried out before any allocation is approved.

In the MSS bands at 1.5-1.6 GHz the special considerations for use of these bands by aeronautical services contained within footnotes, particularly No. S5.357A, must be maintained.

WRC-2000 agenda item 1.7 - interference on HF aeronautical service bands

This agenda item is the “review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting the operational, distress and safety communications, taking into account Resolution **346 (WRC-97)**”.

The frequencies allotted to the aeronautical mobile (R) service in Appendix S27 are used to preserve the “safety and regularity of flight” along civil air routes in accordance with No. S43.1. In some areas of the world, airlines are experiencing harmful interference to their Air Traffic Services communications in flight. This is a serious and, unfortunately, increasing problem. The transmissions are believed to originate from unlicensed installations.

The operational use of the HF bands is coordinated internationally by ICAO and satisfies the present and future uses of the service. Any amendments to the Standards for equipment characteristics and performance contained in ICAO Annex 10, which are in accord with Appendix S27 to the Radio Regulations, would necessitate worldwide changes in aircraft equipment. The solution to this problem is considered to be more appropriate to a rigorous enforcement and control of the radio environment, than to technical measures of doubtful effectiveness, or by a review of the frequencies contained in the allotment plan.

The airlines request ITU’s urgent attention to the removal of this harmful interference **through effective enforcement of the regulations and international cooperation.**

Airline position: agenda item 1.7

To support measures leading to a removal of all unauthorized use of bands between 850 kHz and 22 MHz that are allocated to the aeronautical mobile (R) service through effective enforcement of the regulations and complementary international cooperation.

No change to Appendix S27.

WRC-2000 agenda item 1.9 - allocation in band 1 559-1 567 MHz

Satellite navigation is a core technology for the future of aviation. It enables airlines to improve aircraft navigation and positioning for increased airspace capacity, improved safety, and enhanced operational efficiency. These are all international imperatives. Aviation needs to sustain the integrity and operational viability of GNSS (GPS, GLONASS and augmentation systems) in order to continue supporting implementation of the worldwide, seamless, ATS infrastructure adopted by States through ICAO.

The GNSS is the cornerstone of Eurocontrol's ATM 2000+ Programme, U.S. Free Flight initiatives, and developments in South America, Asia/Pacific, and Africa. **Unimpeded evolution of the GNSS is key to the continued safe growth of global air transport and the national economies which aviation serves. It will reduce flight times, with subsequent reduction of congestion and environmental impact.**

WRC-97 adopted Resolution 220 (WRC-97) in response to a proposal to add an allocation to the 1 559-1 567 MHz band for mobile-satellite services. Radiocommunication WP 8D was then requested to study the feasibility of sharing between MSS and the aeronautical radionavigation-satellite services (ARNS/RNSS). No. S4.10 states, "Member States recognize that the safety aspects of radionavigation and other safety services require special measures to ensure their freedom from harmful interference; it is necessary therefore to take this factor into account in the assignment and use of frequencies."

Radiocommunication WP 8D has completed its feasibility studies on MSS interference to GPS under Resolution 220 (WRC-97). **The studies concluded that sharing with MSS in the 1 559-1 567 MHz band is not feasible,** a view shared by ICAO. **The CPM Report endorses this conclusion. The aviation industry supports the ITU study recommendations.** Continuing studies after this conclusive report would discourage operational stability.

Airline position: agenda item 1.9

No allocation should be made to the MSS in the band 1 559-1 567 MHz.

Suppress Resolution 220 (WRC-97) at WRC-2000.

WRC-2000 agenda item 1.10 - AMS(R)S

Resolution 218 (WRC-97) was agreed at WRC-97 to determine, *inter alia*, the "feasibility of prioritization, real-time pre-emptive access and, if necessary, interoperability" for AMS(R)S when operating in a "generic" environment. Future spectrum requirements were also to be addressed for safety communications as defined in Categories 1 to 6 of Article S44. These studies were to identify the necessary practical aspects of the operation of the generic allocations made by WRC-97 in the 1.5/1.6 GHz MSS bands. **These studies have not yet been concluded.**

Air-ground communication, utilizing satellites for air-traffic management and other airline purposes, has been identified as fundamental for the future of air transport. System and equipment standardization through ICAO has been globally agreed. **Aviation systems must have global interoperability, which requires worldwide harmonization.** These standards are subject to a long period of development and require a significant retrofit of aircraft around the world. Over 2 500 aircraft have been fitted with terminals at a significant level of investment and the number is increasing steadily.

The present system is certified for Air Traffic Services communication. In order to obtain the benefit of these developments, guaranteed access to adequate frequencies is a prerequisite. A situation of disrupted or unsafe communications, or limitations on operating schedules due to frequency shortage, has serious implications for all airlines and the communities which they serve.

CPM-99 has examined the technical aspects contained in Resolution 218 (WRC-97). Pre-emption within a network, for Categories 1 to 6 of Article S44, is feasible. **Between networks, there is no evidence of the feasibility of pre-emption.** Interoperability between different MSS networks would require the incorporation of special technical features. **Further work is necessary to provide conclusive evidence that this would be feasible.**

CPM noted that aviation would require 10.8 MHz up to 2 010 and 18 MHz up to 2 018. CPM favours the capacity planning approach carried out through periodic coordination between operators of MSS services. Aviation has serious concerns about this and on the adequacy of No. S5.357A to have the necessary regulatory force to ensure future access to the AMS(R)S. **Operator coordination by itself, without the involvement of administrations, is not sufficient. The airline view is that clear mechanisms must be given regulatory force to guarantee access into the future.**

Airline position: agenda item 1.10

Provide adequate exclusive allocations to meet the expected growth in AMS(R)S. The present estimate for this is 10.8 MHz by 2010.

It is necessary to provide a clear mechanism to give regulatory force to ensure that AMS(R)S communications in Categories 1 to 6 of Article S44 are given priority and immediate access at all times. Services operating in the subject band must support the requirement to enable the priority and pre-emption for AMS(R)S communications within a network and between networks.

Maintain and expedite the studies under Resolution 218 (WRC-97) on these matters.

WRC-2000 agenda item 1.15.1 - allocations for new RNSS in bands from 1 to 6 GHz

This item addresses requirements for additional spectrum for existing RNSS and future systems in four separate frequency bands involving three ARNS bands and the existing RNSS band.

Band 1 151-1 215 MHz

This band supports distance measuring equipment (DME) services to aircraft. DME provides accurate distance measuring relative to a ground station, used for both approach and en-route navigation operations. The operation can be affected by the addition of an RNSS service. The DME system remains a fundamental part of the aeronautical aviation infrastructure. **Reduction of DME facilities will incur penalties in increased delays and the inability to meet increasing air traffic demand.** The addition of RNSS would only be acceptable provided that it can be conclusively shown that it neither causes interference to DME nor leads to claims for protection from DME.

Band 1 260-1 300 MHz

This ARNS band is used for primary surveillance radar for air traffic management purposes and is a safety service requiring protection from interference. The non-safety RNSS element proposed for this band is not anticipated to be used by aircraft. As stated above, an RNSS allocation may be acceptable provided it will not cause interference nor lead to claim for protection. Again, it is essential to study the pfd limits for downlink transmissions and other related matters.

Band 1 559-1 610 MHz

At present the ICAO global navigation satellite system (GNSS) operates in this band. New RNSS systems have the right of entry into this band, subject to coordination in compliance with the Radio Regulations. **Plans for expanding RNSS in this band must continue to take account of aviation requirements.**

Band 5 000-5 150 MHz

The band 5 000-5 150 MHz is reserved for microwave landing system (MLS) under No. S5.444A. The part of the band 5 030-5 090 MHz supports the present ICAO MLS channel plan, with the remainder earmarked for future use. **Resolution 114 (WRC-95) requests ICAO to review the use of this band and to report to WRC-02/03.** That report is in the process of being prepared.

MLS is a modern replacement for ILS and is fully standardized by ICAO. The ICAO new communication, navigation, surveillance and air traffic management (CNS/ATM) concept includes MLS for precision approaches and landings. Its protection from harmful interference must be assured through regulatory provision. Recommendation ITU-R S.1342 governs the coordination between MLS and stations in the FSS in the band 5 090-5 150 MHz. Any change in allocation should only be agreed upon after the studies required under Resolution 114 (WRC-95) have been concluded. MLS will be deployed at a number of major airports around the world, for instance, London Heathrow.

RNSS (space-to-Earth) use in the part of the band 5 000-5 030 MHz is acceptable to airlines provided that MLS use in the adjacent band is protected. **Any Earth-to-space use in this band must address the question of out-of-band emissions**, which may affect MLS services in the band 5 030-5 150 MHz.

General Comment: When the feasibility of new allocations in existing ARNS is being studied, due allowance must be made for the limited potential to provide physical isolation between antennas on board aircraft.

Airline position: agenda item 1.15.1

Band 1 151-1 215 MHz

An RNSS (space-to-Earth) allocation of minimum size in this band is acceptable, subject to adequate regulatory measures to protect existing and future uses of DME. The RNSS service should be on a no-protection basis with respect to DME use. IATA supports studies to define these measures, including the value of a pfd limit on the RNSS downlink transmissions.

Band 1 260-1 300 MHz

An RNSS allocation in this ARNS band is acceptable, subject to adequate regulatory measures to protect existing services. The allocation should be on a no-protection basis. IATA supports studies to define these measures, including the value of a pfd limit on the RNSS downlink transmissions before the allocation is made.

Band 1 559-1 610 MHz

New RNSS will require coordination in accordance with the appropriate Radio Regulations and must accommodate aviation requirements.

Band 5 000-5 150 MHz

a) **The study required by Resolution 114 (WRC-95) must be completed before any allocation is made.**

An allocation to RNSS in the band 5 030-5 150 MHz is not supported.

b) **An allocation to RNSS (space-to-Earth) is acceptable in the band 5 000-5 030 MHz, subject to the protection of MLS services in the band 5 030-5 150 MHz.**

c) **RNSS (Earth-to-space) use of the band 5 000-5 010 MHz will require study to ensure protection of MLS from out-of-band emissions.**

WRC-2000 agenda item 1.15.3 - fixed service use of band 1 559-1 610 MHz

Footnotes No. S5.355 (secondary) and No. S5.359 (primary) permit the use of this RNSS band by fixed services in the countries whose names appear in the footnotes. ITU-R studies have concluded that these services can interfere with RNSS use by aircraft at distances in excess of 100 km. **Aircraft use of RNSS for air navigation comes under the terms of Nos. S1.59 and S1.169 and must be protected against harmful interference.** Appropriate procedures contained in the Radio Regulations for dealing with harmful interference to apply. **No safe sharing is possible between these two services.**

GNSS is a core technology to meet, safely and efficiently, the current and anticipated demands for air traffic, whilst reducing congestion and environmental impact. **An interference risk such as that presented by fixed service use seriously impedes the establishment of a global regulatory approval regime for GNSS.** These footnotes should be deleted.

Airline position: agenda item 1.15.3

The airlines support the deletion of Nos. S5.355 and S5.359 in their entirety.

Document 65-E
3 April 2000
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PLENARY MEETING

Spain

MAINTAINING HISPASAT-2 FREQUENCY ASSIGNMENTS IN APPENDICES S30 AND S30A PLANS

In 1991, the Administration of Spain communicated to the former International Frequency Registration Board (IFRB) the information listed in Annex 2 of Appendices 30 and 30A relating to a new satellite system, HISPASAT-2, requesting IFRB to modify the Plans contained in those Appendices, in application of Article 4 thereof. Since then, a series of events have taken place in ITU that have significantly altered the regulatory environment within which the Administration of Spain has had to apply the requisite procedures for modification of the Plans.

As a result of these events and associated resolutions, the Administration of Spain was forced to take a series of decisions that changed its initial project, so as to adapt to the new technical and regulatory environment that was being developed.

These include, *inter alia*, modification of the technical parameters of the HISPASAT-2 network, and particularly a change of orbital position (from 31º W to 30º W) adopted by WRC-97. In consequence of the above, the Administration of Spain was obliged to modify the date of bringing into use of HISPASAT-2, postponing it by ten months, from 31 January 1999 to 1 December 1999.

Nevertheless, the Administration of Spain, knowing that the frequency assignments to the HISPASAT-2 network were entered in Part B of the Plan in 1996, considered that, pursuant to § 4.3.17 of Article 4 of Appendix S30: "*The frequency assignment concerned shall enjoy the same status as those appearing in the appropriate Regional Plan and will be considered as a frequency assignment in conformity with the Plan*". Also, when WRC-97 adopted a revision of the Plans, the HISPASAT-2 frequency assignments were, of course, included as an integral part of the Plan.

This is entirely confirmed by the wording of *resolves* 2 of Resolution 533 (WRC-97), which states in relation to the application of § 4.3.5 of Article 4 that "*the replacement of assignments at 31° W by assignments at 30° W and 33.5° W; shall not be considered as new or additional assignments under § 4.1b) of Article 4 of Appendices **S30** and **S30A**. Therefore, these assignments shall not be subject to the provisions of § 4.3.5 of Appendix **S30** and § 4.2.5 of Appendix **S30A** and the associated Rules of Procedure. In particular, the associated orbital positions shall be treated as* "*orbital positions in the Plan*"*, and the assignments shall not lapse even if they are not brought into use within eight years from the adoption of the revised Plans"*.

Therefore, the Administration of Spain, by virtue of those provisions, considered that the frequency assignments to HISPASAT-2 were covered in the wording of Resolution 533.

However, in 1999 the Radiocommunication Bureau informed the Administration of Spain that the frequency assignments to the HISPASAT-2 network were to be deleted from the Plan as a result of the Rule of Procedure on § 4.3.5 of Appendix S30 as revised by the Radio Regulations Board in December 1998.

In view of that decision, which seriously affected its interests, and in defence of those interests, the Administration of Spain submitted a report to the Radio Regulation Board at its 18th meeting (8-12 November 1999) setting out the reasons why it considered that the frequency assignments in question should be maintained in the Plans. At that meeting, RRB recognized that there was some ambiguity between the text of *resolves* 2 of Resolution 533 and certain sections of Articles 11 and 9A of Appendices S30 and S30A, respectively, and thus decided to instruct the Bureau "*to continue to take into account HISPASAT-2 in its calculations on a provisional basis pending the decision of WRC-2000 on the matter*".

The Administration of Spain notified the Bureau of the launch of the third satellite in the HISPASAT series in February 2000; this new satellite uses the frequency assignments contained in the HISPASAT-2 network. The Administration of Spain also fulfilled the due diligence process, even though this was not required from the regulatory point of view, and notified the Bureau that the date of bringing into use of this new satellite was 16 February 2000.

In the light of the foregoing, the Administration of Spain **requests WRC-2000**:

- to maintain the frequency assignments to HISPASAT-2 in the Appendices S30 and S30A Plans and to instruct the Bureau to take the necessary action in order to carry out this decision.

Details of the procedure followed and the grounds on which the Administration of Spain bases its request for consideration by WRC-2000 are given in the annex to this document.

Annex: 1

ANNEX

Introduction

1 In 1991, the Administration of Spain communicated to the International Frequency Registration Board (IFRB) the information listed in Annex 2 of Appendices 30 and 30A relating to a new satellite system, HISPASAT-2, requesting IFRB to modify the Plans contained in those Appendices, in application of Article 4 thereof. The modification consisted in adding 10 channels to the 5 channels already recorded in the Plans on behalf of Spain. While both Plans were based on the use of analogue modulation, the Administration of Spain signified its intention to use the 10 channels with analogue and/or digital modulation, as permitted by the provisions of both Appendices. The system was scheduled to be brought into use on 31 January 1999, i.e. less than eight years after receipt of the information by IFRB (7 March 1991).

Since 1992, however, a series of events has taken place in ITU that has significantly altered the environment within which the Administration of Spain has had to apply the requisite procedures for modification of the Plans. These include:

- Abolition of IRFB by the Additional Plenipotentiary Conference, (Geneva, 1992), replacing it with the part-time Radio Regulations Board.
- Adoption by the 1995 World Radiocommunication Conference (WRC-95) of the simplified Radio Regulations. While the procedures of Appendices 30 and 30A were not incorporated in the standard procedure of the simplified Regulations, many of their parts were modified with a view to bringing them in line with standard procedure.
- As part of the process of updating the technical parameters, WRC-95 adopted a series of measures on the basis of which entries in the Plans would be revised; those measures were to be used for those systems, such as HISPASAT-2, for which the Plan modification process was under way.
- Adoption by the 1997 World Radiocommunication Conference (WRC-97) of revised Plans including those systems, such as HISPASAT-2, for which the procedure of Article 4 had been successfully completed.
- A series of Rules of Procedure, some of which have been modified more than once.
- Delay in the issuing of Rules of Procedure relating to the calculations required for identifying the administrations that may be affected by the use of digital modulation employed by the HISPASAT-2 system. The only calculation method that the Radiocommunication Bureau could use was one provided by Joint Working Party 10-11S only in 1996, i.e. more than five years after receipt of the information by IFRB.

2 Administrations, in keeping with their international commitments, have to operate their systems in conformity with the Plan as indicated in § 3.1 of Article 3, which stipulates that: "*The Member States in Regions 1, 2 and 3 shall adopt, for their broadcasting-satellite space stations operating in the frequency bands referred to in this Appendix, the characteristics specified in the appropriate Regional Plan and the associated provisions*". The Administration of Spain, being among them, faced constant uncertainty regarding the characteristics of HISPASAT-2 that would finally appear in the Plans due to the continuous changes referred to in section 1 above. As a result of these events and associated decisions, the Administration of Spain was forced to take a series of decisions that changed its initial project, so as to adapt to the new technical and regulatory environment that was being developed. These decisions include, *inter alia*, modification of the technical parameters of the HISPASAT-2 network, and particularly a change of orbital position (from 31º W to 30º W) adopted by WRC-97. In consequence of the above, the Administration of

Spain was obliged to modify the date of bringing into use of HISPASAT-2, postponing it by ten months, from 31 January 1999 to 1 December 1999. On the surface of it, this circumstance could give the impression that the period between the date of receipt of the information by IFRB and the date of bringing into use of HISPASAT-2 exceeded the time-frame set in § 4.3.5 of Article 4 of Appendix S30 (eight years). However, that is not the case, because here, as in any such procedure, an interruption of the procedure for reasons arising in the course of its application stays the period set *a priori*, which only resumes when the causes of the interruption disappear. Nevertheless, in 1999, despite its enormous processing delays and the various decisions adopted by different conferences, the Bureau informed the Administration of Spain that the frequency assignments to the HISPASAT-2 network were to be deleted from the Plan as a result of the Rule of Procedure on § 4.3.5 adopted by RRB in December 1998.

One of the events to which we refer above is the revision of the Plans by a future conference. In connection with that revision, some 300 systems have been communicated to the Radiocommunication Bureau, the majority of which are paper satellites that will never be brought into use. The decision of the Bureau, based on a Rule of Procedure adopted by the Board, will have the effect of relegating HISPASAT-2 to the end of the queue, and yet it is a real system which was brought into use on 16 February 2000.

Case history

3 Since the Administration of Spain communicated to IFRB the information listed in Annex 2 of Appendices 30 and 30A, there has been extensive correspondence between the Spanish Administration and the Radiocommunication Bureau (initially IFRB), relating to the application of Appendices 30/30A and S30/S30A procedures to the satellite system HISPASAT-2, adding new channels to those already recorded in the downlink Plan and the uplink Plan on behalf of Spain. In addition, two World Radiocommunication Conferences - WRC-95 and WRC-97 - adopted decisions in relation to the above Appendices which considerably affected the development of the system. It is therefore essential to consider the action taken by IFRB and subsequently BR and by the Spanish Administration together with the decisions of WRC-95 and WRC-97. This action is described below. None of what follows should be taken in any way as a criticism of any of the parties involved in modification of the Plans. However, it is necessary to point out that the consequences of the actions taken have repeatedly affected the development of the HISPASAT system, making it impossible for both those responsible for developing the system and the responsible administration to know on which bases the system should continue to be developed.

Phase 1: Commencement of the procedures for modification of the Plans

4 On 7 March 1991, IFRB received from the Administration of Spain the information contained in Annex 2 of Appendices 30 and 30A, modifying those Appendices by adding 10 new channels for Appendix 30 (1, 3, 5, 7, 9, 11, 13, 15, 17 and 19) and 10 channels for Appendix 30A (21, 23, 25, 27, 29, 31, 33, 35, 37 and 39). The communication contained, *inter alia*, the following information:

- All the channels were intended to be used with analogue modulation (27M0F3F) and/or digital modulation (27M0G9W).
- The service area was described as an ellipse covering the continental territory and the Canary Islands, such that any coverage of the territories of other countries was due to unavoidable overlap required by the need to develop the system in an economical manner.

- The date of bringing into use was 31 January 1999, so that the period between the submission of information to IFRB and the bringing into use of the system did not exceed eight years; here, the Spanish Administration took into account that a possible extension of the date of bringing into use could be accepted by the then IFRB, pursuant to the Rules of Procedure in force, as for similar situations to which Articles 11 and 13 of the Radio Regulations apply.
- Some carriers were indicated for use on an experimental basis.

The communication also contained the following note: "*We do not rule out the use of other systems which guarantee interference lower than or equal to that produced by the system considered in the appropriate Regional Plan or which comply with the provisions of § 3.2 of Article 3 of Appendix 30*". This commitment applies equally to the digital use for which § 3.2 of Article 3 applies.

5 The IFRB secretariat examined the information received in application of §§ 4.3.1-4.3.6 of Appendix 30 and §§ 4.2.1-4.2.7 of Appendix 30A and included the results of this examination in Documents D37825 and D37826 for consideration by the Board. The Board adopted those two documents at its meeting of 27 May 1992. In essence, the Board's decisions:

- identified definitively those administrations whose services may be affected by the use of the proposed additional channels with analogue modulation; and
- recognized that no calculation method was available for the purpose of identifying administrations that may be affected by the use of digital modulation. That fact is also recognized in Appendix S30, in footnote 26, which states that "*Protection masks for verifying that this provision is met are not yet fully defined in existing ITU-R Recommendations. Recommendations for interference between analogue and digital signals are still under development. In absence of criteria to evaluate interference, the Bureau will use the worst-case approach as adopted by the Radio Regulations Board*".

6 On 9 June 1992, IFRB published the results of its calculations in Special Sections AP30/E/14 and AP30A/E/11 annexed to Weekly Circular 2030. In those publications, no indication was given to the international community that the findings were limited to analogue modulation and that, due to the unavailability of a calculation method, countries that may be affected by the use of digital modulation were not indicated. If the worst-case approach mentioned above had been available to IFRB and IFRB had applied it and published the results together with the results for analogue modulation, the Spanish Administration would have been able to continue the development of its system in a clear environment.

Noting the rapid development of digital modulation in other systems in the fixed-satellite service bands and the associated potential difficulties, the Spanish Administration, much to its own regret, had no alternative but to delay the development of its system (the expected delay was estimated to be of no more than one year) until it had an idea of the extent of the difficulties it might encounter in coordinating digital modulation with countries other than those appearing in the Special Sections. The actual delay in publication of the list of affected administrations in fact exceeded five years.

Phase 2: Processing of the analogue case

7 On 25 July 1995, having made appropriate modifications to its system in order to obtain the agreement of the administrations identified by IFRB as being potentially affected by the use of analogue modulation, the Administration of Spain informed the Radiocommunication Bureau of the results obtained, in application of § 4.3.14 of Appendix 30 and § 4.2.15 of Appendix 30A.

Normally, after reviewing these results and confirming that all required agreements had been obtained or were no longer required, the Bureau should have included the modifications in the Plans.

8 On the same date, the Administration of Spain notified the frequency assignments for recording in the Master International Frequency Register (MIFR) in application of Articles 5 of both Appendices. In so doing, it took due account of § 5.1.3, which specifies that: "*Each notice must reach the Bureau not earlier than three years before the date on which the frequency assignment is to be brought into use*", and indicated its intent to bring the HISPASAT-2 network into use despite some uncertainties attached to the pending results of calculations for the digital case. Except if the Bureau found that some of the agreements required had not been obtained, the date of receipt of this information should be the date of modification of the Plans, i.e. before WRC-95. In any event, the Administration of Spain is entitled to consider that the decisions of that Conference apply to the Plans as modified, including the Article 4 modifications for both Appendices proposed by the Spanish Administration.

9 On 30 July 1996, the Bureau published Special Sections (Part B) AP30/E/47 and AP30A/E/43 containing the results of the successful application of Articles 4 of both Appendices for the additional channels to be used by the HISPASAT-2 network with analogue modulation. These publications meant that the Appendices 30 and 30A Plans had been modified to include 10 additional channels with analogue modulation, which is the type of modulation on which the two Plans were based. The use of digital modulation was considered within the framework of § 3.2 of Article 3, § 5.2.1 *c)* of Article 5 and § 3.1.3 of Annex 5.

Phase 3: Processing of the digital case

10 On 13 October 1995, the Bureau informed the Spanish Administration of the results of its examination relating to digital modulation 27M0G9W using the algorithms submitted by JWP 10-11S; it had not been possible to finalize that examination for the initial publication of 9 June 1992 due to the unavailability of a calculation method. Through an exchange of correspondence between the Spanish Administration and the Bureau during the period from 13 October 1995 to 20 February 1996, the situation in respect of the final characteristics to be used was clarified; among other modifications to the system, the transmitting space station power was reduced from 24.1 dBW to 22.1 dBW.

11 On 13 August 1996, the Bureau published Special Sections AP30/E/14(Corr.1) and AP30A/E/11(Corr.1) annexed to Weekly Circular 2240. These Special Sections contained the list of administrations identified using an algorithm provided by JWP 10-11S on 29 November 1994 and 1 December 1995. This delay in publication prevented Spain from effectively completing the required negotiations with the administrations concerned, for two reasons:

- Experience in other cases of coordination shows that a requested administration often prefers to start negotiations only after the publication of the related Special Sections.
- Since no draft Rule of Procedure had been published containing the calculation algorithm, the Administration of Spain could reasonably anticipate objections by administrations once such a draft was published or when the calculation algorithm was used without having yet been published.

Consequently, **the Administration was effectively unable to carry out negotiations until more than five years after receipt of the information by IFRB**. Moreover, the environment within which these negotiations were to be conducted changed radically. In 1992, very few cases of modifications to the Plans were in the hands of IFRB. In 1996, WRC-95 had adopted Resolution 531, and the studies carried out in the Study Groups in preparation for the Conference Preparatory Meeting (CPM) resulted in a large number of submissions of modifications of the Plans to the Bureau. The effect of this was to raise doubts in the minds of the financing partners of HISPASAT-2 as to the ability of the Spanish Administration to finalize all the required agreements, hence adding delays in the construction of the satellite.

Phase 4: Impact of WRC-95 decisions

12 WRC-95 discussed many issues relating to Appendices 30 and 30A. Many proposals were placed before the Conference, leading to the adoption of Resolution 531 containing instructions to the Study Groups to carry out the necessary studies for revision of the Plans by WRC-97. The Bureau was also instructed to apply new technical criteria (see Recommendation 521) to the entries in the Plans and to systems in the process of modifying the Plans, and to include entries in the Plans for new countries. Annex 2 of that Resolution contains a very useful summary of the situation prevailing in 1995 regarding the difficulties associated with the application of both Appendices, including:

- the fact that the technical criteria on the basis of which the 1977 Plan was adopted are not adapted to the technology in use in 1995;
- the limited spectrum available to each country prevents economical development of a broadcasting-satellite network, obliging countries such as Spain which planned to develop such systems to apply the procedure of Article 4 for additional channels[1].

13 The decisions contained in Resolution 531 which are of direct interest to HISPASAT-2 include:

- § 2.1.4 of Annex 1, as an instruction to the Bureau: "… *and protect, on the basis of the planning parameters contained in Recommendation **521 (WRC-95)** and, as far as possible, on the basis of the criteria set forth in Appendix **S30/30** (respectively **S30A/30A**), the assignments which are in conformity with Appendix **S30/30** (respectively **S30A/30A**) and have been notified under § 5.1 of Article 5 of Appendix **S30/30** (respectively **S30A/30A**)*"
- § 2.2.2 of Annex 1, permitting a change of the orbital location: "*utilization of existing orbital locations, except for those administrations wishing alternative ones…*."
- § 5.3.4 relating to non-standard parameters, which is the case of HISPASAT-2: "*WRC-95 instructs the Bureau to identify the systems still under Article 4 of Appendices **S30/30** and **S30A/30A**, including those using parameters different from those on the basis of which the current Plans were developed, in order to include a Note in the relevant publications*.

  This Note is intended to indicate that if the proposed system has not successfully completed the Article 4 procedures by WRC-97, WRC-97 will take account as far as possible of its parameters (see § 2.1.7 above); otherwise, if this is not possible, the administration responsible for this system may either revise its parameters, at WRC-97, so as to be compatible with the revised Regions 1 and 3 Plan, or maintain the modification and continue coordination under the modification procedures adopted by WRC-97, as of their entry into force."

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[1] Spain was able to include in the HISPASAT-1 system the five channels appearing in the 1977 Plan, by combining them on board the same satellite with a payload for the fixed-satellite service. Currently, the only way that the Spanish Administration can meet the expected demand for satellite services is to extend its capacity using BSS bands due to the overcrowded situation in the Ku-band.

This decision introduced an additional uncertainty in relation to the future of HISPASAT-2. What can an administration do in the development of its system knowing that there is a probability that WRC-97 may ask it to modify its characteristics?

- § 5.4 which instructs the Bureau to conduct planning exercises starting by: "*Step 1: Modify the existing Plan assignments on the basis of the new parameters contained in Recommendation **521 (WRC-95)***."

Phase 5: Follow-up action on WRC-95 decisions

14 In application of the decisions of WRC-95, the Bureau modified the characteristics recorded in both Appendices for the use of analogue modulation by HISPASAT-2. The Bureau also used the modifications notified by the Spanish Administration to evaluate the impact of the use of digital modulation, as indicated in section 11 of this report above.

Phase 6: Impact of WRC-97 decisions

15 WRC-97 considered in detail Appendices S30 and S30A on the basis of a report by the Bureau on the work assigned to it by WRC-95. While the purpose of this consideration was, in principle, to include entries in the two Plans for new countries, the end result was the adoption of new Plans incorporating the new countries and a number of beams to which Articles 4 of both Appendices had been successfully applied, including HISPASAT-2. By virtue of this action, the entries on behalf of Spain for HISPASAT-2 for analogue modulation received formal recognition by the Conference. Moreover, the change in orbital location from 31° W to 30° W was also formally adopted by the Conference. The Spanish Administration was therefore entitled to consider the HISPASAT-2 entries for analogue modulation as an integral part of the Plans, like any other entry adopted in 1977, for two reasons:

- The HISPASAT-2 analogue entry was published, 30 July 1996, in Part B of Special Sections AP30/E/47 and AP30A/E/43, and therefore § 4.3.17 of Appendix S30 and the corresponding paragraph of APS30A apply to it. These state that: "*The Bureau shall publish in a special section of its weekly circular the information received under § 4.3.14 together with the names of any administrations with which the provisions of this Article have been successfully applied.* ***The frequency assignment concerned shall enjoy the same status as those appearing in the appropriate Regional Plan and will be considered as a frequency assignment in conformity with the Plan***."

- WRC-97 adopted a revision of the Plans and therefore the entries for HISPASAT-2 **are no longer to be considered as modification of the Plans** through the successful application of the procedure of Article 4. They are confirmed as entries in the Plans made by a conference which revised the Plans.

  This interpretation is confirmed by the wording of *resolves* 2 of Resolution 533 which stipulates, in relation to the application of § 4.3.5 of Article 4, that:

  "– *the replacement of assignments at 31° W by assignments at 30° W and 33.5° W**;

  *shall not be considered as new or additional assignments under § 4.1b) of Article 4 of Appendices **S30** and **S30A**. Therefore, these assignments shall not be subject to the provisions of § 4.3.5 of Appendix **S30** and § 4.2.5 of Appendix **S30A** and the associated Rules of Procedure. In particular, the associated orbital positions shall be treated as "orbital positions in the Plan", and the assignments shall not lapse even if they are not brought into use within eight years from the adoption of the revised Plans*".

* The orbital position at 31° W shall no longer be considered as an orbital position in the Plan.

Despite these provisions, entries for HISPASAT-2 in the revised Plan bear the remarks 5 and 7, leaving the door open to comments from administrations and subjecting the date of bringing into use to the agreement of these administrations, under the additional procedure contained in Resolution 53.

16 WRC-97 also adopted decisions in its Resolutions 53 and 533 affecting the development of HISPASAT-2. Resolutions 53 and 533 contain two additional procedures. Insofar as aspects affecting HISPASAT-2 are concerned, the content of these two Resolutions may be summarized as follows:

- Resolution 533:
  - confirms the analogue entry for HISPASAT-2 in the Plans;
  - confirms that § 4.3.5 does not apply to it;
  - sets a procedure for the coordination of the digital use.
- Resolution 53:
  - sets a procedure for the revision of remarks 5 and 7 appearing in the Plans against the analogue entries for HISPASAT-2.

16.1 Resolution 533 contains, among others, the following points:

– *resolves* 1.: Use of new technical parameters: The Conference used new technical parameters and instructed the Bureau to use them "*in its subsequent examination of submissions for modification and notifications of assignments in the Regions 1 and 3 Plan received under Articles 4 and 5 of Appendices **S30** and **S30A***".

– *resolves* 3.: Establishment of a new reference situation, which is the basis for the Bureau to conclude if a modification to the Plans affects entries in the Plans.

– *resolves* 2.: The new reference situation referred to in *resolves 3* shall take account of the new orbital locations adopted by the Conference for seven systems; HISPASAT-2 is one of these, as it is displaced from 31° W to 30° W.

– *resolves* 2.: The status of HISPASAT-2 is clearly defined. The third indent of this *resolves* specifies that:

"– *the replacement of assignments at 31° W by assignments at 30° W and 33.5° W*;*

*shall not be considered as new or additional assignments under § 4.1b) of Article 4 of Appendices **S30** and **S30A**. Therefore, these assignments shall not be subject to the provisions of § 4.3.5 of Appendix **S30** and § 4.2.5 of Appendix **S30A** and the associated Rules of Procedure. In particular, the associated orbital positions shall be treated as "orbital positions in the Plan", and the assignments shall not lapse even if they are not brought into use within eight years from the adoption of the revised Plans*".

– *resolves* 4. to 6.: Applicable to the digital use by HISPASAT-2. Special Sections AP30(Res.533)/E/14 and AP30A(Res.533)/E/11 were published on 15 September 1998 and the second indent of *resolves* 6 states that: "*within four months from the date of the above publication, possibly affected administrations should provide comments to the Radiocommunication Bureau and to the notifying administration; however, the notifying administration shall indicate any agreements which have been obtained previously and any new agreements*". The time-limit for such comments in respect of

* The orbital position at 31° W shall no longer be considered as an orbital position in the Plan.

HISPASAT-2 was 15 January 1999, i.e. **15 days before the initially notified date of bringing into use**. Such a short period of time would have been insufficient to allow the Administration of Spain to reach an agreement with the newly identified administrations. Also, the special section for the downlink was published in a provisional way due to the provisional application of § 4.3.1.4 of Appendix S30 and, therefore, the list of affected administrations was not definitive. Later, on 21 December 1999, a corrigendum (Special Section AP30(Res.533)/E/14(Corr.1)) was published with a definitive list of affected administrations. Keeping in mind that § 5.1.3 of Article 5 requires notification to be effected three months before the date bringing into use and the footnote thereto requires administrations to "*initiate the procedure for modifying the Plan concerned in sufficient time to ensure that this limit is observed….*", this would literally take HISPASAT-2 back to 9 June 1992, the date on which the initial calculations were published.

16.2 Resolution 53: This Resolution adds a little more complexity to the problem, since it subjects the date of bringing into use of the analogue carriers of HISPASAT-2 to additional agreements to be obtained under a procedure contained in the Resolution. Entries for HISPASAT-2 bear remarks 5 and 7.

Remark 5 states: "*This assignment shall be brought into use only when the limits given in Table 1 are not exceeded or with the agreement of the affected administrations identified in Table 2 with respect to*:

a) *assignments in the Region 2 Plan on 27 October 1997; or*

b) *assignments in the terrestrial services which are recorded in the Master Register with a favourable finding or received by the Bureau prior to 27 October 1997 for recording in the Master Register and which subsequently receive a favourable finding based on the Plan as it existed on 27 October 1997; or*

c) *assignments in the fixed-satellite service which: are recorded in the Master Register with a favourable finding; or those which have been coordinated under the provisions of No.* ***1060*** *or § 7.2.1 of Appendix* ***S30****; or those that are in process of coordination under the provisions of No.* ***1060*** *or § 7.2.1 of Appendix* ***S30*** *prior to 27 October 1997.*"

Remark 7 states: "*This assignment shall not claim protection from the assignments of the administration indicated in Table 3 which are recorded in the Master Register with a favourable finding prior to 27 October 1997 to which No.* ***S5.487/838*** *and No.* ***S5.43/435*** *do not apply*".

The remarks 5 and 7 associated to them are dealt with under the procedure of Resolution 53, which indicates in *resolves* 4: "*that the new coordination requirements identified in the above-mentioned circular-letter shall apply provisionally from the date of the above-mentioned circular-letter until a decision is taken by WRC-99;*". The procedure set forth in that Resolution permits any administration identified by the Bureau to decide whether or not to remain in the list of potentially affected administrations whose agreement is required before bringing HISPASAT-2 into use. This means that, irrespective of the results of coordination required under the procedure of Resolution 53, the remarks associated with the HISPASAT-2 assignments will be reviewed by the next conference. In the light of the foregoing, **in no way can the assignments be deleted, since doing so would mean that a Rule of Procedure of RRB supersedes a decision of the conference.**

Coordination under Resolution 53 is a new constraint on HISPASAT-2, since it has to take account of all new terrestrial and space systems notified to the Bureau between 9 June 1992 (date of publication of Special Sections AP30/E/14 and AP30A/E/11 for Spain) and 27 October 1997. This applies equally to proposed modifications to the Region 2 Plans.

17 In the light of these last events, in addition to a series of amendments to the Rules of Procedure, such as the one that considers the date of a modification as a new date (see CR/59)[2], **the Administration of Spain is entitled to consider that it could postpone the date bringing into use**. Considering that it could never be entirely sure that the final status of its system would remain unchanged, and taking into account operational requirements, the Spanish Administration decided to go ahead with the launch and operation of HISPASAT-2. It confirmed the contracts it had with the manufacturer and the launch provider and, in agreement with them, fixed the date of bringing into use at 1 December 1999 as notified to the Bureau on 14 June 1999. In so doing, the Administration of Spain was confident that it would be able to comply with any action that the Bureau may request of it in application of the decisions of WRC-97.

Conclusion

18 The above sections have described the changing regulatory environment which the Administration of Spain has had to cope with in applying the required regulatory procedures, from submission of the information listed in Annex 2 of Appendices 30 and 30A up to the application of Resolution 533 to the HISPASAT-2 network after WRC-97. Taking into account the above considerations, the Administration of Spain requests WRC-2000 to maintain the frequency assignments to HISPASAT-2 in the Plans contained in Appendices S30 and S30A of the Radio Regulations.

[2] CR-59 reads as follows "*Moreover if the information, provided either under this inquiry or at any stage of application of Article 4, adds new affected administrations on the basis of technical examination methods and criteria described in Appendix 30 (C/I, power flux-density, Appendix 29), **the parts of the network relating to these changes shall have a new date of receipt***."

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

New Zealand

PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.6.1 - IMT-2000 ISSUES

This document has been cancelled.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

New Zealand

PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.6.1 - IMT-2000 ISSUES

MSS OPERATIONS IN THE BANDS IDENTIFIED FOR IMT-2000 OPERATIONS

Background

Considerable work has gone on internationally over the last few years to identify the possible long-term needs for the satellite component of IMT-2000. New Zealand has noted that there have been a number of MSS networks both operational, and under planning, that have come under financial difficulties. This brings into question the usefulness of further MSS allocations for IMT-2000 satellite component operations.

In its document, Principles for evaluating IMT-2000 candidate bands, New Zealand made the point that administrations need flexibility when deciding how much spectrum is required nationally on the one hand to meet their IMT-2000 needs while on the other hand satisfying the requirements of existing services in these bands.

Given this need for flexibility, it would appear to New Zealand that it would be useful for the Conference to identify bands where there are already mobile service allocations within the Table of Frequency Allocations sharing with the MSS[1], for possible use by the terrestrial or satellite component of IMT-2000.

This would mean that if MSS use does not materialize or is not necessary nationally, greater flexibility would be available to administrations to apportion the spectrum requirements between IMT-2000 uses and other services.

It should be noted that geographical separation may be required between MSS and MS IMT-2000 operations in the same frequency band.

[1] This applies to the band 2 500-2 520 MHz and 2 670-2 690 MHz.

Proposal

NZL/66/1

In the event of the Conference identifying the band 2 520-2 670 MHz for the terrestrial component of IMT-2000 and identifying the bands 2 500-2 520 MHz and 2 670-2 690 MHz, for the satellite component of IMT-2000, then the latter two bands should additionally be identified for use by both the terrestrial and satellite components.

NZL/66/2

The dual identification of the bands should be reviewed at a future conference.

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PLENARY MEETING

Denmark, Liechtenstein (Principality of), Luxembourg, Norway, Netherlands (Kingdom of the), Switzerland (Confederation of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

RESOLUTION 85 (MINNEAPOLIS, 1998)

RESOLUTION 49 (WRC-97)

1 Introduction

The Plenipotentiary Conference (Kyoto, 1994) adopted Resolution 18 to deal in part with the increasing number of “paper satellites”. *Considering* c) of that Resolution reads as follows:

> “that there is growing concern about the accommodation of new satellite networks, including those of new ITU Members, and the need to maintain the integrity of ITU procedures and agreements.”

In the review under Resolution 18, there were considerable concerns expressed about the number of satellite filings submitted to ITU and for which many administrations considered as “paper satellites”, i.e. those of a speculative nature and which will probably never be brought into service. Proposals were made to WRC-97 attempting to address this aspect of the problem. Some of the proposals related to an administrative due diligence process and others related to a financial due diligence process. WRC-97 finally adopted, in Resolution 49, an administrative due diligence procedure and this Resolution also instructed the Director to report to WRC-99 and subsequent WRCs on the results of the implementation of this procedure.

There were proposals made to PP-98, which continued to express concern about this problem, and as a consequence PP-98 adopted Resolution 85. In that Resolution WRC-2000 is requested to evaluate the results of the implementation of administrative due diligence and report to PP-02 and also instructs the Director to inform WRC-2000 about the effectiveness of the administrative due diligence procedure.

Council-99 also took up this problem and as consequence it adopted Decision 483. This Decision instructed the Director (among other things) “to provide a means, such as calling information exchange meetings, for enabling administrations and network operators to be both informed of the Bureau’s activities and to provide input for further improvements in the overall satellite network notification processing system”. Due to the increasing magnitude of the “backlog” problem of satellite network filings with the Bureau, the Director of BR organized an informal information exchange meeting in January 2000 to exchange ideas on how the problem could be addressed. At that meeting, the Director, in his opening statement, indicated:

> "Reform of the Radio Regulations - While all of the above factors touch on the backlog, I believe, and indeed the RRB agreed, that the area which could bring the greatest impact is a serious reform of the Radio Regulations to bring them much more into line with the real requirements of satellite operators as they seek to coordinate their systems. Yes, we must try to address the above five areas but, for example, rather than spending a lot of scarce resources automating a flawed regulatory process, shouldn't we redouble our efforts to improve the regulatory framework to ensure that what we are doing is really what is required? In this regard, WRC-2000 is crucial. As I said at the RAG, if the Member States of the ITU do not make significant improvements and simplifications of the regulatory process pursuant to Minneapolis Resolution 86 by means of changes in the Radio Regulations and perhaps the adoption of Resolutions to implement certain measures, I fear that by the next WRC in 2003, if the ITU becomes increasing irrelevant to the needs of the satellite community, its credibility will have suffered irreparable damage and satellite operators will look elsewhere for mechanisms to coordinate their satellite networks. This would be a great pity, indeed. Technology is continuing to develop more rapidly and should not, cannot and will not wait for slow, bureaucratic processes to be followed. We can't go down the path we followed for the so-called simplification of the Radio Regulations where the process was initiated by the Plenipotentiary Conference in 1989 and the results implemented only almost ten years later on 1 January 1999. During today, I hope that there will be discussion generated on ways to substantially improve, if not resolve, the situation."

In one of the contributions to the January meeting, it was stated that:

> "In our view this very long delay in the process is due to two major reasons:
>
> - the complexity of the data and procedural process of the Radio Regulations which may not reflect the real needs of administrations satellite operators;
> - the volume of space system filings (including the extensive overfilings that occurs) which are submitted to the BR."

Other contributions to WRC are addressing the question of the complexity of the Radio Regulations, but so far, there have been no contributions which will have an impact on the volume of the filings with the Bureau, and that is the purpose of this document.

The consequence of this very large number of "paper filings" for the Bureau is an extraordinary amount of work on filings for which many (if not most) of the networks will never be implemented and thus the backlog problem. The consequences for administrations and satellite operators is the very large number of satellite networks/administrations that are identified as potentially affected when new notices for real systems are submitted. This forces the network operators to either attempt to coordinate with these very many "paper satellite networks" with substantial costs or make some risk assessment as to which networks are likely to be "real" and those which are likely to be "paper", and only coordinate with the "real" systems at some risk.

It is recognized that under Resolution 85 (Minneapolis, 1998) WRC-2000 is to report to PP-02 on this matter, but as the Director noted in his statement to the January meeting, the problem is so serious that WRC-03 is probably too late and, as the Director indicated at that time:

> "I fear that by the next WRC in 2003, if the ITU becomes increasing irrelevant to the needs of the satellite community, its credibility will have suffered irreparable damage and satellite operators will look elsewhere for mechanisms to coordinate their satellite networks."

Consequently, in spite of the request of PP-98, it is necessary that WRC-2000 take some definitive decisions and report on these decisions to PP-02.

At the information exchange meeting in January 2000, the Bureau indicated that the administrative due diligence process under Resolution 49 is having no positive impact on reducing the number of filings. This result was not unexpected, as the administrative due diligence process of Resolution 49 provides for the submission of certain data near the end of the period for bringing into use of the network, which is after all the work has been done by the Bureau. Because the administrative due diligence is near the end of the process, it has no impact on the submission of new filings. It is for this reason that it is not possible to wait until WRC-03 before taking further action to reduce the number of filings. One of the suggestions made to the correspondence group set up at the 21 January 2000 information meeting was that the present administrative due diligence data be submitted much earlier in the process and possibly at the same time as the coordination request is submitted. As the coordination request is submitted to ITU 4 1/2 to 5 years in advance of the in-service date, any data submitted on satellite construction contracts and launching contracts submitted with the coordination data is not likely to be data based on firm contracts and thus is not of much value as administrative due diligence data.

It is also noted that in the Report of the Director to WRC (Document 32) the Director has indicated 37 networks have been cancelled, but as indicated in the document "all of these cancellations had reached the maximum (nine year) period for bringing into use and pursuant to the application of <*resolves* 1 and 2> of Resolution 51 (WRC-97) and S11.44 of the Radio Regulations and hence would have been cancelled in any event".

2 Financial due diligence

2.1 Background to the proposals

The above Administrations are of the view that the only reasonable means to constrain the numbers of filings to the Bureau is to adopt some form of financial due diligence.

The proposals for financial due diligence that were made to WRC-97 consisted of the following three elements:

- a **one time** financial deposit which would be based on the operating bandwidth of the proposed network and would be submitted at the time of the coordination request. The interest from this deposit would be retained by ITU and the principle amount of the deposit would be returned when the network frequencies are brought into use within the time period provided for by the Regulations. If the network is not brought into use within the specified time period, then the deposit is forfeited to ITU. This element is aimed at the addressing of the "paper satellite" problem during the coordination phase of the process;
- an **annual** registration fee (here referred to as an annual coordination fee), again based on the operating bandwidth of the planned network, and payable starting at the beginning of the coordination process and continuing until the network frequencies are recorded as being in operation. This is an alternative to the deposit approach with the same objective;

- an **annual** registration fee that would also be based on the operating bandwidth and would be payable upon the recording of the network frequencies in the MIFR that the frequencies are in operation and would continue as long as the network frequencies are recorded in the Master Register. This element is aimed at addressing those “paper satellites” that are recorded in the MIFR;
- in both cases of the **annual** fees, any default in paying the annual fee would result in the network frequencies no longer having to be taken into consideration by BR and other administrations and the corresponding publications or recordings in the MIFR would be cancelled.

The main problem facing ITU today is the backlog of filings with the Bureau. A secondary problem is that there may be a number of “paper satellites” recorded in the MIFR which increase the workload of the administrations/operators primarily but do not have a significant impact on today’s backlog problem of the Bureau. Consequently, it is proposed in this document that WRC-2000 deal with the backlog issue and that WRC-03 may wish to consider the question of “paper satellites” recorded in the MIFR.

2.2 Financial deposit

The idea of the deposit is that at the time of submission of the coordination data to BR, the administration would have to submit, within a short fixed time period, a financial deposit. This deposit would be dependent on the operating frequency bandwidth of the network. This deposit and the interest earned would be returned to the administration/operator if the network were brought into use within the time period provided for by the Radio Regulations. However, if the frequencies are not brought into use within the required period, then the deposit would be forfeited to ITU. All income from any forfeited deposits is to be used by Council in reducing the value of the contributory unit and thus providing a benefit to all members including the developing countries. This approach, in our view, would be the most effective means in addressing the problem of “paper satellites” that are submitted for coordination. It is also the simplest approach to implement.

2.3 Amount of financial deposit

The amount of the financial deposit must be such that it is a deterrent to frivolous filings but not so high as to be a deterrent to the development of “real” networks. A deposit of about 1 per cent of the cost of building and launching a satellite into service would seem to be an adequate balance. Thus it is proposed that the deposit for a typical satellite having a total bandwidth of 500 MHz would be CHF 5 million or CHF 10 000 per MHz.

2.4 Scope of applicability

It is proposed that this financial due diligence procedure be applied to all MSS, BSS and FSS filings in the following frequency bands: 3 400-8 400 MHz and 10.7-31 GHz. This procedure would apply to all satellite coordination requests under S9.7 and S9.11A as well as requests for modifications under Article 4 of Appendices S30/S30A. As the fee is based on a fee per MHz of bandwidth, the bandwidth will be calculated on the basis of the amount of contiguous spectrum used by the satellite (uplink, downlink and inter-satellite) including the guardbands between channels and at the edge of the used spectrum.

2.5 Timing of submission of deposits

When the Bureau publishes the coordination request (No. S9.38, § 4.3.6 of Appendix S30, and § 4.2.7 of Appendix S30A), the Bureau shall calculate the amount of the deposit and send the invoice to the administration. If the invoice is not paid within six months (with suitable reminders), the Bureau shall cancel the publication.

2.6 Transition arrangements

Considering the magnitude of the filings now with ITU, it is our opinion that any new measures should be applicable to all satellite networks that have been filed with ITU and not yet brought into use, and either recorded in the MIFR or recorded in the Plans of Appendices 30/30A. Therefore, we are proposing that the effective date of such fees should be [1 January 2001]. In order to implement this new approach, we propose that immediately after WRC-2000 the Bureau would inform all administrations that have satellite networks still at the coordination phase as to the amount of the deposit and they would have until 1 January 2001 to submit the fee. Any networks for which the fee has not been submitted by 1 January 2001 (with suitable reminders by the Bureau) would have the publication cancelled by the Bureau and this network would no longer be taken into consideration by the Bureau and other administrations. As the financial approach is administered by ITU and the submission of funds to ITU is a necessary part of the process, it is clear that this approach is very transparent to outsiders and that it will be administered in a consistent and objective manner.

2.7 Proposals

The Annex to this document proposes the adoption of a Resolution dealing with the financial due diligence process and the following are some consequential modifications to give the necessary regulatory effect to the Resolution.

ARTICLE S9

MOD DNK/LIE/LUX/NOR/HOL/SUI/67/1

Procedure for effecting coordination with or obtaining agreement of other administrations[1, 2, 3, 4, 5, 5*bis*]

ADD DNK/LIE/LUX/NOR/HOL/SUI/67/2

5*bis* **A.S9.5*bis*** In the application of this Article, Resolution [**XXX (WRC-2000)**] shall also be applied.

Reasons: To give regulatory effect to the financial due diligence procedure.

ARTICLE S11

MOD DNK/LIE/LUX/NOR/HOL/SUI/67/3

Notification and recording of frequency assignments[1, 2, 3, 3*bis*]

ADD DNK/LIE/LUX/NOR/HOL/SUI/67/4

3*bis* **A.S11.3*bis*** In the application of this Article, Resolution [**XXX (WRC-2000)**] shall also be applied.

Reasons: To give regulatory effect to the financial due diligence procedure.

APPENDIX S30

Provisions for all services and associated Plans for the broadcasting-satellite service in the frequency bands 11.7-12.2 GHz (in Region 3), 11.7-12.5 GHz (in Region 1) and 12.2-12.7 GHz (in Region 2)

(See Article **S9**)

ARTICLE 4

MOD DNK/LIE/LUX/NOR/HOL/SUI/67/5

Procedure for modifications to the Plans[1*bis*]

ADD DNK/LIE/LUX/NOR/HOL/SUI/67/6

1*bis* In the application of this Article, Resolution [**XXX (WRC-2000)**] shall also be applied.

Reasons: To give regulatory effect to the financial due diligence procedure.

APPENDIX S30A

Provisions and associated Plans for feeder-links for the broadcasting-satellite service (11.7-12.5 GHz in Region 1, 12.2-12.7 GHz in Region 2 and 11.7-12.2 GHz in Region 3) in the frequency bands 14.5-14.8 GHz[1] and 17.3-18.1 GHz in Regions 1 and 3, and 17.3-17.8 GHz in Region 2

ARTICLE 4

MOD DNK/LIE/LUX/NOR/HOL/SUI/67/7

Procedure for modifications to the Plans[2*bis*]

ADD DNK/LIE/LUX/NOR/HOL/SUI/67/8

2*bis* In the application of this Article, Resolution [**XXX (WRC-2000)**] shall also be applied.

Reasons: To give regulatory effect to the financial due diligence procedure.

ANNEX

ADD DNK/LIE/LUX/NOR/HOL/SUI/67/9

DRAFT RESOLUTION XXX (WRC-2000)

Application of financial due diligence to certain space networks

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the Kyoto Plenipotentiary Conference, 1994, identified the need for a review of the ITU coordination and notification procedures for space networks and adopted Resolution **18**;

b) that the number of submissions of satellite networks to ITU has increased substantially in 1994-1999 and continues to increase;

c) that various mechanisms of possible procedural approaches to due diligence have been studied and WRC-97 adopted Resolution **49** to address the problem of the excessive filings;

d) that PP-98 considered this problem and requested WRC-2000 to consider the matter and report to PP-02;

e) that the administrative due diligence process has not had any impact on the problem of excessive filings of satellite networks;

f) that the Conference decided that the problem of excessive filings is quite serious and is becoming even more serious and that it is necessary that early action be taken to implement these financial measures before WRC-03,

resolves

to apply a refundable financial deposit fee for those MSS, FSS and BSS satellite networks that are subject to coordination under Article **S9** and Article 4 of Appendices **S30/S30A** in accordance with the Annex to this Resolution.

ANNEX TO DRAFT RESOLUTION XXX (WRC-2000)

Application of the refundable financial deposit

WRC-2000 has adopted a one-time refundable deposit to be applicable to certain satellite networks that are subject to coordination. This fee shall be applied as follows as of [1 August 2000]:

a) all satellite networks of the FSS, MSS and BSS in the following frequency bands: 3 400-8 400 MHz and 10.7-31 GHz that are subject to coordination under Nos. **S9.7** and **S9.11A** shall be subject to this fee;

b) all modifications to the Plans of Appendices **30** and **30A** that involve the addition of new frequencies and/or orbit positions shall also be subject to this deposit;

c) the refundable deposit for GSO networks will be calculated on the basis of [10 000] Swiss francs per MHz of operating frequency range per orbit position, including the total of the uplinks and downlinks and any inter-satellite links. For non-GSO networks, the deposit will be calculated on the basis of [10 000] Swiss francs per MHz of operating frequency range per network, including the total of the uplinks and downlinks and any inter-satellite links;

d) as of the date of the publication of the details of the planned network under No. **S9.38** or § 4.3.6 of Appendix **30**, or § 4.2.7 of Appendix **30A**, the Bureau shall calculate the amount of the deposit and inform the notifying administration that it has four months to submit the deposit. If the deposit is not received by ITU within four months, the Bureau shall cancel the relevant publication and the Bureau and other administrations shall no longer take the concerned network into consideration;

e) the deposit with the interest will be returned to the notifying administration if all of the satellite network frequencies are bought into use by the dates provided for in the Radio Regulations, otherwise the deposit shall be forfeited to ITU. If only some of the frequencies are actually brought into use within the time period, a proportional part of the deposit shall be retained by ITU;

f) as a transitional measure for those networks submitted to ITU and published prior to [1 August 2000] but not yet recorded in the MIFR, the following measures shall be applied to those networks that are subject to the deposit:

- as of [1 August 2000] the Bureau shall inform those administrations having such networks subject to these deposits of the amount of the deposit and request that the deposit be submitted to ITU prior to [1 January 2001];
- any networks for which the deposit has not been received by ITU by [1 January 2001] (after suitable reminders) shall have the publication cancelled by the Bureau and these networks shall no longer be taken into consideration by the Bureau and other administrations.

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PROPOSALS FOR THE WORK OF THE CONFERENCE

RESOLUTION 86 (MINNEAPOLIS, 1998)

Please add Sweden to the list of co-sponsors to this document.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Belgium, Denmark, Liechtenstein (Principality of), Luxembourg, Norway, Netherlands (Kingdom of the), Switzerland (Confederation of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

RESOLUTION 86 (MINNEAPOLIS, 1998)

1 Introduction

The ITU Radiocommunication Bureau organized an information exchange meeting on the problems associated with satellite procedures on 21 January 2000. The report of that meeting was sent to administrations and Sector Members in Administrative Circular CA/75. The above administrations have reviewed the suggestions contained in that circular and, as a result of this review, make the following proposals to WRC-2000.

2 Application of the Radio Regulations in the space services

We now have the situation in the application of the Radio Regulations for space services where the process has almost collapsed and is nearly unworkable in terms of the real world for the putting into service of satellite networks. If the process is not fixed in the near future, it will lead to more and more cases where satellites are put into operation without completing the ITU process. As a result of this breakdown, operators who must find means to ensure non-interference and to ensure continuity of service will tend to find solutions outside the framework of ITU. It must be recognized that, despite what the Radio Regulations say, a satellite network operator, with the approval of the administration, once the satellite construction and launch has been contracted for, will not stop the process including the launch just because the ITU process has not been completed and all problems resolved.

At the present time it takes the Bureau almost two years to publish a coordination request and about three years to record a space network in the Master Register. During the recent Radiocommunication Bureau information meeting on satellite procedures, it was stated by the Bureau that if there were no more coordination requests received it would take three years to process those that have already been filed with the Bureau. It was also noted at the same meeting that an extremely large percentage of the correspondence, which the Bureau must handle, is related to comments concerning Advance Publication of Information, where the correspondence has no regulatory effect and the information is simply put on file. It has also been suggested that perhaps the API process could be merged with the coordination process, thus eliminating this unnecessary burden which has been imposed on the Bureau.

Our comments with regard to the delay before publication are not intended to be a criticism of the Bureau, but are a criticism of the process that the Members have imposed on the Bureau in the Radio Regulations. If we take this time period and add to it a minimum period of about two to three years to effect the coordination, we then have a total period of about seven to eight years from the submission of a coordination request to the Bureau until the frequencies are recorded in the Master Register. It is necessary to contrast that seven- to eight-year period with the time it takes to contract, build and launch a satellite which is about two years. Even with no time considered for the actual coordination, the Bureau time is about five years - more than twice the time needed to build and launch a satellite. This contrast in time periods tells us that there is something seriously wrong with the administrative process that ITU has adopted.

In our view this very long delay in the process is due to two major reasons:

- the complexity of the data and procedural process of the Radio Regulations which may not reflect the real needs of administrations and satellite operators;
- the volume of space system filings (including the extensive overfilings that occur) which are submitted to the Bureau. This document does not address the problem of the volume of filings.

3 RR procedures

3.1 In Administrative Circular CA/75 the following possibilities to address the backlog were identified:

“a) suppression of the API process for networks subject to coordination;

b) mandatory electronic filing for new requests for coordination or notification;

c) establish methods for rapid electronic capture of filings still awaiting processing;

d) the use of a coordination arc as a trigger in identifying coordination requirements for FSS in certain cases;

e) separation of uplink and downlink data in determining the need for coordination;

f) make available on the ITU website, in the SNS database, details of new (electronic) filings “as received” with no further examination other than through the application of validation software tools;

g) publication to include only findings by the Bureau and a list of administrations with which coordination is required. Other detailed APS4 information to be available in the SNS database on the Web. This information could also include details of networks that triggered the need for coordination;

h) eliminate duplication of data requirements and technical/regulatory examination between coordination (S9) and notification (S11);

i) restrict the number of modifications to a network filing that can be made over a given period of time;

j) simplification of the Master Register;

k) improve software for capture, validation and technical examination;

l) any scope for further improvement in processes within BR;

m) noting deficiencies in the effect of Resolution 49 (WRC-97), consider again the concept of financial due diligence."

3.2 Due to the complexity of satellite networks and the difficulty of reaching allocation decisions at a WRC, we have arrived at a situation where there have been many different types of limits placed in the Radio Regulations. In association with these limits there are provisions where the Bureau is required to make examinations with respect to these limits. This leads to the situation where the data sent to the Bureau is complex and the Bureau must validate it in order to do the required examinations and then to publish this data. This has imposed an enormous workload on the Bureau, but without giving the Bureau the necessary resources to do this work. While one option would be to provide the Bureau with more resources this is not realistic given the magnitude of the increase that would be required and it is not the approach that we would favour. Our preference would be to very seriously reconsider the role of the Bureau in dealing with these matters, and reduce that role of the Bureau so that less work by the Bureau and thus less time would be necessary between a submission being received and its publication. The Bureau would thus have a very simple and more limited role, and more of the detailed work would be done between the operators during the frequency coordination process. Resolution 86 (Minneapolis, 1998) does provide the scope and possibility for a WRC to make major changes to the procedures for space systems. As mentioned previously, there have been some informal discussions between the Bureau, administrations and satellite operators to discuss some of these problems, and this document is a result of those informal discussions and Administrative Circular CA/75.

3.3 It is also necessary to ensure that the decisions of WRC-2000 do not increase the workload of the Bureau. In fact, some of the proposals contained in the Report of the CPM will complicate the process further and increase the workload of the Bureau. In this respect, CS92 provides in part that when adopting Resolutions and Decisions, a WRC "…shall take into account the foreseeable financial implications…".

3.4 In Document CMR2000/13, Europe has proposed a number of changes under Resolution 86 and these proposals are in addition to those proposals.

4 Proposals

4.1 Some of the suggestions can be implemented by WRC-2000 making specific changes to the Radio Regulations, and the following proposals are made for adoption by WRC-2000. In addition, some proposals are made that do not relate to the backlog issue but do relate to problems with satellite procedures.

4.2 We would propose to suppress the API process for all satellite networks that are subject to satellite-to-satellite coordination under Article S9 (see Annex 1).

This will reduce, to some extent, the workload of the Bureau with little loss of effectiveness as the API for systems requiring coordination is very brief and does not include much information. More importantly, it would provide an additional period of six months for the coordination process. The current provisions include an automatic delay of six months between the API and the request for coordination and also permits an administration (which has a previous API) to submit a coordination request for a new orbital position without requiring a new API. This results in unreliable information but is also an abuse of the process. As an example, Administration A may have an API filing at 50° E and one year later Administration B submits an API for 90° E. The present procedure permits Administration A to move its API position to 90° E as soon as it finds out about the submission of Administration B, and then have priority over the filing of Administration B.

If the proposal in Annex 1 is not accepted, it is proposed to modify No. S9.2 as follows:

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/1

S9.2 Amendments to the information sent in accordance with the provisions of No. **S9.1** shall also be sent to the Bureau as soon as they become available. The use of an additional frequency band or in the case of geostationary satellites, an orbital position outside the original service arc will require the application of the advance publication procedure for this band.

Reasons: At the present time it is possible to change the orbital position of a satellite at the API stage to a position 180 degrees from the original position. This network is obviously not the same satellite network because the service area is completely different, and this new network should be subject to a new API.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/2

S9.3 For those cases where coordination under Section II is not required, ~~If~~if, upon receipt of the Weekly Circular containing information published under No. **S9.2B**, any administration believes that interference which may be unacceptable may be caused to its existing or planned satellite networks or systems, it shall within four months of the date of publication of the Weekly Circular communicate to the publishing administration its comments on the particulars of the anticipated interference to its existing or planned systems. A copy of these comments shall also be sent to the Bureau. Thereafter, both administrations shall endeavour to cooperate in joint efforts to resolve any difficulties, with the assistance of the Bureau, if so requested by either of the parties, and shall exchange any additional relevant information that may be available. If no such comments are received from an administration within the aforementioned period, it may be assumed that the administration concerned has no objections to the planned satellite network(s) of the system on which details have been published.

Reasons: If the proposal in Annex 1 to suppress the API is not accepted, then it is proposed to modify S9.3 to indicate that the requirement that a copy of the comments shall be sent to the Bureau and that the Bureau is to make a publication of its summary of the comments, is to be applied only in the cases of networks not requiring coordination. This provision gives the Bureau a significant amount of work in the case of GSO networks with no benefit to the administrations involved in the process.

4.3 The best way to implement any such changes would be to propose modifications to the Radio Regulations, but there has not been much time between the BR Information Meeting in January and the WRC. In some cases the proposals are of a transitional nature and to be applied immediately after the WRC. Taking into account these two factors and the shortage of time available to prepare and decide on such important changes to the Radio Regulations for some of the ideas, it is proposed that, rather than make specific changes to the Radio Regulations at WRC-2000, it would be preferable at this time to concentrate on the preparation of a Resolution for WRC-2000. The intent of this Resolution would be to implement a number of changes on a provisional basis (including its application to those networks already filed with the Bureau) and then WRC-02/03 could consider the necessary permanent changes to the Radio Regulations. Attached as Annex 2 to this document is a draft Resolution dealing with both transitional measures and some other measures, which should be used until WRC-02/03. WRC-02/03 can then decide, if considered appropriate, to make the necessary permanent changes to the Radio Regulations.

4.4 In the present Radio Regulations, there are a number of references to the Weekly Circular. Following the decisions of WRC-97 and the Bureau, the new name is the International Frequency Information Circular; consequently it is proposed to change these terms in the Radio Regulations.

ANNEX 1

NOTE - The proposals in this Annex relate only to suppression of the API (as discussed in § 4.2).

ARTICLE S9

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/3

Procedure for effecting coordination with or obtaining agreement of other administrations[1, 2, 3, 4, 5, 5*bis*]

Section I – Advance publication of information on satellite networks or satellite systems that are not subject to coordination under Section II

~~*General*~~

Reasons: To restrict the API to only those networks not subject to coordination.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/4

S9.1 ~~Before~~When initiating any action under this Article or under Article **S11** in respect of frequency assignments for a satellite network or a satellite system that are not subject to coordination under Section II, an administration, or one[6] acting on behalf of a group of named administrations, shall, ~~prior to the coordination procedure described in Section II of Article **S9** below,~~ where applicable, send to the Bureau a general description of the network or system for advance publication in the ~~Weekly~~International Frequency Information Circular not earlier than five years and preferably not later than two years before the planned date of bringing into use of the network or system (see also Nos. **S11.44** and **S11.44B** to **S11.44I**). The characteristics to be provided for this purpose are listed in Appendix **S4**. ~~The coordination or notification information may also be communicated to the Bureau at the same time; it shall be considered as having been received by the Bureau not earlier than six months after the date of receipt of the information for advance publication where coordination is required by Section II of Article **S9**. Where coordination is not required by Section II, notification shall be considered as having been received by the Bureau not earlier than six months after the date of publication of the advance publication information.~~

Reasons: To restrict the API to only those networks not subject to coordination.

ADD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/5

5*bis* **A.S9.5*bis*** In applying the provisions of this Article, the provisions of Resolution [**XXX (WRC-2000)**] shall also be applied, where appropriate, in lieu of the provisions of this Article.

Reasons: It is necessary to add a footnote to the title of this Article making reference to draft Resolution XXX (WRC-2000) to give it the necessary regulatory effect.

ADD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/6

S9.1A Notification information may be communicated to the Bureau at the same time; however, it shall be considered as having been received by the Bureau not earlier than six months after the date of receipt of the advance publication information under No. **S9.2B**.

Reasons: Due to the rearrangement of the provisions.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/7

S9.2 Amendments to the information sent in accordance with the provisions of No. **S9.1** shall also be sent to the Bureau as soon as they become available. The use of an additional frequency band will require the application of ~~the advance publication~~this procedure for this band.

Reasons: Due to the rearrangement of the provisions.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/8

S9.2B On receipt of the complete information sent under Nos. **S9.1** ~~and~~or **S9.2**, the Bureau shall publish it in a Special Section of its ~~Weekly~~International Frequency Information Circular within three months. When the Bureau is not in a position to comply with the time limit referred to above, it shall periodically so inform the administrations, giving the reasons therefore.

Reasons: These modifications are of an editorial nature.

SUP BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/9

Sub-Section IA – Advance publication of information on satellite networks or satellite systems that are not subject to coordination procedure under Section II

Reasons: To suppress the API for networks subject to coordination.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/10

S9.3 If, upon receipt of the ~~Weekly~~International Frequency Information Circular containing information published under No. **S9.2B**, any administration believes that interference which may be unacceptable may be caused to its existing or planned satellite networks or systems, it shall within four months of the date of publication of the ~~Weekly~~International Frequency Information Circular communicate to the publishing administration its comments on the particulars of the anticipated interference to its existing or planned systems. A copy of these comments shall also be sent to the Bureau. Thereafter, both administrations shall endeavour to cooperate in joint efforts to resolve any difficulties, with the assistance of the Bureau, if so requested by either of the parties, and shall exchange any additional relevant information that may be available. If no such comments are received from an administration within the aforementioned period, it may be assumed that the administration concerned has no objections to the planned satellite network(s) of the system on which details have been published.

Reasons: These modifications are of an editorial nature.

SUP BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/11

S9.5A

Reasons: The API for networks not subject to coordination is for more than just information.

SUP BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/12

Sub-Section IB – Advance publication of information on satellite networks or satellite systems that are subject to coordination procedure under Section II

SUP BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/13

S9.5B

SUP BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/14

S9.5C

SUP BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/15

S9.5D

SUP BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/16

S9.5B.1

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/17

S9.30 Requests for coordination made under Nos. **S9.7** to **S9.14** and **S9.21** shall be sent by the requesting administration to the Bureau, together with the appropriate information listed in Appendix **S4** to these Regulations. Requests for coordination under Nos. **S9.7** to **S9.14** and **S9.21** shall be sent to the Bureau no earlier than five years and preferably no later than two years before the planned date of bringing into use of the network or system (see also Nos. **S11.44** and **S11.44B** to **S11.44I**). In the case of coordination under No. **S9.21**, any terrestrial station is not subject to these time limits.

Reasons: To provide for the start of the five-year period as the API is no longer the starting point.

ADD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/18

S9.30A Amendments to the information sent in accordance with the provisions of No. **S9.30** shall also be sent to the Bureau as soon as they become available. The use of an additional frequency band will require the restart of the coordination procedure for this band.

Reasons: To carry over some of the provisions for the API.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/19

S9.38 *d)* publish, as appropriate, the complete information in the ~~Weekly~~International Frequency Information Circular within four months. When the Bureau is not in a position to comply with the time limit referred to above, it shall periodically so inform the administrations, giving the reasons therefore.

Reasons: This modification is of an editorial nature.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/20

S9.40 *e)* inform the administrations concerned of its actions and communicate the results of its calculations~~,~~ when requested drawing attention to the relevant ~~Weekly~~International Frequency Information Circular.

Reasons: To reduce the need for BR to send out this data to only when requested.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/21

S9.41 Following receipt of the ~~Weekly~~International Frequency Information Circular referring to requests for coordination under Nos. **S9.7** to **S9.9**, an administration believing that it should have been included in the request shall, within four months of the date of publication of the relevant ~~Weekly~~International Frequency Information Circular, inform the initiating administration and the Bureau, giving its technical reasons for doing so, and shall request that its name be included.

Reasons: These modifications are of an editorial nature.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/22

S9.51 Following its action under No. **S9.50**, the administration with which coordination was sought under Nos. **S9.7** to **S9.9** shall, within four months of the date of publication of the ~~Weekly~~International Frequency Information Circular under No. **S9.38**, either inform the requesting administration and the Bureau of its agreement or act under No. **S9.52**.

Reasons: This modification is of an editorial nature.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/23

S9.52 If an administration, following its action under No. **S9.50**, does not agree to the request for coordination, it shall, within four months of the date of publication of the ~~Weekly~~International Frequency Information Circular under No. **S9.38**, or of the date of dispatch of the coordination data under No. **S9.29**, inform the requesting administration of its disagreement and shall provide information concerning its own assignments upon which that disagreement is based. It shall also make such suggestions as it is able to offer with a view to satisfactory resolution of the matter. A copy of that information shall be sent to the Bureau. Where the information relates to terrestrial stations or earth stations operating in the opposite direction of transmission within the coordination area of an earth station, only that information relating to existing radiocommunication stations or to those to be brought into use within the next three months for terrestrial stations, or three years for earth stations, shall be treated as notifications under Nos. **S11.2** or **S11.9**.

Reasons: This modification is of an editorial nature.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/24

S9.52A In the case of coordination requested under No. **S9.14**, on receipt of the special section of the ~~Weekly~~International Frequency Information Circular referred to in No. **S9.38**, and within the same four-month period from the publication of that special section, an administration in need of assistance may inform the Bureau that it has existing or planned terrestrial stations which might be affected by the planned satellite network, and may request the Bureau to determine the need for coordination by applying the Appendix **S5** criteria. The Bureau shall inform the administration seeking coordination of this request, indicating the date by which it may be able to provide the results of its analysis. When these results are available, the Bureau shall inform both administrations. This request shall be considered as a disagreement, pending the results of the analysis by the Bureau of the need for coordination.

Reasons: This modification is of an editorial nature.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/25

S9.55 All administrations may use correspondence, any appropriate means of telecommunication or meetings, as necessary, to assist in resolving the matter. The results thereof shall be communicated to the Bureau, which shall publish them in the ~~Weekly~~International Frequency Information Circular, as appropriate.

Reasons: This modification is of an editorial nature.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/26

S9.64 If the disagreement remains unresolved after the Bureau has communicated its conclusions to the administrations involved, the administration which requested coordination shall, having regard to the other provisions of this Section, defer the submission of its notice of frequency assignments under Article **S11** to the Bureau for six months from the date of the request or the ~~Weekly~~International Frequency Information Circular containing the request for coordination, as appropriate.

Reasons: This modification is of an editorial nature.

ARTICLE S11

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/27

Notification and recording of frequency assignments[1, 2, 3, 3bis]

ADD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/28

[3bis] **A.S11.3*bis*** In applying the provisions of this Article, the provisions of Resolution [**XXX (WRC-2000)**] shall also be applied, where appropriate, in lieu of the provisions of this Article.

Reasons: It is necessary to add a footnote to the title of this Article making reference to draft Resolution XXX (WRC-2000) to give it the necessary regulatory effect.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/29

S11.44 The notified date of bringing into use of any assignment to a space station of a satellite network shall be no later than five years following the date of receipt by the Bureau of the relevant information under No. **S9.1** or **S9.30** as applicable. The notified date of bringing into use may be extended at the request of the notifying administration by not more than two years, only under the conditions specified under Nos. **S11.44B** to **S11.44I**. Any frequency assignment not brought into use within the required period shall be cancelled by the Bureau after having informed the administration at least three months before the expiry of this period.

Reasons: Consequential to the suppression of the API for networks subject to coordination.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/30

S11.44A A notice not conforming to No. **S11.44** shall be returned to the notifying administration with a recommendation to restart the advance publication procedure or coordination procedure, as applicable.

Reasons: Consequential to the suppression of the API for networks subject to coordination.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/31

S11.44B The notified date of bringing into use as published under **S9.2** or **S9.38** as applicable will be extended by the Bureau in accordance with No. **S11.44** if due diligence information required by Resolution **49 (WRC-97)** is provided for the satellite network~~; if the procedure for effecting coordination in accordance with Section II of Article **S9** as applicable has commenced;~~ and if the notifying administration certifies that the reason for the extension is one or more of the following specific circumstances:

Reasons: Consequential to the suppression of the API for networks subject to coordination.

MOD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/32

S11.48 If, after the expiry of the period of five years, plus the extension specified in No. **S11.44**, as appropriate, from the date of receipt of the complete information referred to in No. **S9.1** or **S9.30** as applicable, the administration responsible for the satellite network has not brought the frequency assignments to stations of the network into use, the corresponding information published under Nos. **S9.2B** and **S9.38**, as appropriate, shall be cancelled, but only after the administration concerned has been informed at least three months before the expiry date referred to in No. **S11.44**.

Reasons: Consequential to the suppression of the API for networks subject to coordination.

NOC BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/33

S11.49

APPENDIX S4

Consolidated list and tables of characteristics for use in the application of the procedures of Chapter SIII

Consequential modifications to Appendix S4 to reflect the suppression of the API for networks subject to coordination.

ANNEX 2

ADD BEL/DNK/LIE/LUX/NOR/HOL/SUI/68/34

DRAFT RESOLUTION XXX (WRC-2000)

Provisional improvements in the satellite coordination process

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) Resolution **18** of the Plenipotentiary Conference (Kyoto, 1994);

b) Resolution **86** of the Plenipotentiary Conference (Minneapolis, 1998);

c) that there now exists a large backlog of satellite network coordination requests pending with the Radiocommunication Bureau such that elimination of this backlog at current processing rates and with no new networks being received would take the Bureau nearly three years to accomplish;

d) that WRC-97 decreased the period between receipt of the Advance Publication Information and the placing of satellite networks into use from seven to five years (RR **S9.1, S11.44**) and decreased the extension period from three to two years (RR **S11.44B** to **S11.44I**);

e) the critical importance of efficient telecommunication services at affordable prices to all nations and users;

f) the key role played by communication satellite networks in providing such efficient and affordable communication services;

g) that the current breakdown of ITU’s satellite coordination procedures seriously compromises the ability of such networks to provide such services and compromises the role of ITU in this process;

h) that it is imperative, in view of the urgency of the situation and to maintain the credibility of ITU, that such reforms be adopted at WRC-2000, at least on a provisional basis, for review at WRC-03,

considering further

that the underlying objectives of this Resolution are:

i) to greatly simplify the existing procedures while preserving the rights and obligations of all administrations under the Radio Regulations;

j) to make the application of such simplified procedures transparent to administrations and operators;

k) to adopt such reformed procedures effective as of the end of this Conference, so as to have an immediate impact upon the present critical situation,

resolves

1 that the Bureau and administrations shall apply the following provisions in lieu of the equivalent provisions of Articles **S9** and **S11**:

a) for those networks for which the data has been already submitted to the Bureau under No. **S9.30** and No. **S11.15** which have not been submitted in the required electronic format, the notices shall be resubmitted to the Bureau by [1 January 2001] in electronic form using the Bureau format and these notices shall keep the date of the original paper submission. The Bureau shall continue the processing based on the electronic submission. For those networks subject to this provision, the Bureau shall scan the paper submission and post it on the WWW. If any administration subsequently indicates after the publication/posting of the electronic submission, and it is confirmed by the Bureau that the data of the electronic submission is different than that of the paper submission, the Bureau shall change the date of receipt to that of the electronic submission;

b) that all new notices for space networks submitted to the Bureau under No. **S9.30** and No. **S11.15** after [1 January 2001] shall be submitted in electronic form using the software provided by the Bureau, otherwise they shall be returned to the administration as being incomplete;

c) that the Bureau, in its publication of the Special Sections, shall publish only a limited summary subset of the data items and the findings. The remaining data items shall be available periodically on CD-ROM;

2 that the revised provisions of Section I of Article **S9** and Nos. **S11.44**, **S11.44A**, **S11.44B** and **S11.48** shall be applied by the Bureau and administrations as of [3 June 2000] for all new submissions as well as those received by the Bureau prior to that date and which have not yet been processed,

further resolves

3 that WRC-03 will review the experience gained with the implementation of the above procedures, with the objective of adopting any modifications, improvements or adjustments as may be necessary;

4 that ITU-R should study further possible improvements and simplifications to the Regulations in response to Resolution **86** (Minneapolis, 1988).

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to
Document 69-E
7 May 2000
Original: English

PLENARY MEETING

Spain, France, Luxembourg, Norway, Netherlands (Kingdom of the), Sweden

PROPOSALS FOR THE WORK OF THE CONFERENCE

RESOLUTION 86 (MINNEAPOLIS, 1998)

Coordination Arc

Please add France and Sweden to the list of co-sponsors to this document.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 69-E
5 April 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Spain, Luxembourg, Norway, Netherlands (Kingdom of the)

PROPOSALS FOR THE WORK OF THE CONFERENCE

RESOLUTION 86 (MINNEAPOLIS, 1998)

Coordination Arc

1 We now have the situation in the application of the Radio Regulations for space services where the process has almost collapsed and is nearly unworkable in terms of the real world for the putting into service of satellite networks. If the ITU process is not fixed in the near future, it will lead to more and more cases where satellites are put into operation without completing the ITU process. As a result of this breakdown, operators who must find means to ensure non-interference and to ensure the continuity of service will tend to find solutions outside the framework of ITU. It must be recognized that despite what the Radio Regulations say, a satellite network operator, with the approval of the administration, once the satellite construction and launch has been contracted for, will not stop the process including the launch just because the ITU process has not been completed and all problems resolved.

2 At the present time it takes the Bureau almost two years to publish a coordination request and about three years to record a space network in the Master Register. During the recent Radiocommunication Bureau information meeting on satellite procedures, it was stated by the Bureau that if there were no more coordination requests received it would take three years to process those that have already been filed with the Bureau. Our comments with regard to the delay before publication are not intended to be a criticism of the Bureau but are a criticism of the process that the Members have imposed on the Bureau in the Radio Regulations. If we take these time periods and add to it a minimum period of about 2-3 years to effect the coordination we then have a total period of about 7-8 years from the submission of a coordination request to the Bureau until the frequencies are recorded in the Master Register. It is necessary to contrast that 7-8 year period with the time it takes to contract, build and launch a satellite of about two years. Even with no time considered for the actual coordination the Bureau time is about five years - more than twice the time needed to build and launch a satellite. This contrast in time periods tells us that there is something seriously wrong with the administrative process that ITU has adopted.

3 As mentioned above the ITU Radiocommunication Bureau organized an Information Exchange meeting on the problems associated with the satellite procedures on 21 January 2000. The report of that meeting was sent to administrations and Sector Members in CA/75. One of the items considered was the use of a coordination arc instead of the delta T/T of Appendix S8.

4 The use of a coordination arc would greatly simplify the work of the Bureau and thus it would have a drastic effect in reducing the time that it takes to process a filing. This matter was further considered by WP 4A during its recent meeting and a draft new Recommendation was prepared. In terms of dealing with the backlog in the processing of notices it is considered that the coordination arc should be adopted by WRC-2000 and that it should be applied to the FSS service in certain specified frequency bands. It is also considered that this new approach should be applied immediately after WRC-2000 and that it should also be applied to those notices that have already been filed with BR. Consequently, it is proposed that this new approach be implemented by means of a Resolution to be put into effect on the close of WRC. The annexed draft Recommendation is submitted to WRC.

5 The key features of the approach proposed are as follows:

- that it should be applied to the unplanned FSS in certain specified frequency bands;
- that any network that is more than the required coordination angle from the new network would not be included in the coordination process;
- the coordination angle would be different for different frequency ranges;
- any network that has a separation angle of less that the required arc could be excluded from the coordination process if the notifying administration could demonstrate that the delta T/T was less that six per cent;
- that this process would be applied to all new notices received after WRC;
- that it would also be applied to all coordination requests that have been submitted to the Bureau before the end of WRC;
- that, as a transitional measure for those networks still in the coordination process, a network that is outside the coordination arc should be included in the coordination if the responsible administration could demonstrate that the delta T/T exceeds six per cent.

6 There are other proposals to WRC which propose that in the application of the present procedures in the identification of possible affected administrations using Appendix S8, that there should be a separation of the uplink and downlink considerations. This proposal in this document is not inconsistent with those proposals in that application of the cases mentioned in the preceding paragraph the delta T/T would be calculated separately for the uplinks and downlinks.

7 As there is also a backlog in the processing of modifications to the Plans of Appendices S30 and S30A, it is also proposed that the same coordination arc process be applied with respect to the need for agreement between BSS and other BSS as well as FSS under Appendices S30 and S30A.

E/LUX/NOR/HOL/69/1

NOTE - It is necessary to add a footnote to the titles of Articles **S9**, **S11**, Appendix **S5** and Appendices **S30** and **S30A** which would make reference to this Resolution to give it the necessary regulatory effect such as:

"In applying the provisions of this Article, the provisions of Resolution **[XXX] (WRC-2000)** shall also be applied, where appropriate, in lieu of the provisions of this Article".

RESOLUTION [XXX] (WRC-2000)

Provisional improvements in the satellite coordination process

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) Resolution **18** of the Plenipotentiary Conference, Kyoto, 1994;

b) Resolution **86** of the Plenipotentiary Conference, Minneapolis, 1998;

c) that there now exists a large backlog of satellite network coordination requests pending with the Radiocommunication Bureau such that elimination of this backlog at current processing rates and with no new notices being received would take the Bureau nearly three years to accomplish;

d) that the current breakdown of the ITU's satellite coordination procedures seriously compromises the ability of such networks to provide such services and compromises the role of ITU in this process;

e) that it is imperative, in view of the urgency of the situation and to maintain the credibility of ITU, that such reforms be adopted at WRC-2000, and be applied on a provisional basis as of the end of WRC-2000,

resolves

that effective immediately, the Bureau and administrations shall apply the following provisions in lieu of the equivalent provisions of Articles **S9**, **S11**, Appendix **S5** and Appendices **S30** and **S30A**:

1 for the identification under No. **S9.36** of the FSS networks of administrations with which coordination is required under No. **S9.7** for networks operating in the non-planned 6/4 GHz, 11-12/13-14 GHz and 18/30 GHz bands, the use of a coordination arc shall be used in lieu of Appendix **S5** in accordance with the following:

a) for all networks presently filed with the Bureau for which the publication has not yet been made and for all networks submitted after 3 June 2000, the Bureau shall use the coordination arc process;

b) the Bureau shall identify as networks possibly affected those which have an orbital separation of less than:

–	6/4 GHz	10 degrees
–	13-14/11-12 GHz	9 degrees
–	8-30 GHz	8 degrees

c) for those networks for which the complete coordination request has been received by the Bureau prior to 3 June 2000 and having an orbit separation of more than the above values, they shall be included in the coordination process if the responsible administration can demonstrate, using the Bureau software, that the criteria of Appendix **S8** have been exceeded;

d) for those networks that have orbital separations less than the above values, they shall be excluded from the need for coordination if the notifying administration can show that the delta T/T is less than six per cent;

2 for modifications to the Plans of Appendices **S30** and **S30A** the Bureau shall use a coordination arc separation of nine degrees to identify possibly affected planned assignments of the same or another Region and of FSS networks (both feeder link and non-feeder link) of the same or another Region in lieu of the criterion in the appropriate Annex of Appendices **S30/S30A**. This provision shall be applied to all new submissions as of 3 June 2000 as well as to all proposed modifications previously submitted to the Bureau but not yet entered in the Plan,

further resolves

that WRC-02/03 will review the experience gained with the implementation of the above procedures, with the objective of adopting any modifications, improvements or adjustments as may be necessary.

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WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

China (People's Republic of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda item 1.1 - requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution 26 (Rev.WRC-97)

MOD CHN/70/1

S5.439 *Additional allocation:* in ~~China,~~ the Islamic Republic of Iran and Libya, the band 4 200-4 400 MHz is also allocated to the fixed service on a secondary basis.

Reasons: The band will no longer be allocated to the fixed service on a secondary basis in China.

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PLENARY MEETING

China (People's Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.2 - to finalize remaining issues in the review of Appendix S3 to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation 66 (Rev.WRC-97*)* and the decisions of WRC-97 on adoption of new values due to take effect at a future time, of spurious emissions for space services

Introduction

ITU-R has made in-depth studies on spurious emission limits for the space service and other issues not directly related to the space service such as spurious emission limits for radars. China supports the results of the ITU-R studies.

To make the first column of Table II in Appendix S3 simple and clear, China proposes to add a service category "safety service" and a footnote in Table II of Appendix S3. The footnote shall clarify that the safety service includes emergency position-indicating radio beacons, emergency locator transmitters, personal location beacons, search and rescue transponders, ship emergency, lifeboat and survival craft transmitters, land, aeronautical or maritime transmitters when used in an emergency, etc.

MOD CHN/71/1

TABLE II

Attenuation values used to calculate maximum permitted spurious emission power levels for use with radio equipment

Service category in accordance with Article S1, or equipment type[15]	**Attenuation (dB) below the power supplied to the antenna transmission line**
All services except those services quoted below:	43 + 10 log (*P*), or 70 dBc, whichever is less stringent
Space services (earth stations) [10, ~~14~~16]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Space services (space stations) [10, ~~14~~17]	43 + 10 log (*P*), or 60 dBc, whichever is less stringent
Radiodetermination[14*bis*]	43 + 10 log (*PEP*), or 60 dB, whichever is less stringent
Broadcast television[11]	46 + 10 log (*P*), or 60 dBc, whichever is less stringent, without exceeding the absolute mean power level of 1 mW for VHF stations or 12 mW for UHF stations. However, greater attenuation may be necessary on a case by case basis.
Broadcast FM	46 + 10 log (*P*), or 70 dBc, whichever is less stringent; the absolute mean power level of 1 mW should not be exceeded
Broadcasting at MF/HF	50 dBc; the absolute mean power level of 50 mW should not be exceeded
SSB from mobile stations[12]	43 dB below *PEP*
Amateur services operating below 30 MHz (including with SSB)~~[12]~~	43 + 10 log (*PEP*), or 50 dB, whichever is less stringent
Services operating below 30 MHz, except space, radiodetermination, broadcast, those using SSB from mobile stations, and amateur[12]	43 + 10 log (*X*), or 60 dBc, whichever is less stringent, where *X* = *PEP* for SSB modulation, and *X* = *P* for other modulation

TABLE II (*end*)

Service category in accordance with Article S1, or equipment type[15]	**Attenuation (dB) below the power supplied to the antenna transmission line**
Low-power device radio equipment[13]	56 + 10 log (*P*), or 40 dBc, whichever is less stringent
Safety service [AAA] ~~Emergency position-indicating radio beacon~~ ~~Emergency locator transmitter~~ ~~Personal location beacon~~ ~~Search and rescue transponder~~ ~~Ship emergency, lifeboat and survival craft transmitters~~ ~~Land, aeronautical or maritime transmitters when used in emergency~~	No limit

ADD CHN/71/2

[AAA] The safety service includes “emergency position-indicating radio beacon”, “emergency locator transmitters”, “personal location beacons”, “search and rescue transponders”, “ship emergency and survival craft transmitters”, “land, aeronautical or maritime transmitters when used in an emergency” other than the ship movement service (**S1.31**).

Reasons: To make the first column of Table II in Appendix S3 simple and clear.

No. S1.65 defines the survival craft station as: A *mobile station* in the *maritime mobile service* or the *aeronautical mobile service* intended solely for survival purposes and located on any lifeboat, life-raft or other survival equipment. Obviously, lifeboat is included in survival craft transmitters, and shall be deleted from “ship emergency, lifeboat and survival craft transmitters”.

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PLENARY MEETING

China (People's Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.4 - to consider issues concerning allocations and regulatory aspects related to Resolutions 126 (WRC-97), 128 (WRC-97), 129 (WRC-97), 133 (WRC-97), 134 (WRC-97) and 726 (WRC-97)

Resolution 726 (WRC-97) - Frequency bands above 30 GHz available for high-density applications in the fixed service

ARTICLE S5

Frequency allocations

MOD CHN/72/1

55.78-66 GHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
55.78-56.9	EARTH EXPLORATION-SATELLITE (passive) FIXED ADD S5.AAA INTER-SATELLITE S5.556A MOBILE S5.558 SPACE RESEARCH (passive) S5.547 S5.557	

ADD CHN/72/2

S5.AAA In the band 55.78-56.26 GHz, the pfd value of the FS stations shall be limited to –28.5 dBW/MHz.

Reasons: ITU-R studies have shown that, without restrictions on the high-density applications in the fixed service in the band 55.78-56.26 GHz, unacceptable interference may occur to passive sensors onboard Earth exploration-satellites.

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PLENARY MEETING

China (People's Republic of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda item 1.5 - to consider regulatory provisions and possible additional frequency allocations for services using high altitude platform stations, taking into account the results of ITU-R studies conducted in response to Resolution 122 (WRC-97)

NOC CHN/73/1

The provisions in the Radio Regulations about the application of HAPS in fixed service shall remain unchanged while related studies under Resolution 122 shall be continued until WRC-03.

Reasons:

1 To date, there is no HAPS system in practice.

2 ITU-R needs to continue its studies on the sharing between HAPS on one side and the FS and FSS on the other side.

3 The sharing study in the band 18-31 GHz and above 3 GHz has just begun.

4 The band 18-31 GHz is already very congested.

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PLENARY MEETING

China (People's Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.6.1

Issue A: IMT-2000 terrestrial component

Introduction

The bands 806-960 MHz and 1 710-1 885 MHz are currently widely used for first- and second-generation cellular systems. APT is proposing identification of the bands 1 710-1 885 MHz and 2 520-2 670 MHz for the IMT-2000 terrestrial component. This identification does not preclude other systems and other services from continuing to operate in this band. Some administrations may decide on a national basis according to their own market requirements and spectrum planning, to identify the band 2 300-2 400 MHz as the additional spectrum for the IMT-2000 terrestrial component in WRC-2000. The current service allocations in the band 2 700-2 900 MHz shall not be changed.

NOC CHN/74/1

S5.388 The bands 1 885-2 025 MHz and 2 110-2 200 MHz are intended for use, on a worldwide basis, by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000). Such use does not preclude the use of these bands by other services to which they are allocated. The bands should be made available for IMT-2000 in accordance with Resolution **212 (Rev.WRC-97)**.

MOD CHN/74/2

2 170-2 520 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 300-2 450 FIXED MOBILE Amateur Radiolocation S5.150 S5.282 S5.395 <u>ADD S5.AAA</u>	**2 300-2 450** FIXED MOBILE RADIOLOCATION Amateur S5.150 S5.282 S5.393 S5.394 S5.396 <u>ADD S5.AAA</u>	

ADD CHN/74/3

S5.AAA In China, [other administrations], the band 2 300-2 400 MHz is intended for use by administrations wishing to implement International Mobile Telecommunications-2000 (IMT-2000) when the bands 1 710-1 885 MHz and 2 520-2 670 MHz are not made available for IMT-2000. This does not preclude the use of this band for other services to which the band is allocated. The band 2 300-2 400 MHz should be made available for IMT-2000 in accordance with Resolution **ZZZ (WRC-2000)**.

Reasons:

1 The band 2 300-2 400 MHz is allocated on a primary basis to the mobile service in all Regions.

2 ITU-R has recommended the 1-3 GHz range as the most suitable for IMT-2000.

3 The CPM Report concludes that there is a requirement for an additional spectrum of 160 MHz for the terrestrial component of IMT-2000 beyond the spectrum already identified in RR S5.388 and beyond the spectrum used in the three Regions for the second-generation mobile systems.

4 The band 2 300-2 400 MHz can provide administrations with an alternative when some countries have difficulties in implementing IMT-2000 on the bands 1 710-1 885 MHz or 2 520-2 670 MHz.

NOC CHN/74/4

2 700-4 800 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 700-2 900	AERONAUTICAL RADIONAVIGATION S5.337 Radiolocation S5.423 S5.424	

Reasons: The band 2 700-2 900 MHz is very important to the aeronautical radionavigation service and the weather radar service. Many countries, including China, have a great number of aeronautical radionavigation radars and weather radar systems working and further developing in this band. Since the aeronautical radionavigation service and the weather radar service are safety services, the current service allocations in the band 2 700-2 900 MHz shall not be changed so as to guarantee the operation of the aeronautical radionavigation service and the weather radar service and to meet their future development needs.

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PLENARY MEETING

China (People's Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.8 - to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands

Introduction

Agenda item 1.8 is to consider regulatory and technical provisions to enable earth stations on board vessels to operate in the fixed-satellite service networks in bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands. The bands 3 700-4 200 MHz and 5 925-6 425 MHz are now allocated on a primary basis to FS, FSS and MS. China has a great number of point-to-point systems at 6 GHz with typical capacities of 34 Mbit/s and above distributed widely along the major port cities of the coastal provinces. Due to the long coastal line in China, the use of ESVs may have the potential to cause unacceptable interference to the existing and future fixed systems operating in the band 5 925-6 425 MHz. Although identification of a minimum distance may protect FS from interference, ITU-R needs to make further studies on the minimum distance value.

Operational issues

Option 1 in the CPM Report suggests a self-contained Resolution be considered by WRC-2000 as an interim provision. However, China considers the example draft Resolution to be not operable because of the mobility of interference sources. Even if the interference source could be found, the damages to the affected FS operator would not be made up. Besides, testing and regulatory conditions for searching for the interference source may bring extra costs to FS operators and the administration.

Conclusion

China considers that the existing Radio Regulations should not be modified before announcement of the study results. Under such circumstances, ESV terminals shall continue to be operated according to No. S4.4.

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PLENARY MEETING

China (People's Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.9 - to take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite (MSS) service in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions 213 (Rev.WRC-95) and 220 (WRC-97)

Resolution 213 (Rev.WRC-95) - Sharing studies concerning possible use of the band 1 675-1 710 MHz by the mobile-satellite service

ARTICLE S5

Frequency allocations

NOC CHN/76/1

1 660-1 710 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 675-1 690 METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile	**1 675-1 690** METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space)	**1 675-1 690** METEOROLOGICAL AIDS FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile
S5.341	S5.341 S5.377	S5.341

1 690-1 700 METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) Fixed Mobile except aeronautical mobile S5.289 S5.341 S5.382	**1 690-1 700** METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE-SATELLITE (Earth-to-space) S5.289 S5.341 S5.377 S5.381	**1 690-1 700** METEOROLOGICAL AIDS METEOROLOGICAL-SATELLITE (space-to-Earth) S5.289 S5.341 S5.381
1 700-1 710 FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile S5.289 S5.341	**1 700-1 710** FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile MOBILE-SATELLITE (Earth-to-space) S5.289 S5.341 S5.377	**1 700-1 710** FIXED METEOROLOGICAL-SATELLITE (space-to-Earth) MOBILE except aeronautical mobile S5.289 S5.341 S5.384

Reasons: The sharing studies made by ITU-R conclude that frequency sharing in the band 1 675-1 700 MHz is not feasible due to the unacceptable interference to both the meteorological aid service and the non-GSO mobile-satellite service, neither is frequency sharing between the non-GSO mobile-satellite service and the meteorological-satellite service. Therefore, the current service allocations in the band 1 675-1 700 MHz shall not be changed so as to protect the meteorological aid service and the meteorological-satellite service, and to meet future development needs.

Agenda item 4

SUP CHN/76/2

RESOLUTION 213 (Rev.WRC-95)

Sharing studies concerning possible use of the band 1 675-1 710 MHz by the mobile-satellite service

Reasons: The sharing studies conducted by ITU-R concerning possible use of the band 1 675-1 710 MHz by the mobile-satellite service conclude that frequency sharing in the band 1 675-1 700 MHz is not feasible due to unacceptable interference to both the meteorological aid service and the non-GSO mobile-satellite service, neither is the frequency sharing in this band between the non-GSO mobile-satellite service and the meteorological-satellite service. Since the studies required by Resolution 213 have already been completed, Resolution 213 should be suppressed.

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PLENARY MEETING

China (People's Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.11 - to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions 214 (Rev.WRC-97) and 219 (WRC-97)

<u>**NOC**</u> CHN/77/1

335.4-410 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
401-402	METEOROLOGICAL AIDS SPACE OPERATION (space-to-Earth) EARTH EXPLORATION-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) Fixed Mobile except aeronautical mobile	
402-403	METEOROLOGICAL AIDS EARTH EXPLORATION-SATELLITE (Earth-to-space) METEOROLOGICAL-SATELLITE (Earth-to-space) Fixed Mobile except aeronautical mobile	
403-406	METEOROLOGICAL AIDS Fixed Mobile except aeronautical mobile	

Reasons: Sharing studies by ITU-R show that the co-channel frequency sharing in the band 401-406 MHz between the non-GSO mobile-satellite service systems which use narrow-band modulation technology and the meteorological aid service is not feasible. Maintaining the current service allocations in the band 401-406 MHz unchanged can both protect the meteorological aid service and ensure the future development of the Earth exploration-satellite service and the meteorological-satellite service.

NOC CHN/77/2

410-470 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
450-455	FIXED MOBILE S5.209 S5.271 S5.286 S5.286A S5.286B S5.286C S5.286D S5.286E	
455-456 FIXED MOBILE S5.209 S5.271 S5.286A S5.286B S5.286C S5.286E	**455-456** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.286A S5.286B S5.286C S5.209 S5.271	**455-456** FIXED MOBILE S5.209 S5.271 S5.286A S5.286B S5.286C S5.286E
456-459	FIXED MOBILE S5.271 S5.287 S5.288	
459-460 FIXED MOBILE S5.209 S5.271 S5.286A S5.286B S5.286C S5.286E	**459-460** FIXED MOBILE MOBILE-SATELLITE (Earth-to-space) S5.286A S5.286B S5.286C S5.209 S5.271	**459-460** FIXED MOBILE S5.209 S5.271 S5.286A S5.286B S5.286C S5.286E
460-470	FIXED MOBILE Meteorological-Satellite (space-to-Earth) S5.287 S5.288 S5.289 S5.290	

Reasons: In many countries, a great number of mobile services, fixed services and meteorological services are using the band 450-470 MHz, and these services are still developing. The current service allocations shall not be changed in order to protect the existing services and ensure their future development.

SUP CHN/77/3

RESOLUTION 219 (WRC-97)

Studies relating to consideration of the allocation to the non-geostationary mobile-satellite service in the meteorological aids band 405-406 MHz and the impact on primary services allocated in the adjacent bands

Reasons: The sharing studies carried out by ITU-R in the band 405-406 MHz between the mobile-satellite service and the meteorological aid service show that the frequency sharing in the band 401-406 MHz between the non-GSO mobile-satellite system which uses the narrow-band modulation technology and the meteorological aid service is not feasible. Once Resolution 219 is suppressed, such problem as the impact on primary services allocated in the adjacent bands from the non-GSO mobile-satellite service will not exist any more. With the technological development, there may be possibility of sharing, then sharing studies in other appropriate bands below 1 GHz between the mobile-satellite service and the terrestrial service can be carried out according to Resolution 214. If the non-GSO mobile-satellite systems is used for short message services, thorough studies shall be made on the market positioning and the situation of corresponding terrestrial services. A good lesson in this regard is the failure of the Iridium system. Sharing without careful studies and considerations will not only waste resources but also cause unduly interference.

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PLENARY MEETING

China (People's Republic of)

PROPOSAL ON FREQUENCY ALLOCATION ON A WORLDWIDE BASIS TO RADIODETERMINATION-SATELLITE SERVICE IN THE BAND 1 610-1 626.5 MHz AND 2 483.5-2 500 MHz

Agenda item 1.15 - Issues related to the radionavigation-satellite service

Introduction

According to the Table of Frequency Allocations in the Radio Regulations (No. S5), the band 1 610-1 626.5 MHz is allocated on a primary basis to the radiodetermination-satellite service in Region 2 and to the radiodetermination-satellite service on a secondary basis in Region 3. Footnote S5.371 specifies the allocation of this band to the radiodetermination-satellite service on a secondary basis in Region 1, and footnote S5.369 specifies the allocation of this band to the radiodetermination-satellite service on a primary basis in 25 countries of Regions 1 and 3 (including Angola, Australia, Burundi, China, Cote d'Ivoire, Eritrea, Ethiopia, India, the Islamic Republic of Iran, Israel, Jordan, Lebanon, Liberia, Libya, Madagascar, Mali, Pakistan, Papua New Guinea, Dem. Rep. of the Congo, Syria, Senegal, Sudan, Swaziland, Togo and Zambia).

The band 2 483.5-2 500 MHz is allocated on a primary basis to the radiodetermination-satellite service in Region 2 and to the radiodetermination-satellite service on a secondary basis in Region 3. Footnote S5.371 specifies the allocation of this band to the radiodetermination-satellite service on a secondary basis in Region 1, and footnote S5.400 specifies the allocation of this band to the radiodetermination-satellite service on a primary basis in 23 countries of Regions 1 and 3 (including Angola, Australia, Bangladesh, Burundi, China, Eritrea, Ethiopia, India, the Islamic Republic of Iran, Jordan, Lebanon, Liberia, Libya, Madagascar, Mali, Pakistan, Papua New Guinea, Dem. Rep. of the Congo, Syria, Sudan, Swaziland, Togo and Zambia).

Taking into account the increasing demands for the radiodetermination-satellite service, the Chinese Administration proposes a primary allocation to the radiodetermination-satellite service on a worldwide basis in the band 1 610-1 626.5 MHz and 2 483.5-2 500 MHz. This proposal is submitted to be considered in WRC-2000 under the agenda item 1.15.

Proposal

Part of No. S5 of the Radio Regulations should be modified as follows:

MOD CHN/78/1

1 610-1 660 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 610-1 610.6 MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space)	**1 610-1 610.6** MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space)	**1 610-1 610.6** MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) ~~Radiodetermination-satellite (Earth-to-space)~~
S5.341 S5.355 S5.359 S5.363 S5.364 S5.366 S5.367 S5.368 ~~S5.369 S5.371~~ S5.372	S5.341 S5.364 S5.366 S5.367 S5.368 S5.370 S5.372	S5.341 S5.355 S5.359 S5.364 S5.366 S5.367 S5.368 ~~S5.369~~ S5.372
1 610.6-1 613.8 MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space)	**1 610.6-1 613.8** MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space)	**1 610.6-1 613.8** MOBILE-SATELLITE (Earth-to-space) RADIO ASTRONOMY AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) ~~Radiodetermination-satellite (Earth-to-space)~~
S5.149 S5.341 S5.355 S5.359 S5.363 S5.364 S5.366 S5.367 S5.368 ~~S5.369 S5.371~~ S5.372	S5.149 S5.341 S5.364 S5.366 S5.367 S5.368 S5.370 S5.372	S5.149 S5.341 S5.355 S5.359 S5.364 S5.366 S5.367 S5.368 ~~S5.369~~ S5.372
1 613.8-1 626.5 MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth)	**1 613.8-1 626.5** MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth)	**1 613.8-1 626.5** MOBILE-SATELLITE (Earth-to-space) AERONAUTICAL RADIONAVIGATION RADIODETERMINATION-SATELLITE (Earth-to-space) Mobile-satellite (space-to-Earth) ~~Radiodetermination-satellite (Earth-to-space)~~
S5.341 S5.355 S5.359 S5.363 S5.364 S5.365 S5.366 S5.367 S5.368 ~~S5.369 S5.371~~ S5.372	S5.341 S5.364 S5.365 S5.366 S5.367 S5.368 S5.370 S5.372	S5.341 S5.355 S5.359 S5.364 S5.365 S5.366 S5.367 S5.368 ~~S5.369~~ S5.372

Reasons: Compared with the former allocation table, there is no change in Region 2 but two changes in Region 3: the radiodetermination-satellite service is upgraded from a secondary service to a primary service, and footnote S5.369 is suppressed.

For Region 1, there are three changes:

- The radiodetermination-satellite service is added as a primary service.
- Footnote S5.371 is suppressed.

  According to footnote S5.371, the radiodetermination-satellite service is a secondary service in Region 1. If this service is upgraded to a primary one, footnote S5.371 shall be suppressed.
- Footnote S5.369 is suppressed.

  This is the consequence of upgrading the radiodetermination-satellite service from a secondary service to a primary one.

MOD CHN/78/2

2 170-2 520 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
2 483.5-2 500 FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) RADIOLOCATION RADIODETERMINATION-SATELLITE (Earth-to-space) S5.398 ~~Radiolocation~~ S5.150 ~~S5.371 S5.397 S5.398 S5.399 S5.400~~ S5.402	**2 483.5-2 500** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) RADIOLOCATION RADIODETERMINATION-SATELLITE (space-to-Earth) S5.398 S5.150 S5.402	**2 483.5-2 500** FIXED MOBILE MOBILE-SATELLITE (space-to-Earth) RADIOLOCATION RADIODETERMINATION-SATELLITE (space-to-Earth) S5.398 ~~Radiodetermination-satellite (space-to-Earth) S5.398~~ S5.150 ~~S5.400~~ S5.402

Reasons: Compared with the former allocation table, there is no change in Region 2 but two changes in Region 3: the radiodetermination-satellite service is upgraded from a secondary service to a primary service, and footnote S5.400 is suppressed.

For Region 1, there are six changes:

- The radiodetermination-satellite service is added as a primary service.
- Footnote S5.371 is suppressed.

  According to footnote S5.371, the radiodetermination-satellite service is a secondary service in Region 1. If this service is upgraded to a primary one, footnote S5.371 shall be suppressed.

- The radiolocation service is upgraded from a secondary service to a primary one.

  According to footnote S5.399, harmful interference shall not be caused to, or protection shall not be claimed from, stations of the radiolocation service by stations of the radiodetermination-satellite service in Region 1. If the radiodetermination-satellite service is upgraded to a primary service, the radiolocation service shall also be upgraded to a primary status.

- Footnote S5.397 is suppressed.

  If the radiolocation service in Region 1 is upgraded to a primary service, footnote S5.397 in the band 2 483.5-2 500 MHz shall be suppressed.

- Footnote S5.399 is suppressed.

  Countries in Region 1 can require to maintain this footnote.

- Footnote S5.400 is suppressed.

  This is the consequence of upgrading the radiodetermination-satellite service from a secondary service to a primary one.

Reasons: At present, the allocation to the radiodetermination-satellite service in the band 1 610-1 626.5 MHz and 2 483.5-2 500 MHz is not on a worldwide basis, leading to difficulties in the worldwide application. The proposal will help form a worldwide allocation to meet this requirement, and the modification of the above footnotes is the right result of such an allocation.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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15 March 2000
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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

China (People's Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.15.1 - to consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments

Introduction

Currently, the only frequency bands allocated to the radionavigation-satellite service are bands 1 559-1 610 MHz and 1 215-1 260 MHz in the direction of space-to-Earth. However, these bands are now occupied by GPS and GLONASS systems and some new systems already filed, thus can not meet the frequency needs of the existing radionavigation-satellite systems to add new signals and of the new generation of radionavigation-satellite systems. Therefore, new allocations shall be considered to the radionavigation-satellite service in the range from 1-6 GHz.

Proposals

1 **1 151-1 215 MHz**

MOD CHN/79/1

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
960-1 215	AERONAUTICAL RADIONAVIGATION MOD S5.328	

MOD CHN/79/2

S5.328 The band 960-1 215 MHz is reserved on a worldwide basis for the use and development of airborne electronic aids to air navigation and any directly associated ground-based facilities. The 1 151-1 215 MHz portion of this band is allocated to the radionavigation-satellite service (space-to-Earth) on a co-primary basis. In this band, stations of the radionavigation-satellite services shall not cause interference to, claim protection from, or otherwise impose constraints on the operation or development of the aeronautical radionavigation service.

Reasons: China supports the allocation of the band 1 151-1 215 MHz to RNSS (space-to-Earth) on a co-primary and worldwide basis. The adequate bandwidth of this band can accommodate several independent RNSS systems. However, in order to guarantee the implementation of the aeronautical radionavigation service in this band, the radionavigation-satellite service shall be limited so as not to cause interference to the aeronautical radionavigation service or to constrain the use of this service.

2 1 260-1 300 MHz

MOD CHN/79/3

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 260-1 300	EARTH EXPLORATION-SATELLITE (active) RADIOLOCATION SPACE RESEARCH (active) RADIONAVIGATION-SATELLITE SERVICE (space-to-Earth) MOD S5.336 ADD S5.336A Amateur S5.282 S5.330 S5.331 S5.332 S5.334 S5.335	

MOD CHN/79/4

S5.336 ~~Not used~~Use of the radionavigation-satellite service in the band 1 260-1 300 MHz shall be subject to the condition that no harmful interference is caused to the radionavigation service authorized under No. **S5.331**.

ADD CHN/79/5

S5.336A Use of the radionavigation-satellite service in the band 1 260-1 300 MHz shall not cause harmful interference to wind profiler radars in the band 1 270-1 275 MHz.

Reasons: There is no major difference between the current allocations of 1 240-1 260 MHz and 1 260-1 300 MHz except for the absence of the radionavigation-satellite service in the latter. After adding allocations to the radionavigation-satellite service in the band 1 260-1 300 MHz, sharing can be realized in the same way as used in the band 1 240-1 260 MHz. Wind profiler radars are planned to use the band 1 270-1 295 MHz, so no interference shall be caused by the radionavigation-satellite service in the band 1 260-1 300 MHz.

3 1 300-1 350 MHz

MOD CHN/79/6

890-1 350 MHz

Allocation to services		
Region 1	**Region 2**	**Region 3**
1 300-1 350	AERONAUTICAL RADIONAVIGATION S5.337 RADIONAVIGATION-SATELLITE SERVICE (Earth-space) ADD S5.337A ~~Radiolocation~~RADIOLOCATION S5.149	

ADD CHN/79/7

S5.337A The use of the band 1 300-1 350 MHz by earth stations in the radionavigation-satellite service and by stations in the radiolocation service shall not cause harmful interference to, or constrain the development of the aeronautical radionavigation service.

Reasons: This allocation is mainly for the terrestrial beacon reference stations of the radionavigation-satellite service. Results of ITU-R studies show that the radionavigation-satellite service (Earth-to-space) signal in the band 1 300-1 350 MHz:

a) can protect the aeronautical radionavigation service and the radiolocation service in the band 1 300-1 350 MHz by careful location of the beacons. The required separation distance between the radar and the beacon is less than 60 km;

b) is compatible with the emissions of the radars in the band 1 300-1 350 MHz with an adequate adjusting of the AGC loop in the receiver.

Upgrading of the radiolocation service is necessary to give this service the same status as that of the RNSS (Earth-to-space).

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PLENARY MEETING

China (People's Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.19 - Proposal on BSS replanning

Introduction

In response to Resolution 532 adopted in WRC-97, IRG held five meetings and GTE held four during the past two years. IRG and GTE made in-depth studies on the replanning basis of the BSS in Regions 1 and 3, and on the method of analyzing the compatibility between the replanning on one side and the other services and the BSS Plans in Region 2 on the other side. As a result, a planning approach and a compatibility analysis method based on the digital technology are identified.

According to the study results of IRG, GTE helped BR conduct a BSS replanning exercise and compatibility analysis and came to the conclusion that it is fully feasible to allocate 10 channels to Region 1 and 12 channels to Region 3 according to the digital replanning approach identified by IRG/GTE and that the interference between the replanning on one side and the other services and BSS Plans in Region 2 on the other side is acceptable and solvable.

Proposals

CHN/80/1

1 The results of the replanning exercise communicated by BR to the Conference shall be considered as a draft Plan to be adopted by WRC-2000.

CHN/80/2

2 IRG be remained there to deal with the unsolved issues on BSS replanning in Regions 1 and 3 after WRC-2000.

Reasons:

1 Resolution 532 resolves:

> "2 that the Director of the Radiocommunication Bureau shall present the results of the IRG's studies to the WRC-99 regarding the feasibility of increasing the minimum assigned capacity for countries in Regions 1 and 3 to around ten analogue-equivalent channels, based on the planning principles in Annex 1;

3 that WRC-99 should consider the results of the above studies and, if the conclusion is that such replanning is feasible, initiate an appropriate revision for completion no later than 2001,”

2 WRC-2000 is the only conference before 2001 where the revision can be adopted.

3 Under the current BSS Plans, each country is allocated 4-5 channels, which restrains the economical implementation of the BSS systems of ITU member states. More and more countries are adding channels and orbital locations through the “procedure of modification” (Article 4), thus making the replanning more difficult, and affecting the equitable access to BSS resources by member states.

4 IRG/GTE's study on the BSS replanning in Regions 1 and 3 shows that it is feasible to allocate 10 channels to countries in Region 1 and 12 channels to countries in Region 3.

INTERNATIONAL TELECOMMUNICATION UNION

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PLENARY MEETING

China (People's Republic of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

Agenda item 1.19*bis* - in accordance with Article S14, to consider objections expressed by administrations with respect to the Radio Regulations Board's Rules of Procedure relating to the application of RR 2674/S23.13 in order for the Bureau to modify its findings in accordance with the conclusions of the Conference

Background

RR No. S23.13/2674, a generic provision applicable to the BSS in all the three Regions, states:

In devising the characteristics of a space station in the broadcasting-satellite service, all technical means available shall be used to reduce, to the maximum, the radiation over the territory of other countries unless an agreement has been previously reached with such countries.

The present Rule of Procedure concerning RR2674/S23.13 states:

"2.1 When examining, for data completeness, the information related to a BSS space station, received by the Bureau after 18 November 1995, for application in the Plan modification or coordination procedures in accordance with either Article 4 of Appendix **S30** or Section B (§ 3.2.1) of Resolution **33 (Rev.WRC-97)** or under No. **S9.11**, whose service area exceeds the territory of the notifying Administration, the Bureau shall require that the service area be defined in terms of other administrations (country/territory symbols) included in the service area. The notifying administration should therefor indicate whether a special (separate) agreement has been obtained from these administrations relating to the inclusion of their territories in the service area.

2.2 The Special Sections published by the Bureau in application of Article 4 of Appendix **S30** (APS30/E... series) or of Resolution **33 (Rev.WRC-97)** (RS33/C.. series) or of No. **S9.11** shall contain the indication of the agreements already obtained under No. **S23.13** or not yet obtained with a request for such agreement. The expiry period for comment relating to the inclusion or otherwise of the territory in the service area will be the same 4 months which is required for comments of administrations concerning technical compatibility with the proposed plan modification procedures.

2.3 If no comment is received either by the notifying administration or through the Bureau within the four month period mentioned in § 2.2 above, it is understood that there is no objection to the inclusion of the territory in the planned service area."

China is of the view that the Rule of Procedure concerning RR2674/S23.13 is not in full accordance with the conclusion of WRC-95 for the following reasons:

Provision RR2674/S23.13 was adopted as early as WARC-71, and shall be applied to all the BSS networks communicated to BR.

To provide BSS through space stations by the notifying administration to other countries means other countries included in the service area can directly receive TV and sound programs from these space stations.

As we know, different countries in the world have different cultural backgrounds, lifestyles and religions. It is not appropriate to take it for granted that the notified country has no objection to the inclusion of its territory in the service area of the BSS space station of the notifying country and that agreement under RR2674 has been obtained from the notified country for the space station only because no reply is received from the notified country within 4 months.

Resolution 531 Annex 1 explains the application of RR2674/S23.13, and Resolution 536 (WRC-97) also states:

In addition to observing No. **S23.13/2674**, and before providing satellite broadcasting service to other administrations, administrations originating the services should obtain the agreement of those other administrations.

Therefore, China proposes the following modifications to the present Rule of Procedure concerning RR2674/S23.13:

MOD* CHN/81/1

2.1 When examining, for data completeness, the information related to a BSS space station, received by the Bureau, for application in the plan modification or coordination procedures in accordance with either Article 4 of Appendix **S30** (Annex 2 data) or Section B (paragraph 3.2.1) of Resolution **33 (WRC-97)** or under No. **S9.11**, ~~after 18 November 1995,~~ whose service area exceeds the territory of the notifying Administration, the Bureau shall require that the service area be defined in terms of other administrations (country/territory symbols) included in the service area. The notifying administration should therefore indicate whether a special (separate) agreement has been obtained from these administrations relating to the inclusion of their territories in the service area.

Reasons: RR2674/S23.13 was adopted as early as in 1971, and shall be applied to all the BSS space stations communicated to the BR.

2.2 The Special Sections published by the Bureau in application of Article 4 of Appendix 30 or of Resolution 33 shall contain the indication of the agreements already obtained under RR2674 or not yet obtained with a request for such agreement. When receiving such a request, the affected administration shall make quick comments to indicate whether or not it agrees with the inclusion of its territory in the service area.

Reasons: We need to adopt a cautious attitude towards the issue of agreement under RR2674/S23.13.

* The proposed modification does not clearly indicate the changes as regards the text currently in the Rules of Procedure.

2.3 Only if the notifying administration or BR receives an explicit agreement from the notified administration concerning RR2674/S23.13 can it be understood that the notified administration has no objection to the inclusion of its territory in the service area of the BSS space station.

Reasons: No reply within 4 months can not be interpreted as an agreement.

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PLENARY MEETING

Note by the Secretary-General

CONFERENCE RULES OF PROCEDURE AND THE USE OF VISUAL AIDS

Attention is drawn to Article 32A of the Convention (Right to Vote) and to the Rules of Procedure of Conferences and Other Meetings of the International Telecommunication Union as adopted by the Plenipotentiary Conference (Minneapolis, 1998) and published in the collection of basic texts of the International Telecommunication Union adopted by the Plenipotentiary Conference (edition 1999).

To ensure that the Conference runs smoothly and efficiently, delegates and observers are invited to review these rules, particularly those related to the rules for debates, and voting.

In order to assist the Chairperson and other conference officers in applying these rules, delegations and observers have been provided with a number of visual aids which are intended to be used as follows:

- all delegations and observers participating in the Conference will be issued yellow placards with country/organization/entity codes printed on them in black. These should be used when requesting the floor to speak on the substance of a matter under discussion;
- all delegations participating in the Conference will be issued yellow cards with squares printed on them in black. These should be used when raising motions of order and points of order in relation to a matter under discussion;
- all delegations having the right to vote at the Conference will be issued white cards with squares printed on them in red. These should be used in cases where there is a vote by show of hands.

Delegations and observers are kindly requested not to use their white name-plates when requesting the floor during debates since these name-plates are generally not legible from the podium.

Your cooperation in the use of these visual aids will assist the conference officers and is much appreciated.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Korea (Republic of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

THE ORBITAL LOCATION OF THE REPUBLIC OF KOREA FOR THE ADDITIONAL CHANNELS IN ACCORDANCE WITH AGENDA ITEM 1.19 (WRC-2000)

Introduction

In the current Appendices S30/S30A of the Radio Regulations, the BSS beam, KOR11200, is assigned at 110º E for the Republic of Korea. In accordance with agenda item 1.19, at least 10 channels may be assigned to the administrations in Regions 1 and 3.

IRG (Inter-conference Representative Group) concluded that 10 channels can be assigned at 116º E for the Republic of Korea (refer to the final report of IRG, Document IRG99-5/24(Rev.4)). AGTE (APT Group of Technical Experts) concluded that 12 channels can be assigned at 116º E for the Republic of Korea.

Proposal

KOR/83/1

The Republic of Korea proposes that the BSS beam, KOR11200 at 110º E, be deleted in Appendices S30/S30A of the Radio Regulations for the replanning of the BSS Plan and its feeder-link Plan. It means that the additional channels, in accordance with agenda item 1.19 (WRC-2000), would be assigned at 116º E.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Korea (Republic of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

APPLICATION PROCEDURE OF THE FILING FEE FOR THE REGISTRATION OF THE SATELLITE NETWORK

Introduction

The ITU Plenipotentiary Conference (Minneapolis, 1998) adopted Resolution 88 for the implementation of cost-recovery for satellite network filings. Pursuant to this Resolution, ITU Council (1999) adopted Decision 482 and decided that satellite network filings for the production of the special sections of the Weekly Circular for the space telecommunication services concerning advance publication, and their associated requests for coordination or agreement (Article 11, Article 14 plus Resolutions 33 and 46, or Article S9 of the Radio Regulations) and requests for modification of the space service plans contained in Appendices S30/30, S30A/30A and S30B/30B to the Radio Regulations, received by the Radiocommunication Bureau after 7 November 1998, shall be subject to charges as set out in Annex A to this Decision.

Each Member State shall be entitled to the publication of special sections for one satellite network each year, without charges, in accordance with this Decision. Each Member State may determine which category shall benefit from the “free” entitlement. However, there is no proper time to determine for each Member State the “free” entitlement within a year in Decision 482.

Proposal

KOR/84/1

The Republic of Korea proposes that each Member State choose a “free” satellite network for the publication of a special section in accordance with Decision 482 (1999) anytime within every year. However, in accordance with Decision 482 (1999), each Member State shall be required to pay a registration fee to the BR for the publication of the satellite network prior to the selection of a “free” entitlement. In this case, the pre-paid fee for the selected “free” satellite network shall be refunded to the Member State concerned immediately.

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INTERNATIONAL TELECOMMUNICATION UNION

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PLENARY MEETING

Korea (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.1 - requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, in accordance with Resolution 26 (Rev.WRC-97)

Introduction

In Circular Letter CR/131, the Radiocommunication Bureau requests administrations to review those footnotes to the Table of Frequency Allocations (Article S5 of the Radio Regulations) where their country names appear in order to identify any footnotes that may be reduced in scope or deleted. The need for a regular review of footnotes was established by Resolution 26 at WRC-95 and reaffirmed at WRC-97.

Proposals

The Republic of Korea Administration has reviewed the footnotes and makes the following proposals in respect of those footnotes which include explicit references to the “Republic of Korea”:

MOD KOR/85/1

S5.259 *Additional allocation:* in Germany, Austria, Cyprus, ~~the Republic of Korea,~~ Denmark, Egypt, Spain, France, Greece, Israel, Italy, Japan, Jordan, Malta, Morocco, Monaco, Norway, the Netherlands, Syria and Sweden, the band 328.6-335.4 MHz is also allocated to the mobile service on a secondary basis, subject to agreement obtained under No. **S9.21**. In order to ensure that harmful interference is not caused to stations of the aeronautical radionavigation service, stations of the mobile service shall not be introduced in the band until it is no longer required for the aeronautical radionavigation service by any administration which may be identified in the application of the procedure invoked under No. **S9.21**.

Reasons: No further requirements.

MOD KOR/85/2

S5.477 *Different category of service:* in Algeria, Saudi Arabia, Austria, Bahrain, Bangladesh, Brunei Darussalam, Cameroon, ~~the Republic of Korea,~~ Egypt, the United Arab Emirates, Eritrea, Ethiopia, Guyana, India, Indonesia, the Islamic Republic of Iran, Iraq, Jamaica, Japan, Jordan, Kuwait, Lebanon, Liberia, Malaysia, Nigeria, Oman, Pakistan, Qatar, Democratic People's Republic of Korea, Singapore, Somalia, Sudan, Sweden, Trinidad and Tobago, and Yemen, the allocation of the band 9 800-10 000 MHz to the fixed service is on a primary basis (see No. **S5.33**).

Reasons: No further requirements.

MOD KOR/85/3

S5.500 *Additional allocation:* in Algeria, Angola, Saudi Arabia, Bahrain, Brunei Darussalam, Cameroon, ~~the Republic of Korea,~~ Egypt, the United Arab Emirates, Gabon, Indonesia, the Islamic Republic of Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Madagascar, Malaysia, Mali, Malta, Morocco, Mauritania, Nigeria, Pakistan, Qatar, Syria, Senegal, Singapore, Sudan, Chad and Tunisia, the band 13.4-14 GHz is also allocated to the fixed and mobile services on a primary basis.

Reasons: No further requirements.

MOD KOR/85/4

S5.524 *Additional allocation:* in Afghanistan, Algeria, Angola, Saudi Arabia, Bahrain, Bangladesh, Brunei Darussalam, Cameroon, China, the Congo, ~~the Republic of Korea,~~ Costa Rica, Egypt, the United Arab Emirates, Gabon, Guatemala, Guinea, India, Islamic Republic of Iran, Iraq, Israel, Japan, Jordan, Kuwait, Lebanon, Malaysia, Mali, Morocco, Mauritania, Nepal, Nigeria, Oman, Pakistan, the Philippines, Qatar, Dem. Rep. of the Congo, Syria, Democratic People's Republic of Korea, Singapore, Somalia, Sudan, Tanzania, Chad, Togo and Tunisia, the band 19.7-21.2 GHz is also allocated to the fixed and mobile services on a primary basis. This additional use shall not impose any limitation on the power flux-density of space stations in the fixed-satellite service in the band 19.7-21.2 GHz and of space stations in the mobile-satellite service in the band 19.7-20.2 GHz where the allocation to the mobile-satellite service is on a primary basis in the latter band.

Reasons: No further requirements.

MOD KOR/85/5

S5.542 *Additional allocation:* in Algeria, Saudi Arabia, Bahrain, Bangladesh, Brunei Darussalam, Cameroon, China, the Congo, ~~the Republic of Korea,~~ Egypt, the United Arab Emirates, Eritrea, Ethiopia, Guinea, India, the Islamic Republic of Iran, Iraq, Japan, Jordan, Kuwait, Lebanon, Malaysia, Mali, Morocco, Mauritania, Nepal, Pakistan, the Philippines, Qatar, Syria, Democratic People's Republic of Korea, Somalia, Sudan, Sri Lanka and Chad, the band 29.5-31 GHz is also allocated to the fixed and mobile services on a secondary basis. The power limits specified in Nos. **S21.3** and **S21.5** shall apply.

Reasons: No further requirements.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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Korea (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

INFORMATION PAPER

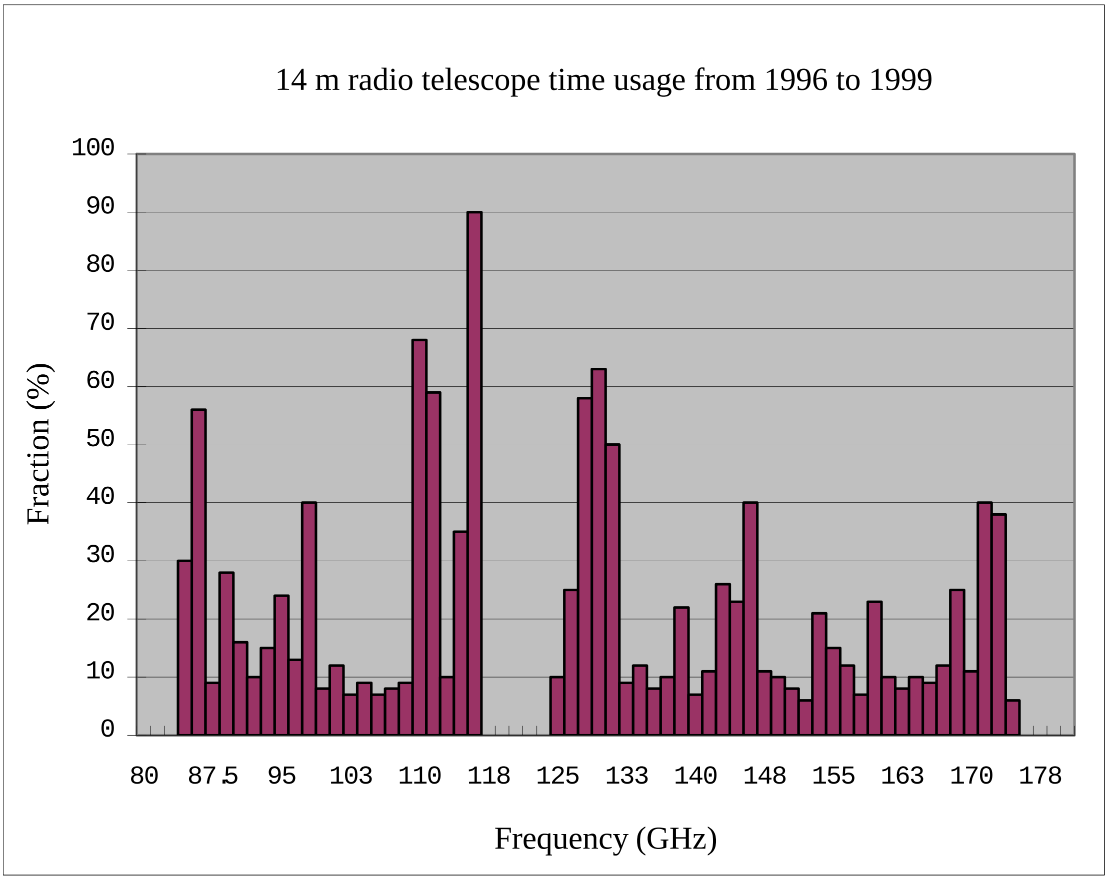
1 Page 1, last paragraph, 6th line, replace the words ".. may not be finished until 2015," with ".. may be finished before 2015,".

2 Replace Figure 1 on page 2 with the following figure:

FIGURE 1

14 m radio telescope time statistics in the 80-180 GHz range

(Taeduk Radio Astronomy Observatory in the Republic of Korea)



3 Page 3, **reasons**, 6th line, replace the words ".. may not be finished until 2015," with "… may be finished before 2015,".

4 Page 5, last row, 5th column, underline the number S5.149A.

INTERNATIONAL TELECOMMUNICATION UNION

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PLENARY MEETING

Korea (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

INFORMATION PAPER

Agenda item 1.16 - to consider allocation of frequency bands above 71 GHz to the earth exploration-satellite (passive) and radio astronomy services, taking into account Resolution 723 (WRC-97)

Resolution 723 (WRC-97) "Consideration by a future competent world radiocommunication conference of issues dealing with allocations to science services"

1 Additional allocations for specially important frequency bands in the Republic of Korea

In the Republic of Korea, Figure 1 shows the 14 m radio telescope time statistics in the 85-175 GHz band for the radio astronomy services and measurements of mesospheric ozone. As shown in Figure 1 and Table 1, the bands 127-131 GHz and 171-174 GHz are of vital importance to the radio astronomy service for simultaneous observations of the silicon monoxide (SiO) molecule and its isotopic variants at 127.5, 128.4, 129.3, 130.3, 171.3, 172.5 and 173.7 GHz in the Republic of Korea. And these bands are now used for the following studies: time monitoring and survey of the SiO molecular lines toward late type stars and star forming regions, line survey and molecular line observations toward star forming regions, starless cores, supernova remnants and so on, and the interstellar chemistry. However, as shown in the present Radio Regulations, the RAS in these bands has not been allocated primary or secondary status. Therefore, it is proposed that the suggested minimum bands in Table 1 are allocated to the radio astronomy service on a primary basis.

Advantages

Since the RA operation is only passive and there are few RA stations in the world, the RAS should be able to share with terrestrial services having protection measures within limited radio quiet zones around the radio astronomy observatory. The impact of co-primary allocations to the terrestrial services and the RAS in these bands is expected to be limited. The impact of co-primary allocations to the satellite services (downlink) and the RAS in these bands is expected to be very limited because current major observing projects in the Republic of Korea may not be finished until 2015,

* Pursuant to Resolution 26 (Rev.WRC-97) the Secretariat notes that this contribution was received on 6 April 2000.

and these primary allocations will not be needed by the RAS after 2015. By 2015, all of these applications will have transitioned to the secondary service. Therefore, shared allocations with the terrestrial services and satellite services would permit the radio astronomy service assured access to bands that are required for astronomical research.

Disadvantages

There may be minor coordination requirements associated with the affected satellite services until 2015. Such coordination requirements may be limited by regulatory action, and may consist of no more than providing the orbital elements to radio astronomy stations through some pre-established mechanism.

FIGURE 1

14 m radio telescope time statistics in the 80-180 GHz range

(Taeduk Radio Astronomy Observatory in the Republic of Korea)

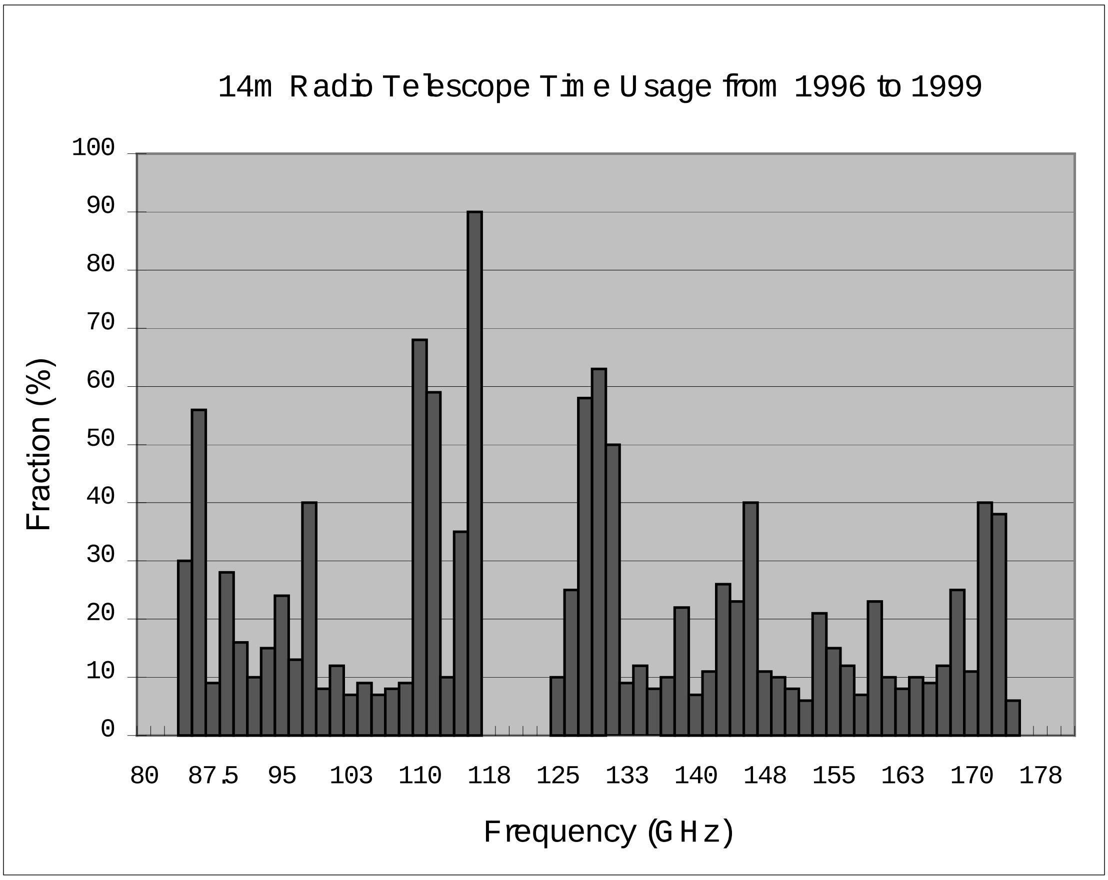

TABLE 1

Silicon monoxide molecules in the bands 127-131 and 171-174 GHz

Substance	Rest frequency (GHz)	Suggested minimum band (GHz)
SiO v=3, J=3-2	127.555240	127.42-127.68
SiO v=2, J=3-2	128.458888	128.33-128.59
SiO v=1, J=3-2	129.363368	129.23-129.49
SiO v=0, J=3-2	130.268702	130.13-130.39
SiO v=2, J=4-3	171.275105	171.11-171.45
SiO v=1, J=4-3	172.481060	172.31-172.65
SiO v=0, J=4-3	173.688142	173.52-173.85

2 Korean view

- In the Republic of Korea, the bands 85-116 GHz and 124-175 GHz are currently used for the radio astronomy services and measurements of mesospheric ozone, and it will be used in the near future at 200-275 GHz for the radio astronomy services and mesospheric ozone, respectively.
- The Korean view for agenda item 1.16 of WRC-2000 is to protect the above frequencies including 128-131 GHz and 171-174 GHz for the corresponding services.
- The APT proposals modify many of the allocation tables above 71 GHz to accommodate the requirements of the radio astronomy and Earth-exploration satellite (passive) services, while giving consideration to the needs of other services.
- As shown in the APT proposal, footnote S5.QQQ has been adapted for inclusion of allocations to the currently operating RAS in the bands 128-131 GHz and 171-174 GHz.

ADD KOR/86/1

S5.QQQ *Additional allocation*: in the Republic of Korea, the bands 127-131 GHz, 171-171.6 GHz, 172.2-172.8 GHz and 173.3-174 GHz are also allocated to the radio astronomy service on a primary basis until 2015.

Reasons: This footnote is required to protect the radio astronomy service operating in the Republic of Korea, since current operational instruments are already in these bands and these bands are of vital importance to the RAS for simultaneous observations of the silicon monoxide (SiO) molecule and its isotopic variants. The impact of co-primary allocations to the terrestrial/satellite services and the RAS in these bands is expected to be very limited since current observations in the Republic of Korea may not be finished until 2015, and these primary allocations will not be needed by the RAS after 2015. By 2015, all of these applications will have transitioned to the secondary service.

- Suggested changes to modify the frequency allocations above 71 GHz for agenda item 1.16 concerning the WRC-2000 are contained in the Annex.
- The Annex gives a comparison of the allocations and footnotes with a newly proposed table by APT, USA, CEPT and existing Radio Regulations above 71 GHz.

ANNEX

Comparison of the allocations and footnotes with a newly proposed table by APT, USA, CEPT and existing Radio Regulations

GHz	71	74	75.5	76	77.5	78 81
Original RR (1979)	F/FS↑/M/MS↑	F/FS↑/M+sr ↓	A/AS+sr↓	RL+a+as+sr↓		
APT **(4 Feb. 2000)**	F/FS↓/M/MS↓	BS/F/FS↓/ M+sr↓	BS/F/FS↓/ M+sr↓	RA/RL+a+as+sr↓	A/AS+ra+sr↓	RA/RL+a+as+sr↓
USA **(27 Mar. 2000)**	“	“	“	“	“	“
CEPT **(27 Mar. 2000)**	“	“		“	“	“
APT (Footnote)	~~S5.149~~ ~~S5.556~~	S5.561	S5.561 S5.EEE 2010	S5.149 ~~S5.560~~	~~S5.560~~	S5.149 S5.560
USA (Footnote)	“	S5.561	S5.561 S5.EEE 200[6]	“	~~S5.560~~ S5.149	“
CEPT (Footnote)	“	S5.561 S5.EEE 200[5]		S5.149A ~~S5.560~~	~~S5.560~~ S5.149A	S5.149A S5.560

GHz	81	84	86	92	94	94.1	95	100 102
Original RR	F/FS↓/M/ MS↓+sr↓	F/M/B/BS	E(p)/RA/S(p)	F/FS↑/M/ RL	E(a)/RL/ S(a)	F/FS↑/M/ RL	M/MS/RN/ RNS+rl	E(p)/F/M/(p)
APT	F/FS↑/M/MS↑/RA +sr↓	B/ F/FS↑/M/RA	E(p)/RA/S(p)	F/M/RA/RL	E(a)/RL/ S(a)+ra	F/M/RA/ RL	F/M/RA/ RL/ RN/RNS	E(p)/RA/S(p)
USA	"	"	"	"	"	"	"	E(p)/RA/S(p)/ F/M/
CEPT	"	"	"	"	"	"	"	E(p)/RA/S(p)

APT (Footnote)	S5.149 S5.DDD	S5.149 ~~S5.561~~	S5.340	S5.149 ~~S5.556~~	S5.562	S5.149 ~~S5.556~~	S5.149 ~~S5.555~~ S5.553 **S5.554** ???	S5.341 S5.340
USA (Footnote)	S5.149 S5.DDD RES.RAS	S5.149 ~~S5.561~~ RES.RAS	**S5.340** ???	S5.149 ~~S5.556~~ RES.RAS	S5.562	S5.149 RES.RAS	S5.149 ~~S5.555~~ S5.553 **S5.554** ??? RES.RAS	S5.341 S5.149
CEPT (Footnote)	S5.149A S5.DDD	S5.149A ~~S5.561~~	**S5.340** ???	S5.149A ~~S5.556~~ S5.FFF	S5.562 S5.FFF	S5.149A S5.FFF	S5.149A ~~S5.555~~ ~~S5.553~~ **S5.554** ???	S5.341 S5.340

GHz	102	105	109.5	111.8	114.25	116	119.98	120.02	122.25

Original RR	F/FS↓/M	← E(p)/RA/S(p) →				E(p)/F/IS/M /S(p)	E(p)/F/IS/M /S(p) + a	E(p)/F/IS/M /S(p)
APT	F/M/RA	F/M/RA/S(p)	E(p)/RA/S(p)	F/M/RA/S(p)	E(p)/RA/S(p)	E(p)/IS/S(p)	E(p)/IS/S(p)	E(p)/IS/S(p)
USA	“	“	“	“	“	“	“	“
CEPT	“	“	“	“	“	“	“	“

APT (Footnote)	S5.149 S5.341	S5.149 ~~S5.340~~ S5.341 S5.CCC	S5.340 S5.341	S5.149 ~~S5.340~~ S5.341 S5.CCC	S5.340 S5.341	S5.341 ~~S5.558~~ S5.XXX	S5.341 ~~S5.558~~ S5.XXX	~~S5.558~~ S5.XXX S5.138
USA (Footnote)	S5.149 S5.341 RES.RAS	“	“	“	”	”	”	” S5.138
CEPT (Footnote)	S5.149A S5.341	S5.149A ~~S5.340~~ S5.341 S5.CCC	“	S5.149A ~~S5.340~~ S5.341 S5.CCC	”	S5.341 ~~S5.558~~ S5.JJJ	S5.341 ~~S5.558~~ S5.JJJ	~~S5.558~~ S5.JJJ S5.138

GHz	122.25	123	126	130	134	136	141

	122.25–123	123–126	126–130	130–134	134–136	136–141
Original RR	E(p)/F/IS/M/S(p)		F/IS/M/RL		M/MS/RN/RNS + rl	
APT	F/IS/M +a	F/FS↓/IS/M/MS/ RN/RNS + ra	FS↓/MS/RN/RNS + ra	F/IS/M/RA	A/AS + ra	RA/RL +a+as
USA	“ AMATEUR → Amateur	“	“	“	“	“
CEPT	“	FS↓/MS↓/RN/RNS + ra		F/IS/M/RA/ E(a)	“	“

	122.25–123	123–126	126–130	130–134	134–136	136–141
APT (Footnote)	S5.558	~~S5.138~~ S5.558	S5.554 ~~S5.558~~ ~~S5.559~~	S5.149 S5.558 ~~S5.559~~	~~S5.149~~ ~~S5.340~~ ~~S5.553~~ ~~S5.554~~ ~~S5.555~~	S5.149 ~~S5.340~~ ~~S5.553~~ ~~S5.554~~ ~~S5.555~~
	S5.138 ~~S5.341~~	~~S5.341~~	S5.149 S5.QQQ	S5.QQQ		
USA (Footnote)	S5.558	~~S5.138~~ S5.558	~~S5.558~~ ~~S5.559~~	~~S5.559~~	“	“
	S5.138		**S5.554**: Need to check 126-134 GHz ???	**S5.149**: Need to check Add: 130-134 GHz **S5.558**: Need to check **RES.RAS**		**S5.149**: Need to Check Add: 136-141 GHz 140.69-140.98 GHz ???
CEPT (Footnote)	S5.558	~~S5.138~~ S5.554 ~~S5.559~~		S5.149A S5.558 ~~S5.559~~	“	S5.149A ~~S5.340~~ ~~S5.553~~ ~~S5.554~~ ~~S5.555~~
	S5.138	~~S5.558~~		S5.LLL		

GHz	141	142	144	148.5	149	150	151	151.5	155.5
Original RR	M/MS/RN/ RNS + rl	A/AS	RL + a+as		F/FS↓/M	E(p)/F/FS↓/ M/S(p)	F/FS↓/M		
APT	F/M/RA/RL	F/M/RA/RL	F/M/RA/RL	E(p)/RA/S(p)	E(p)/RA/S(p)	E(p)/RA/S(p)	E(p)/RA/S(p)	F/M/RA/RL	
USA	“	“	“	“	“	“	“	“	
CEPT	F/M/RA/RL			E(p)/RA/S(p)				“	

APT (Footnote)	S5.149 ~~S5.340~~ ~~S5.553~~ ~~S5.554~~ ~~S5.555~~	S5.149	S5.149 ~~S5.555~~	~~S5.149~~ S5.340 ~~S5.555~~	S5.340	~~S5.149~~ S5.340 ~~S5.385~~	S5.340	S5.149
USA (Footnote)	“	“	“	“	“	“	“	“
	RES.RAS	RES.RAS	RES.RAS	~~**S5.149**~~ ??? 148.5-151.5 GHz: Need to delete from S5.149				**S5.149** ???: Need to check RES.RAS
CEPT (Footnote)	S5.149A ~~S5.340~~ ~~S5.553~~ ~~S5.554~~ ~~S5.555~~			~~S5.149~~ S5.340 ~~S5.385~~ ~~S5.555~~				S5.149A

GHz	155.5 – 156	156 – 158	158 – 158.5	158.5 – 164	164 – 167
Original RR	F/FS↓/M	E(p)/F/FS↓/M	F/FS↓/M		E(p)/RA/S(p)
APT	E(p)/F/M/RA/S(p)	E(p)/F/M/RA/S(p)	E(p)/F/M/RA/S(p)	F/FS↓/M/MS↓	E(p)/RA/S(p)
USA	“	“	“	“	“
CEPT	E(p)/F/M/RA/S(p)			“	“

APT (Footnote)	S5.149 S5.AAA S5.BBB S5.CCC	S5.149 S5.AAA S5.BBB S5.CCC	S5.149 S5.AAA S5.BBB S5.CCC		S5.340
USA (Footnote)	“ **S5.149** ???: Need to check RES.RAS	“ **S5.149** ???: Need to check RES.RAS	“ **S5.149** ???: Need to check RES.RAS		“
CEPT (Footnote)	S5.149A S5.AAA S5.BBB S5.CCC				“

GHz	167–168	168–170	170–174.5	174.5–174.8	174.8–176.5	176.5–182	182–185
Original RR	E(p)/RA/S(p)	F/M	F/IS/M	E(p)/F/IS/M/S(p)		F/IS/M	E(p)/RA/S(p)
APT	F/FS↓/IS/M	F/FS↓/IS/M	F/FS↓/IS/M	F/IS/M	E(p)/IS/S(p)	E(p)/IS/S(p)	E(p)/RA/S(p)
USA	“	“	“	“	“		E(p)/S(p)
CEPT	F/FS↓/IS/M			F/IS/M	“	“	E(p)/RA/S(p)

	167–168	168–170	170–174.5	174.5–174.8	174.8–176.5	176.5–182	182–185
APT (Footnote)	S5.558	S5.558 **S5.149**	~~S5.385~~ S5.558 S5.149 S5.QQQ	~~S5.149~~ ~~S5.385~~ S5.558	~~S5.149~~ ~~S5.385~~ ~~S5.558~~ S5.YYY	~~S5.149~~ ~~S5.385~~ ~~S5.558~~ S5.YYY	S5.563 **S5.340** ???
USA (Footnote)	“	S5.558	~~S5.385~~ S5.558 ~~**S5.149**~~: Need to check 174.42-175.02 GHz	“ ~~**S5.149**~~: Need to check	“ ~~**S5.149**~~: Need to check	“ ~~**S5.149**~~: Need to check (177, 178.2, 181)	“ **S5.340** ???
CEPT (Footnote)	~~S5.385~~ S5.558 ~~S5.149~~			“	~~S5.149~~ ~~S5.385~~ ~~S5.558~~ S5.KKK	~~S5.149~~ ~~S5.385~~ ~~S5.558~~ S5.KKK	“ **S5.340** ???

GHz	185	190	191.8	200	202	209	217	226
Original RR	F/IS/M	M/MS/RN/RNS		E(p)/F/M/S(p)	F/FS↑/M		E(p)/RA/S(p)	
APT	E(p)/IS/S(p)	E(p)/S(p)	F/IS/M/MS /RN/RNS	E(p)/RA/S(p)	E(p)/RA/S(p)	F/FS↑/M/RA	F/FS↑/M/RA/S(p)	
USA	“	“	“	“	“	“	“	
CEPT	“		“	“		“	“	
APT (Footnote)	~~S5.149~~ ~~S5.385~~ ~~S5.558~~ S5.YYY	S5.340 ~~S5.341~~ ~~S5.553~~ ~~S5.554~~	S5.341 S5.554 / S5.149 S5.553 S5.558	S5.340 S5.341 / S5.RRR	S5.340 S5.341 / S5.RRR	S5.149 S5.341	S5.149 ~~S5.340~~ S5.341 S5.CCC	
USA (Footnote)	“ / ~~S5.558~~: Need to check	“	S5.554 / S5.34 ??? S5.553	S5.340 S5.341	S5.340 S5.341	S5.149 S5.341 / RES.RAS	“	
CEPT (Footnote)	~~S5.149~~ ~~S5.385~~ ~~S5.558~~ S5.KKK	“	S5.341 S5.554 / ~~S5.553~~	S5.340 S5.341		S5.149A S5.341	S5.149A ~~S5.340~~ S5.341 S5.CCC	

GHz	226	231	231.5	232	235	238	240	241	248	250

Original RR	E(p)/RA/S(p)	F/FS↓/M + rl			E(p)/F/FS↓/ M/S(p)	F/FS↓/M + rl		RL +a+as	A/AS
APT	E(p)/RA/S(p)	E(p)/RA/S(p)	F/M+rl	F/FS↓/M + rl	E/FS↓/S(p)	F/FS↓/M/RL /RN/RNS	F/M/RL	M/ RA/RL +a+as	A/AS +ra
USA	“	“	←	F/FS↓/M + rl	E/F/M/ RA/S(p)	F/FS↓/M/RL /RN/RNS	→	RA/RL +a+as	“
CEPT	E(p)/RA/S(p)		“	“	“	“	“	“	“

APT (Footnote)	S5.340 ~~S5.341~~	S5.340			S5.RRR			S5.149 S5.138	
USA (Footnote)	“	S5.340						**S5.149**: Need to check S5.138 RES.RAS	
CEPT (Footnote)	S5.340 ~~S5.341~~				S5.NNN			S5.149A S5.138	S5.149A

GHz	250–252	252–265	265–275	275 … 1000
Original RR	E(p)/S(p)	M/MS/RN/RNS	F/FS↑/M/RA	Not Allocated
APT	E(p)/RA/S(p)	F/M/MS↑/RA/RN/RNS	F/FS↑/M/RA	…
USA	"	"	"	…
CEPT	"	"	"	…

APT (Footnote)	~~S5.149~~ S5.340 ~~S5.555~~ / S5.RRR	S5.149 ~~S5.385~~ ~~S5.555~~ ~~S5.564~~ / S5.553 S5.554	S5.149 / S5.RRR	S5.565 (388-424 GHz)
USA (Footnote)	~~S5.149~~ S5.340 ~~S5.555~~	S5.149 ~~S5.385~~ ~~S5.555~~ ~~S5.564~~ / S5.553 S5.554 RES.RAS	**S5.149**: Need to change from 265-275 to 265-275	S5.565 (388-**434** GHz)
CEPT (Footnote)	"	S5.149A ~~S5.385~~ ~~S5.555~~ ~~S5.564~~ / ~~S5.553~~ **S5.554** ???	S5.149A	S5.565 (388-424 GHz)

Comments	**A:** Amateur Service	**AS:** Amateur Satellite Service
	B: Broadcasting Service	**BS:** Broadcasting-Satellite Service
	E(a): Earth Exploration-Satellite Service (active)	**E(p):** Earth Exploration-Satellite Service (passive)
	F: Fixed Service	**FS:** Fixed-Satellite Service
	IS: Inter-Satellite Service	**SR:** Space Research
	M: Mobile Service	**MS:** Mobile-Satellite Service
	RA: Radio Astronomy Service	**RL:** Radiolocation Service
	RN: Radionavigation Service	**RNS:** Radionavigation-Satellite Service
	S(a): Space Research Service (active)	**S(p):** Space Research Service (passive)

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Korea (Republic of)

PROPOSALS FOR THE WORK OF THE CONFERENCE

Agenda item 1.13.1 - to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

Introduction

WRC-97 decided to include power limits in Articles S21 and S22 in order to ensure coexistence among non-GSO FSS, GSO FSS, GSO BSS, space sciences and terrestrial services in several frequency bands in the 10-30 GHz band range. WRC-97 also requested studies for WRC-2000 to consider the adoption of this concept or other regulatory approaches to address the above coexistence in other frequency bands.

Resolutions 130 and 538 (WRC-97) introduced provisional epfd limits for non-GSO FSS systems in certain bands intended to protect GSO FSS and GSO BSS systems operating co-frequency and requested ITU-R to conduct the appropriate technical, operational and regulatory studies to review the regulatory conditions relating to the coexistence of non-GSO and GSO systems.

In general, the Republic of Korea supports the CPM-99 Report related to agenda item 1.13.1.

The Republic of Korea proposes that these non-GSO systems should not impose undue constraints on existing and planned systems, and the future development of these systems and services while the non-GSO systems are operating. The Republic of Korea also proposes that the use of other frequency bands for non-GSO FSS might be considered not only after the complete study of sharing issues in ITU-R but also after the successful operation of non-GSO systems following Articles S21 and S22.

Proposals

MOD KOR/87/1

RESOLUTION 538 (Rev.WRC-~~97~~2000)

Use of the frequency bands covered by Appendices S30/30 and S30A/30A by non-geostationary-satellite systems in the fixed-satellite service

...

resolves

...

~~1.7 that, as of 22 November 1997, such a system shall be subject, for the coordination with non-GSO systems, to the application of the provisions of § 2.1 of Section II of Resolution **46 (Rev.WRC-97)**/No. **S9.12**;~~

Reasons: The Republic of Korea proposes the suppression of *resolves* 1.7 of Resolution 538 provided that suitable text is reflected in the relevant footnote.

Proposed modifications to footnote to reflect *resolves* 1.7 from Resolution 538 (WRC-97)

MOD KOR/87/2

S5.516 The use of the band 17.3-18.1 GHz by geostationary-satellite systems in the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service. For the use of the band 17.3-17.8 GHz in Region 2 by feeder links for the broadcasting-satellite service in the band 12.2-12.7 GHz, see Article **S11**. The use of the bands 17.3-18.1 GHz (Earth-to-space) in Regions 1 and 3 and 17.8-18.1 GHz (Earth-to-space) in Region 2 by non-geostationary-satellite systems in the fixed-satellite service is subject to the application of the provisions of ~~Resolution **538 (WRC-97)**~~ No. **S9.12** for coordination with other non-geostationary-satellite systems in the fixed-satellite service. Non-geostationary-satellite systems in the fixed-satellite service shall not claim protection from geostationary-satellite networks in the fixed-satellite service operating in accordance with the Radio Regulations, irrespective of the dates of receipt by the Bureau of the complete notification information for the non-GSO FSS systems and of the complete coordination information for the GSO networks.

Reasons: As a result of the modification to Resolution 538 (WRC-97), consequential changes to suppression of *resolves* 1.7 of the Resolution would be required to No. S5.516 in Article S5. The Republic of Korea proposes to modify the footnote based on Option 1A of Annex 6 of the CPM Report.

Proposed suppression to Section VI of Article S22

SUP KOR/87/3

~~Section VI – Earth station off-axis power limitations in the fixed-satellite service~~[11]

~~**S22.26** § 9 The level of equivalent isotropically radiated power (e.i.r.p.) emitted by an earth station shall not exceed the following values for any off-axis angle φ which is 2.5° or more off the main-lobe axis of an earth station antenna:~~

~~*Off-axis angle*~~	~~*Maximum e.i.r.p.*~~
~~2.5° ≤ φ ≤ 7°~~	~~(39 – 25 log φ) dB(W/40 kHz)~~
~~7° < φ ≤ 9.2°~~	~~18 dB(W/40 kHz)~~
~~9.2° < φ ≤ 48°~~	~~(42 – 25 log φ) dB(W/40 kHz)~~
~~48° < φ ≤ 180°~~	~~0 dB(W/40 kHz)~~

~~**S22.27** For FM-TV emissions with energy dispersal, the limits in No. **S22.26** above may be exceeded by up to 3 dB provided that the off-axis total e.i.r.p. of the transmitted FM-TV carrier does not exceed the following values:~~

~~*Off-axis angle*~~	~~*Maximum e.i.r.p.*~~
~~2.5° ≤ φ ≤ 7°~~	~~(53 – 25 log φ) dBW~~
~~7° < φ ≤ 9.2°~~	~~32 dBW~~
~~9.2° < φ ≤ 48°~~	~~(56 – 25 log φ) dBW~~
~~48° < φ ≤ 180°~~	~~14 dBW~~

~~**S22.28** FM-TV carriers which operate without energy dispersal should be modulated at all times with programme material or appropriate test patterns. In this case, the off-axis total e.i.r.p. of the emitted FM-TV carrier shall not exceed the following values:~~

~~*Off-axis angle*~~	~~*Maximum e.i.r.p.*~~
~~2.5° ≤ φ ≤ 7°~~	~~(53 – 25 log φ) dBW~~
~~7° < φ ≤ 9.2°~~	~~32 dBW~~
~~9.2° < φ ≤ 48°~~	~~(56 – 25 log φ) dBW~~
~~48° < φ ≤ 180°~~	~~14 dBW~~

~~**S22.29** The e.i.r.p. limits given in Nos. **S22.26**, **S22.27** and **S22.28** are applicable in the following frequency bands allocated to the fixed-satellite service (Earth-to-space):~~

~~12.75-13.25 GHz~~

~~13.75-14 GHz~~

~~14-14.5 GHz.~~

Reasons: The suppression of Section VI of Article S22 would impose no additional technical or regulatory constraints on GSO FSS earth stations. Members may be encouraged to use applicable ITU-R Recommendations. Therefore, the Republic of Korea proposes to suppress Section VI of Article S22.

~~[11] **S22.VI.1** The provisions of this section are suspended pending the review of the values in Nos. **S22.26**, **S22.27** and **S22.28** by WRC-99.~~

Modification to RR footnote No. S5.520 for the 18.1-18.4 GHz (Earth-to-space) band in Regions 1, 2 and 3

MOD KOR/87/4

S5.520 The use of the band 18.1-18.4 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links for the broadcasting-satellite service using the geostationary-satellite orbit.

Reasons: According to the result of the CPM Report (section 3.2.3), the ITU-R study has not been completed for the use of the 18.1-18.4 GHz band by non-GSO FSS. Therefore, the Republic of Korea proposes that the possible introduction of the non-GSO FSS in the 18.1-18.4 GHz would be considered after the complete study by relevant ITU-R Study Groups, as well as after the successful operation of non-GSO systems following Articles S21 and S22.

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PLENARY MEETING

Germany (Federal Republic of) and Norway

PROPOSAL FOR THE WORK OF THE CONFERENCE

The Administrations of Germany and Norway have examined the footnotes to the Table of Frequency Allocations (Article S5 of the Radio Regulations) under agenda item 1.1 and concluded that the following footnote could be deleted:

SUP D/NOR/88/1

S5.437

Reasons: The frequency band 4 200-4 210 MHz is no longer used for the fixed service, nor is it planned to be used for this service in the future.

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WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

Austria

PROPOSALS FOR THE WORK OF THE CONFERENCE

Introduction

The Administration of Austria wishes to make the following proposals which are closely interrelated and may only be processed as a package. These proposals relate to the amateur service allocation in the frequency range 1 810-1 830 kHz and are aimed at achieving conformity with the existing allocation in the Table of Frequency Allocations in RR Article S5 with the purpose of allowing operation of the amateur service in Austria in this band.

In bringing the allocation for Austria closer to the allocation in the Table of Frequency Allocations, these proposals are deemed to contribute to the simplification of the Radio Regulations. In principle it is only a change from *alternative* to *additional allocation* for the fixed and mobile service in the band 1 810-1 830 kHz. The proposal consists of two steps, namely:

1) add Austria to the countries listed in footnote S5.99;

2) delete Austria from the countries listed in footnote S5.98.

These changes will not adversely affect other countries listed in the relevant footnotes and open the door for future deletion of Austria from footnote S5.99 at a future WRC, as soon as the fixed and mobile services are no longer required in Austria.

In accordance with footnote S5.100, consultation with neighbouring countries regarding the addition of Austria to footnote S5.99 was carried out prior to the Conference with a positive response.

MOD AUT/89/1

S5.99 *Additional allocation:* in Saudi Arabia, Austria, Bosnia and Herzegovina, Iraq, Libya, Uzbekistan, Slovakia, the Czech Republic, Romania, Slovenia, Chad, Togo and Yugoslavia, the band 1 810-1 830 kHz is also allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

* Pursuant to Resolution 26 (Rev.WRC-97) the Secretariat notes that this contribution was received on 6 April 2000.

MOD AUT/89/2

S5.98 *Alternative allocation:* in Angola, Armenia~~, Austria,~~ Azerbaijan, Belarus, Belgium, Bulgaria, Cameroon, the Congo, Denmark, Egypt, Eritrea, Spain, Ethiopia, Georgia, Greece, Italy, Kazakstan, Lebanon, Lithuania, Moldova, the Netherlands, Syria, Kyrgyzstan, Russian Federation, Somalia, Tajikistan, Tunisia, Turkmenistan, Turkey and Ukraine, the band 1 810-1 830 kHz is allocated to the fixed and mobile, except aeronautical mobile, services on a primary basis.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Corrigendum 1 to
Document 90-E
22 May 2000
Original: English

PLENARY MEETING

Austria, Liechtenstein (Principality of), Switzerland (Confederation of)

PROPOSAL FOR THE WORK OF THE CONFERENCE

Please add the following countries as co-sponsors to this document:

– Liechtenstein and Switzerland.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 90-E*[*]
6 April 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Austria

PROPOSAL FOR THE WORK OF THE CONFERENCE

Introduction

Austria requests to have its country name added to No. S5.96. The national allocation to the amateur service will, however, be limited to the frequency band 1 850-1 950 kHz. Due attention was given to consultation with administrations of neighbouring countries to prevent harmful interference from the amateur service in Austria to the fixed and mobile services of other countries.

MOD AUT/90/1

S5.96 In Germany, Armenia, Austria, Azerbaijan, Belarus, Denmark, Estonia, Finland, Georgia, Hungary, Ireland, Israel, Jordan, Kazakstan, Latvia, Lithuania, Malta, Moldova, Norway, Uzbekistan, Poland, Kyrgyzstan, Slovakia, the Czech Republic, the United Kingdom, Russian Federation, Sweden, Tajikistan, Turkmenistan and Ukraine, administrations may allocate up to 200 kHz to their amateur service in the bands 1 715-1 800 kHz and 1 850-2 000 kHz. However, when allocating the bands within this range to their amateur service, administrations shall, after prior consultation with administrations of neighbouring countries, take such steps as may be necessary to prevent harmful interference from their amateur service to the fixed and mobile services of other countries. The mean power of any amateur station shall not exceed 10 W.

Reasons: This proposal is made to harmonize the frequency allocation to the amateur service in Austria with the relevant allocation in the majority of its neighbouring countries.

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[*] Pursuant to Resolution 26 (Rev.WRC-97) the Secretariat notes that this contribution was received on 6 April 2000.

INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

Document 91-E
4 April 2000
Original: English

ISTANBUL, 8 MAY – 2 JUNE 2000

PLENARY MEETING

Austria

PROPOSALS FOR THE WORK OF THE CONFERENCE

With reference to Resolution 721 (WRC-97)**,** agenda item 1.1 of the World Radiocommunication Conference 2000, the Administration of Austria requests to delete its country name from the following footnotes in accordance with Resolution 26 (Rev.WRC-97).

MOD AUT/91/1

S5.206 *Different category of service:* in Armenia~~, Austria~~, Azerbaijan, Belarus, Bulgaria, Egypt, Finland, France, Georgia, Greece, Hungary, Kazakstan, Lebanon, Moldova, Mongolia, Uzbekistan, Poland, Kyrgyzstan, Syria, Slovakia, the Czech Republic, Romania, Russian Federation, Tajikistan, Turkmenistan and Ukraine, the allocation of the band 137-138 MHz to the aeronautical mobile (OR) service is on a primary basis (see No. **S5.33**).

Reasons: No further requirement for such use in Austria.

MOD AUT/91/2

S5.210 *Additional allocation:* in~~ Austria,~~ France, Italy, Liechtenstein, Slovakia, the Czech Republic, the United Kingdom and Switzerland, the bands 138-143.6 MHz and 143.65-144 MHz are also allocated to the space research service (space-to-Earth) on a secondary basis.

Reasons: No further requirement for such use in Austria.

MOD AUT/91/3

S5.508 *Additional allocation:* in Germany~~, Austria~~, Bosnia and Herzegovina, France, Greece, Ireland, Iceland, Italy, The Former Yugoslav Republic of Macedonia, Libya, Liechtenstein, Portugal, the United Kingdom, Slovenia, Switzerland, Turkey and Yugoslavia, the band 14.25-14.3 GHz is also allocated to the fixed service on a primary basis.

Reasons: No further requirement for such use in Austria.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

ISTANBUL, 8 MAY – 2 JUNE 2000

Document 92-E
6 April 2000
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English
Spanish

PLENARY MEETING

Note by the Secretary-General

IMO INFORMATION PAPER

I have the honour to bring to the attention of the Conference, at the request of the International Maritime Organization (IMO), the annexed information paper.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

IMO position on WRC-2000 agenda items concerning matters related to maritime services

WRC-2000 agenda item 1.6 - issues related to IMT-2000:

1.6.1 review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

1.6.2 identification of a global radio control channel to facilitate multimode terminal operation and worldwide roaming of IMT-2000

Background

This agenda item is aimed at satisfying the demand for spectrum anticipated for third generation personal communication systems known generically as IMT-2000 (previously FPLMTS). A number of bands in the range 1-3.5 GHz allocated to existing mobile telephone systems or other services have been identified as possible candidates for IMT-2000 expansion.

The bands identified so far have no direct impact on maritime radiocommunication or radionavigation services, however, there may be difficulties resulting from the relocation of displaced services. In particular, it is becoming evident that there is considerable interest from telecommunications network operators in the band 2 700-2 900 MHz. The CPM Report noted the comments from equipment manufacturers that administrations should not rely on future, possibly costly, technological advancements (e.g. multimode, multiband reconfigurable or fully digitized "software" radios and adaptive antennas) to provide sufficient spectrum management flexibility and address the difficulties caused by band fragmentation, in order to offer global services without global spectrum. Manufacturers also considered that to do so may lead to unnecessary delay in implementing global services and result in roaming complications for customers, manufacturers and operators. Since the use of this band for aeronautical radar is both widespread and continuing for air traffic control purposes, there is the question of relocation of the existing services to consider. However, even with the considerable operational and financial problems involved in relocating aeronautical radar systems out of the band, there would still be significant advantages to providers of IMT-2000 services. If used on a global basis, this one band could accommodate the total requirement for additional spectrum for the terrestrial component of IMT-2000, which would yield considerable savings in complexity and costs in the design and construction of IMT-2000 user terminals. The obvious candidate band for relocation of aeronautical radars would be the maritime radionavigation band 2 900-3 100 MHz presently used by 3 GHz marine radars and racons. Such a solution would not be acceptable because air traffic radars and marine radars cannot normally operate in close proximity in the same band without causing harmful interference. If an air traffic control radar operating near a port were to operate in this band used by marine radars, ships entering that port would likely be prevented from using their 3 GHz radar. In that situation, ships would be limited to using 9 GHz radar only. In adverse weather conditions, 3 GHz radar has far superior performance compared to 9 GHz radar and such a restriction on the use of radar could cause a hazard to navigation.

The analysis of candidate IMT-2000 expansion bands in the CPM Report shows no consensus on the suitability of the 2 700-2 900 MHz band. A widely held view, supported by several studies, is that the possibility of sharing between IMT-2000 and radars is highly questionable and that more studies are needed. Another view is that sharing is technically feasible. A solution involving the shared use based on geographical separation seems difficult to achieve because the user terminals would be designed for worldwide use which means that they will be sensitive to radar transmissions in areas where localized use of the 2 700-2 900 MHz band for IMT-2000 is not available. Receiver blocking or damage to IMT-2000 terminals may be expected in these circumstances. The more likely solution, if there is general support for using the band 2 700-2 900 MHz for IMT-2000, is that the band will be identified for global use and transition arrangements instituted to relocate the existing services. However, as noted above, the maritime radionavigation band would be unsuitable for relocating aeronautical radar systems in operational terms, and indeed such a shared use would be potentially hazardous. Another factor for administrations to consider when assessing the suitability of candidate bands for IMT-2000 is that airports and ferries are popular places for mobile phone use. Since IMT-2000 terminals, regardless of the outcome of WRC-2000, will have to work over a very wide frequency range, users may experience loss of service in the vicinity of radars operating in an adjacent band.

IMO position

IMO opposes any allocations for IMT-2000 from existing spectrum allocated for maritime use. Further, allocations for IMT-2000 uses, both terrestrial and satellite, that are near a radionavigation band in widespread use by radars could degrade the usefulness of the radionavigation bands and cause deleterious effects on the IMT-2000 terminal units themselves. IMO opposes such allocations until compatibility studies are completed showing that these allocations are acceptable.

WRC-2000 agenda item 1.7 - review of the use of the HF bands by the aeronautical mobile (R) and maritime mobile services with a view to protecting the operational, distress and safety communications, taking into account Resolution 346 (WRC-97)

Background

The purpose of this agenda item is to consider the use of the HF bands for high priority communications particularly as regards the protection of essential communications from harmful interference. HF channels are designated for various operational and distress and safety purposes by ships and coast stations in Article **S52** and Appendices **S13**, **S15** and **S17** of the Radio Regulations.

Concern has been expressed in IMO for many years over the harmful interference being caused on the HF GMDSS radiotelephone distress and safety communication frequencies 12 290 and 16 420 kHz and after a number of attempts the problem has been brought to a WRC for action. The problem arises because of the anomaly whereby the ship transmitting frequencies of international radiotelephone channels 1221 (ship transmits 12 290 kHz, ship receives 13 137 kHz) and 1621 (ship transmits 16 420 kHz, ship receives 17 302 kHz) are also designated as GMDSS radiotelephony channels for distress and safety purposes. The peculiar circumstance that these frequencies may also be used legitimately as ship transmitting frequencies for general calling has resulted in considerable disruption to distress and safety traffic. The existence of interference to 12 290 kHz and 16 420 kHz, together with disruption to the radiotelephony distress and safety frequency 8 291 kHz, was first noted at COM 40 in 1995 and subsequently publicized in COM/Circ.119. A revised Circular COMSAR/Circ.6 was developed following further discussion at COMSAR 1 in 1996.

The issue was examined during the 1997 World Radiocommunication Conference and Resolution **346 (WRC-97)** *"Protection of distress and safety communications on the frequencies 12 290 kHz and 16 420 kHz from harmful interference caused by these frequencies if also used for non-safety calling"* was developed, which repeated the call made in COMSAR/Circ.6 for administrations to move their coast station calling channels from the channels 1221 and 1621 to any other suitable HF channels.

More recently there have been a number of reports of more generalized interference to maritime and aeronautical communications in the HF bands. The problem is widespread in the Asia-Pacific Region where interference on all channels between 3 and 16 MHz occurs daily at different times, varying in intensity and duration. Monitoring observations have been carried out in the Region in the bands allocated exclusively to the maritime mobile service between 4 063 kHz and 27 500 kHz and these show that a number of frequencies in these bands are still being used by stations of other services. Many instances of interference are, however, caused by licensed stations of the maritime and aeronautical mobile services which are operating in contravention of the Radio Regulations.

Interference to maritime mobile HF communications may be reported under Article **S15** of the Radio Regulations, however, such action has not proved to be effective and, if anything, the interference has continued to increase. The CPM Report notes a number of methods that could prove useful in eliminating or reducing the impact of interference.

Elaborate means of reducing the impact of interference by adaptive measures such as frequency hopping and interference cancelling reception techniques were described in the CPM Report and operational systems are under development for civil aviation use. However, these developments were already in progress because of operational needs and such a solution would not be of immediate use to the maritime community. Also, over-reliance on mitigation techniques may actually tend to encourage illicit use.

Improved reporting procedures will be of use generally and are supported by IMO, however, widespread publicity concerning the particular difficulties in the 12 and 16 MHz bands has not actually reduced the main problem experienced in the maritime HF bands.

The most effective method of resolving the problem of interference to simplex distress and safety radiotelephony channels from duplex routine voice calling channels is to prohibit any use of those routine calling channels where the ship's transmit frequency coincides with the distress and safety channel. In the long term, equipment would have to be modified or replaced to make such use impossible. However, if coast stations are prohibited from using the interfering duplex channels with immediate effect, the problem will quickly decline. Other ideas such as promoting better use of DSC are also helpful in the long term but would be of little immediate effect.

IMO position

IMO reaffirms its opinion that the frequencies 12 290 kHz and 16 420 kHz should only be used for distress and safety communications and allocated solely for such a purpose by means of modification to the relevant parts of the Radio Regulations. IMO also supports efforts to reduce inappropriate use of the HF bands through improved regulatory procedures to safeguard distress and safety communications.

In respect of the CPM Report, IMO therefore supports actions in line with paragraphs 1.2.3.2.1 and 1.2.3.2.3, namely to:

– consider modification of Article **S52** and Appendices **S15** and **S17** in such a way that the HF distress and safety frequencies become exclusive (i.e. that no routine calling on these frequencies is allowed) with, in the long term, additional routine voice calling frequencies being made available;

– consider modification of performance standards for maritime HF transceivers so that, in the future, the forbidden routine calling channels are no longer physically available; and

– encourage the use of DSC thereby promoting the full use of GMDSS facilities.

WRC-2000 agenda item 1.8 - to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the bands 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands

Background

This agenda item seeks to permit the use of earth stations operating in the bands 3 700-4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space) on board ships as part of the fixed-satellite service rather than the maritime mobile-satellite service. This agenda item on C-band earth stations, as they are commonly known, was introduced at WRC-97.

The advantage for the maritime community is that it is possible to gain access to relatively low-cost broadband communication facilities using existing frequencies and space segments in the fixed-satellite service. Ship owners could benefit from the resulting possibilities for wideband communications which, moreover, can be operated with considerable cost savings over the current maritime-satellite systems. The main uses are telephone links for passengers on cruise liners and ferries. There are also a number of applications for ships that need to transfer large amounts of data to shore. The offshore oil industry is a prime example, especially as regards survey ship operations where real-time analysis ashore of data collected on-board ship becomes possible without the cost of the satellite link being a major limitation.

Typically, these links make use of the INTELSAT network of geostationary satellites which can provide a relatively cheap high bandwidth path. There is, however, some loss in flexibility of use, since there is no provision in such systems for on-demand service availability on connection. Instead, the use of a satellite transponder has to be pre-arranged on a permanent or a regular timeslot basis from the ship via a particular ground station into the public or a private telecommunications network.

However, preliminary examination of this issue has revealed a number of operational and legal issues that must be addressed arising from potential for interference to other services allocated in these bands.

The CPM Report notes that interference-free operation can only be guaranteed beyond a certain minimum distance from the coast. This effectively means that an exclusion zone will be defined within which the earth station operator will have to seek the permission of all potentially affected coastal states. There was no consensus on the size of the exclusion zone, however, there seems to be no argument that an eventual exclusion distance, determined on purely technical grounds, must be in excess of 100 km and very likely in excess of 300 km.

Even if the outcome of WRC-2000 suspended the use of 6/4 GHz terminals on ships until studies are complete, the most optimistic outcome could still be no more than a more accurate definition of the exclusion zone needed around coasts to ensure protection of fixed link networks.

Since the areas of most interest where high bandwidth communications are required at sea are all fairly close to shore, it is difficult to understand what benefit further studies into exclusion distances, as opposed to more generalized studies into improving maritime communications, will bring. The prime commercial applications of interest are oil industry survey work, which takes place mainly on the continental shelf and passenger cruising, which typically involves sailing around prime locations close to shore in the Mediterranean, Caribbean and Baltic Seas.

IMO position

IMO supports the orderly introduction of suitable bands for broadband maritime mobile communications when regulatory and technical provisions are accommodated.

WRC-2000 agenda item 1.9 - to take into account the results of ITU-R studies in evaluating the feasibility of an allocation in the space-to-Earth direction to the mobile-satellite service (MSS) in a portion of the 1 559-1 567 MHz frequency range, in response to Resolutions 213 (Rev.WRC-95) and 220 (WRC-97)

Background

The importance of this issue for maritime radiocommunications is that the band 1 559-1 567 MHz is heavily used for radionavigation purposes by the radionavigation-satellite service (GPS and GLONASS). The wider band 1 559-1 610 MHz is also used for important applications in the aeronautical radionavigation service.

The question of an additional allocation to the mobile-satellite service in the band 1 559-1 567 MHz was considered at WRC-97 with the conclusion that no immediate allocation could be made because of uncertainty as to whether the proposed criteria for new mobile-satellite systems in the band 1 559-1 567 MHz could guarantee satisfactory sharing between the mobile-satellite and the radionavigation services. The subject received great attention from both maritime and aeronautical interests because of the need to safeguard the operation of existing radionavigation services and to avoid constraints on the future development of radionavigation services in this band.

WRC-97 did, however, adopt Resolution **220 (WRC-97)** in order to initiate further studies into the technical criteria and operational and safety requirements needed to assess the feasibility of sharing between the aeronautical radionavigation and radionavigation-satellite services operating, or planned to operate, in the band 1 559-1 610 MHz, and the mobile-satellite service in a portion of the band 1 559-1 567 MHz. The intention was that the studies should be available in time for the next WRC to evaluate the feasibility of sharing a portion of the spectrum for new mobile-satellite communication systems.

Further studies have shown considerable doubt about the possibility of successful sharing in this band. Additionally, mobile-satellite services currently using bands adjacent to that used by GNSS, particularly hand-held satellite telephones used aboard ships, can cause interference to shipboard GNSS systems. The potential for interference from ship passengers using hand-held satellite telephones to shipboard GNSS systems is significant.

IMO position

In view of the importance of preserving the integrity of existing radionavigation-satellite systems which are vital to the safe navigation of vessels and the need to avoid constraints on the introduction of new radionavigation systems, IMO is of the opinion that no additional allocation to the mobile-satellite service should be introduced into the band 1 559-1 567 MHz at WRC-2000, and sees no need to continue with further studies. Additionally, technical limits should be placed upon mobile-satellite systems using bands adjacent to 1 559-1 567 MHz to ensure no harmful interference occurs to global navigation satellite systems on board ships.

WRC-2000 agenda item 1.10 - to consider results of ITU-R studies carried out in accordance with Resolution 218 (WRC-97) and take appropriate action on this subject

Background

This agenda item is of prime importance for IMO since it addresses two issues arising from the generic use of satellite L-band spectrum:

1) the future spectrum requirements for the provision of distress, safety and urgency communications in the GMDSS and aeronautical mobile-satellite (R) service communications with priority 1 to 6 of Article **S44**; and

2) the feasibility of prioritization, real time pre-emptive access and, if necessary, interoperability between different mobile-satellite systems for the GMDSS and aeronautical mobile-satellite (R) service communications.

Resolution **218 (WRC-97)** on the use of the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz by the mobile-satellite service was developed at WRC-97 as a result of the allocation of these bands for generic use by the mobile-satellite service, notwithstanding the previous predominant use of the bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz by the maritime mobile-satellite service for satellite communications in the GMDSS. In addition, the bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz were allocated to the aeronautical mobile-satellite (R) service on a primary basis.

The stated purpose of the move to a generic allocation for the mobile-satellite service was to facilitate the assignment of spectrum to multiple mobile-satellite systems in a flexible and efficient manner. There was considerable concern that this course of action would prejudice the provision of satellite communications with aircraft and in the GMDSS, particularly in respect of distress and safety traffic.

The outcome at WRC-97 was that the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz were made generic to the mobile-satellite service. Additional provisions of the Radio Regulations, Nos. **S5.353A**[1] and **S5.357A**[2], were added to protect the GMDSS and aeronautical uses of these bands and the spectrum requirements for the maritime and aeronautical urgent communications. In addition, the new Resolution **218 (WRC-97)** was adopted which includes a call for studies on methods for determining the spectrum requirements for the GMDSS and aeronautical applications.

IMO position

IMO expressed concern at WRC-97 and the 1998 ITU Plenipotentiary Conference that the unique requirements of the maritime community had not been recognized, and expressed concern about the safeguards to be provided for the maritime mobile-satellite service. IMO believes that accommodating the spectrum requirements for maritime distress, urgency and safety

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[1] **S5.353A** In applying the procedures of No. **S9.11A** to the mobile-satellite service in the bands 1 530-1 544 MHz and 1 626.5-1 645.5 MHz, priority shall be given to accommodating the spectrum requirements for distress, urgency and safety communications of the Global Maritime Distress and Safety System (GMDSS). Maritime mobile-satellite distress, urgency and safety communications shall have priority access and immediate availability over all other mobile satellite communications operating within a network. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, distress, urgency and safety communications of the GMDSS. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (See Resolution **218 (WRC-97)**.)

[2] **S5.357A** In applying the procedures of No. **S9.11A** to the mobile-satellite service in the bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz, priority shall be given to accommodating the spectrum requirements of the aeronautical mobile-satellite (R) service providing transmission of messages with priority 1 to 6 in Article **S44**. Aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **S44** shall have priority access and immediate availability, by pre-emption if necessary, over all other mobile-satellite communications operating within a network. Mobile-satellite systems shall not cause unacceptable interference to, or claim protection from, aeronautical mobile-satellite (R) service communications with priority 1 to 6 in Article **S44**. Account shall be taken of the priority of safety-related communications in the other mobile-satellite services. (See Resolution **218 (WRC-97)**.)

communications of the GMDSS in the bands 1 525-1 559 MHz and 1 626.5-1 660.5 MHz shall be given absolute priority in multilateral cooperation agreements.

IMO notes, however, the studies that have taken place since WRC-97 on methods of ensuring priority-access for distress, urgency and safety communications within a network and with other mobile-satellite services. IMO is not convinced that inter-system prioritization and pre-emption will be workable and prefers a capacity planning approach. Further action, however, is necessary within the ITU to demonstrate in a transparent manner that any resulting spectrum sharing arrangements have been developed in compliance with No. **S5.353A**.

The CPM Report provides some endorsement of the capacity planning approach in the short to medium term.

However, the issues of transparency do need to be addressed in a coherent manner. In particular, an eventual solution along such lines will need to describe how the results of the current periodical coordination process among a limited number of administrations and system operators will be placed in the public domain and made available to the ITU. Also the organizations referred to in Resolution **218 (WRC-97)** (ICAO, IMO and IALA) are not allowed to participate in the process as observers. Moreover, they are not informed of the results.

These defects need to be remedied so that all interested parties may have confidence in the process.

Therefore, IMO is of the opinion that WRC-2000 should adopt procedures ensuring that the frequency coordination agreements for mobile-satellite networks in the bands mentioned in No. **S5.353A** do demonstrably accommodate the spectrum requirements for all GMDSS distress, urgency and safety communications as defined in Articles **S32** and **S33**.

WRC-2000 agenda item 1.11 - to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions 214 (Rev.WRC-97) and 219 (WRC-97)

Background

Important maritime interests may be affected by the proposals under this agenda item to introduce non-geostationary mobile-satellite systems in the band 405-406 MHz, which is part of the band 401-406 MHz currently allocated to the meteorological aids service and adjacent to the band 406-406.1 MHz used by the COSPAS-SARSAT system.

The COSPAS-SARSAT system is essential to the operation of the GMDSS. The COSPAS and SARSAT networks of low-altitude polar-orbiting satellites are able to receive distress alerts transmitted from 406 MHz EPIRBs at any location at sea. The relevant information is then relayed to SAR authorities via local user terminals and mission control centres. Because the system operates with very low signal levels it is very sensitive to interference and must therefore be protected to the maximum extent possible. If an EPIRB transmission cannot be processed correctly at the first opportunity, it will be necessary to wait for another satellite pass thus delaying the activation of search and rescue services.

There is also a direct and immediate interest to the maritime community in the operation of meteorological aids in the frequency bands 400.15-406 MHz. These are essential to making upper air measurements for a number of important applications - weather forecasting and environmental monitoring, in particular. These vital measurements are made by radiosondes operating in the meteorological aids service. Many tens of thousands of radiosondes are launched every year now, which represents a considerable increase in use over the past decade.

At WRC-97 there were several proposals for an additional primary allocation for the mobile-satellite service in the band 405-406 MHz. These proposals were strongly opposed by the majority of countries throughout the world on account of the use of the entire frequency band 401-406 MHz for vital meteorological services. Since current radiosondes do not allow for spectrum use based on band segmentation, the conclusions were that it was premature to allocate even 1 MHz of spectrum to the mobile-satellite service and that the entire 5 MHz would still be needed for the use by the meteorological services.

Consequently, no spectrum was made available at WRC-97 and Resolution **219 (WRC-97)** was developed to cover further studies on the issue in collaboration with the WMO.

The main purpose of Resolution **219 (WRC-97)** was to cover studies into the possible transition of the meteorological aids service out of the band 405-406 MHz in favour of a new allocation to the mobile-satellite service in that band. Furthermore, the Resolution called for studies on the impact of unwanted emissions on the primary services, notably COSPAS-SARSAT, allocated in the adjacent bands.

Under the cover of Resolution **219 (WRC-97)** proposals to introduce non-geostationary mobile-satellite systems in the band 405-406 MHz will again be brought forward at WRC-2000. However, the results of technical analyses and studies carried out in respect of the Resolution do not justify a different conclusion from WRC-97 despite the case made for urgently needed spectrum for additional mobile-satellite services below 1 GHz.

All of the band 403-406 MHz is needed to secure the existing radiosonde operations, and there is actually an increase in the requirements for meteorological aids operations for weather forecasting, research, environmental and defence applications. In addition, there are also increasing requirements for the earth exploration-satellite and meteorological services in the band 401-403 MHz. It does not therefore appear feasible to accommodate all these requirements if meteorological aids have to be transferred out of the band 405-406 MHz in favour of an allocation to the mobile-satellite service. Also, since the band is needed in the future for meteorological aids there is no further purpose in considering transition plans as envisaged in Resolution **219 (WRC-97)**.

More importantly for preserving the integrity of the GMDSS, the resulting studies have led to proposals to tighten the current limits for the protection of COSPAS-SARSAT receivers. The very stringent protection requirements that have been established for the COSPAS and SARSAT search and rescue signal processors would, in any event, reduce the spectrum available to the mobile-satellite service in the band 405-406 MHz by up to 14%.

IMO position

Noting that there are maritime allocations (including distress and safety) existing below 1 GHz, IMO recommends that any new MSS allocations shall afford due protection to these maritime allocations.

IMO strongly opposes an additional allocation to the mobile-satellite service in the band 405-406 MHz and supports the maintenance of the current allocations in order to:

1) protect the proven life-saving capabilities of the COSPAS-SARSAT system in the adjacent band 406-406.1 MHz;

2) protect the meteorological aids service, in view of the importance of accurate weather forecasting for safety and commerce; and

3) enable the Earth exploration- and meteorological-satellite services and the meteorological aids service to meet increasing service requirements, in particular for weather forecasting, environmental monitoring and pollution control.

WRC-2000 agenda item 1.15 - issues related to the radionavigation-satellite service

Background

This agenda item deals with various aspects of how the radionavigation-satellite service should develop in the future. The existing service has developed out of a need to provide position information for military purposes and was not planned to provide the numerous civil applications that have since been able to exploit certain elements of the military systems. This has resulted in demands to augment existing systems or introduce new systems that are specifically designed to respond to the growth in civil applications and needs.

1.15.1 to consider new allocations to the radionavigation-satellite service in the range from 1 GHz to 6 GHz required to support developments

Extensive work has been carried out in the ITU Study Groups. Attention is now focused on four bands where additional spectrum may be available to support future development of the radionavigation-satellite service, namely:

- in the space-to-Earth direction:
  - either 1 164-1 188 MHz or parts of the band 1 151-1 215 MHz;
  - 1 260-1 300 MHz;
  - parts of the band 5 010-5 150 MHz;
- in the Earth-to-space direction:
  - 1 300-1 350 MHz;
  - 5 000-5 030 MHz.

Some sharing and compatibility problems remain to be resolved particularly in respect of the aeronautical radionavigation service; however, there should be no adverse effects on maritime services. With the exception of some frequencies used for landing and approach aids on aircraft carriers, none of these candidate bands affect existing maritime radiocommunications or radionavigation systems.

IMO position

IMO supports the implementation of new allocations for use with radionavigation-satellite systems given the importance of reliable navigational aids for enhancing the economic and safety aspects of shipping.

1.15.2 to consider the addition of the space-to-space direction to the radionavigation-satellite service allocations in the bands 1 215-1 260 MHz and 1 559-1 610 MHz

This agenda item deals with the addition of an allocation in the space-to-space direction to complement the present allocation in the bands 1 215-1 260 MHz and 1 559-1 610 MHz to the radionavigation-satellite service in the space-to-Earth direction.

Two radionavigation-satellite systems, GPS and GLONASS, currently use the bands 1 215-1 260 MHz and 1 559-1 610 MHz. Several satellite networks (e.g. TOPEX/Poseidon, AMSAT-3D, Orbcomm, Globalstar and IKONOS-1) make use of GPS signals to establish position and time references essential to the proper functioning of these networks. There are also plans to use signals from the GPS and GLONASS satellites in the control of a range of space-based applications.

The use of these radionavigation-satellite signals is presently protected only through a frequency allocation in the space-to-Earth direction, meaning that the reception of these signals on board other orbiting satellites has no normal protection. The addition of an allocation in the space-to-space direction would give protection to navigation systems on board scientific satellites, Earth-observation satellites, communications satellites and manned spacecraft.

It is necessary to provide the additional direction in both of the bands 1 215-1 260 MHz and 1 559-1 610 MHz because of ionospheric scintillation effects.

IMO position

In view of the importance of many existing and planned satellite systems for maritime purposes, notably communications and weather forecasting, IMO supports a space-to-space allocation subject to the application of appropriate safeguards for existing radionavigation-satellite networks in the space-to-Earth direction.

IMO is of the opinion that the option A identified in the CPM Report would give the most freedom for the further development of radionavigation-satellite applications. Option A involves the addition of the space-to-space direction to the radionavigation-satellite service (space-to-Earth) allocation in the bands 1 215-1 260 MHz and 1 559-1 610 MHz, coupled with a provision indicating that no protection should be given to spaceborne radionavigation-satellite receivers from radionavigation-satellite systems already operating in these bands or for which advance publication information is received by the ITU Radiocommunication Bureau, prior to the end of WRC-2000.

1.15.3 to consider the status of allocations to services other than the radionavigation-satellite service (Nos. S5.355 and S5.359) in the band 1 559-1 610 MHz

The band 1 559-1 610 MHz is allocated on a primary basis to the radionavigation-satellite service and the aeronautical radionavigation service. In addition, allocations to the fixed service are made through two provisions of the Radio Regulations, Nos. **S5.355** and **S5.359,** which respectively provide for an allocation to the fixed service on a secondary basis in 27 countries and on a primary basis to 47 countries.

The importance of this issue is the possible degradation caused to radionavigation-satellite services operating in this band, notably GPS, from other services that are permitted to make use of these bands.

In the case of transmissions in the fixed service, however, experience has shown that harmful interference to GPS reception is a real danger. Analysis of the problem shows radionavigation-satellite receivers are unable to tolerate co-frequency interference from transmissions in the fixed service within radio line-of-sight. Typically, this means that land-based GPS receivers in the main beam of a fixed service transmitter's antenna will experience harmful interference out to a distance of 50 km and out to 400 km distance in the case of aircraft receivers. For the case of non co-frequency transmissions in the fixed service, there is evidence to show that fixed service transmissions in and to either side of the band 1 559-1 610 MHz will cause interference to radionavigation-satellite receivers operating in the band 1 559-1 610 MHz up to 100 m away from the fixed service transmitter.

IMO position

IMO supports removing of the fixed service use of the band l 559-1 610 MHz in order to protect present and future applications in the radionavigation-satellite service. This conclusion is in line with the CPM Report.

WRC-2000 agenda item 1.18 - to consider the use of new digital technology for the maritime mobile service in the band 156-174 MHz and consequential revision of Appendix 18/S18, taking into account Resolution 342 (WRC-97)

Background

A similar agenda item on the use of new digital technology in the maritime radiotelephony channels was considered at the 1997 World Radiocommunication Conference. This item was considered in recognition of the pressure on maritime radio spectrum to provide additional capacity to accommodate new services and to meet the changing demand for radiocommunications. Because there seemed little likelihood of any new spectrum being made available for maritime VHF use, especially since there are similar demands for additional spectrum to meet the demand in the land mobile sector, it was considered that a better alternative would be to adopt new technologies that could support new services and provide more efficient use of the spectrum.

Studies in Radiocommunication Study Group 8 have been in progress for a number of years, going back to Recommendation **318 (Mob-87)** which called for urgent studies into the most appropriate means of promoting a more efficient use of the frequency spectrum in the VHF maritime mobile band. The most likely solution to the problems of congestion identified in the present use of Appendix **S18** was seen to be the adoption of technologies already implemented in the land mobile service. However, in order not to disrupt the provision of distress and safety services in the VHF band there was general acceptance that the adoption of new technologies would require a lengthy phasing-in period.

However, in the absence of any proposals at WRC-97, there was no major substantive action in respect of the VHF bands. Changes were introduced into Appendix **S18** to provide administrations with the flexibility to address any immediate problems of local congestion. In particular a note was added to Appendix **S18** to allow the use of 12.5 kHz channel interleaving on a non-interference basis to the use of the standard 25 kHz channels by other administrations and international shipping. In the main though, further consideration of this aspect was effectively postponed until the next Conference (WRC-2000) by means of Resolution **342 (WRC-97)**. This Resolution advocated that ITU-R should undertake thorough research into the future utilization of maritime VHF communications and the suitability of different technologies to meet future requirements.

It should also be noted that the use of adaptive control techniques could facilitate the introduction of packet-based digital communications technology without the need to re-allocate existing Appendix **S18** channels for sole use by new digital systems. The control protocols would ensure that spare capacity could be used on a dynamic basis without disrupting normal traffic.

IMO position

IMO supports in general the need to make the most efficient use of the maritime VHF band, but stresses that:

1) the introduction of new technologies should take into account the global use of maritime VHF equipment; and

2) new equipment utilizing digital technology must, in addition, be able to handle the existing system, especially for distress and safety purposes.

WRC-2000 agenda item 2 - to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations in accordance with Resolution 28 (WRC-95); and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution 27 (Rev.WRC-97)

Background

The concept of incorporation by reference is also employed by IMO.

In accordance with the provisions of Resolution **28 (WRC-95)** and Resolution **27 (Rev.WRC-97)**, each WRC now has to devote time to ensuring that references are up to date because the various Study Groups of the ITU Sectors routinely propose revisions of ITU-R Recommendations that have already been incorporated by reference and, in response to WRC agenda items, generate new Recommendations for incorporation by reference. It was, therefore, envisaged at WRC-97 to have a standing agenda item for all future WRCs to carry out this essential work. Because of the number of ITU-R Recommendations dealing with the design and operation in the maritime mobile and maritime mobile-satellite service the task of ensuring that references are kept up to date is of direct interest to IMO.

Incorporation by reference is quite well-suited to material of an operational nature or to stable technical material. However, some drawbacks have become apparent regarding the status of the referenced material and the structure of the Radio Regulations. In particular, the concept has failed to provide the practical benefit originally envisaged of simplifying or reducing the volume of the Radio Regulations. The status of incorporation by reference has been discussed during the VGE work and at WARC-92. However, there was no firm conclusion and, despite many requests, no definitive opinion emerged from the ITU legal service as to whether text incorporated by reference is an obligatory part of the Radio Regulations or not. The majority view at WRC-95 was that such texts are obligatory, but still many administrations cannot accept that they have to be treated as an obligatory part of the Radio Regulations.

Because the complexity of the Radio Regulations does not appear to have been reduced and there is still no firm agreement on the status of provisions employing incorporation by reference, the ITU Special Committee considered a number of options on the future use of incorporation by reference and these options were elaborated further at the CPM.

Although there was no immediate consensus on the future use of incorporation by reference at the CPM, there would now appear to be a general recognition that the concept should be retained in some form, and that its use is particularly appropriate in connection with the maritime mobile service.

The preliminary agenda for the WRC, now to be held in 2002 or 2003, includes an item 2.10 (see Resolution **722 (WRC-97)**) for the radio regulatory procedures concerning the maritime mobile and mobile-satellite service, particularly in regard to the completion of the transition to the GMDSS. At this Conference it would be possible to remove references to a large number of ITU-R Recommendations on pre-GMDSS procedures and to review the references to the ITU-R Recommendations related to the GMDSS.

IMO position

Incorporation by reference is of importance to IMO because of the close relationship between many of the ITU-R Recommendations related to GMDSS equipment, and its operation, to IMO performance standards.

IMO requests early indication of any changes proposed by ITU to the mechanism of incorporation by reference and to the list of incorporated Recommendations.

IMO requests that the removal of references to ITU-R Recommendations on pre-GMDSS procedures and review of references to the ITU-R Recommendations related to the GMDSS should be undertaken at WRC-02/03.

WRC-2000 agenda item 7.2 - to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent Conference and on possible agenda items for future conferences

Background

Items 8.3 and 8.4 dealing with maritime issues were originally placed by WRC-97 on the WRC-2000 agenda. These agenda items were subsequently removed from that agenda according to Council Resolution 1130 during the 1998 session of the ITU Council.

IMO position

IMO notes with satisfaction that matters related to maritime distress and safety communications are placed on the preliminary agenda (items 2.4, 2.10, 2.11) for the next WRC (WRC-02/03). IMO strongly recommends these agenda items be retained on the final agenda for WRC-02/03 and to add agenda items postponed from WRC-2000 (items 8.3 and 8.4) to ensure the long-term integrity of the GMDSS.

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PLENARY MEETING

Spain

PROPOSALS FOR THE WORK OF THE CONFERENCE

UPDATING OF SHARING CONDITIONS
IN THE BAND 13.75-14 GHz

Agenda item 1.13.1 requires WRC-2000 "to review and, if appropriate, revise the power limits appearing in Articles **S21** and **S22** in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services;".

In this context, technical studies have been carried out during the period between WRC-97 and WRC-2000 on the criteria for sharing among the different services involved in different frequency bands and, in particular, in the band 13.75-14 GHz. The band 13.75-14 GHz is allocated on a primary basis to the fixed-satellite service (FSS) and the radiolocation service (RLS). In some countries, the band is also allocated to the fixed service and the mobile service (footnotes S5.499 and S5.500 of the Radio Regulations) and to the radionavigation service (footnote S5.501). Geostationary systems in the space research service (GSO SRS) use this band under footnote S5.503. From 2001, the only space research system that will remain in this band on a co-primary basis with the FSS is the tracking and data relay satellite system (TDRSS). In addition, the non-geostationary space research service (non-GSO SRS) and the Earth exploration-satellite service (EESS) have operated with protection from the FSS (footnote S5.503A) until 1 January 2000.

The technical studies carried out have shown that it is possible to maintain the protection currently afforded to RLS, SRS and FSS while reducing the constraints imposed in the sharing conditions for these services, and also enabling non-GSO fixed-satellite service (non-GSO FSS) systems to be accommodated in the band 13.75-14 GHz.

In the studies, various methods of evaluating sharing conditions have been envisaged, having regard to the possibility of reducing the operational constraints imposed on the different services. This would give the various services greater flexibility to accommodate different applications. A number of studies were submitted to the Conference Preparatory Meeting (CPM-99) on sharing conditions between GSO FSS and RLS in the band 13.75-14 GHz and between GSO FSS and SRS in the band 13.772-13.778 GHz. These studies refer to the possibility of reducing the minimum antenna diameter of 4.5 m set in footnote S5.502.

In the light of the studies presented at the CPM and various studies presented subsequently in ITU-R working parties, the Administration of Spain is of the opinion that the current limits in footnote S5.502 for the FSS are not technically justified, and proposes that:

1 WRC-2000 should adopt a new Resolution setting out the prevailing operational constraints in that band, the reasons for which footnote S5.502 is amended and the need for further studies with a view to making more efficient use of the band. A draft Resolution is attached in Annex 1;

2 footnote S5.502 should be amended in the light of the aforementioned Resolution. A proposed revision of the footnote is attached in Annex 2.

Annexes: 2

ANNEX 1

ADD E/93/1

RESOLUTION XXX (WRC-2000)

Sharing conditions applicable in the band 13.75-14 GHz

The World Radiocommunication Conference (Istanbul, 2000),

considering

a) that the band 13.75-14 GHz is allocated on a primary basis to the fixed-satellite and radiolocation services, subject to the sharing conditions set out in No. **S5.502**;

b) that, until they cease to operate, geostationary space stations in the space research service for which information for advance publication was received by the Bureau prior to 31 January 1992 shall operate in the band 13.75-14 GHz under the same conditions as stations in the fixed-satellite service, subject to the conditions set forth in No. **S5.503**;

c) that WARC-92 allocated the band 13.75-14 GHz on a worldwide basis to the fixed-satellite service in order to provide the necessary spectrum resources in the Earth-to-space direction to balance the equivalent bandwidth allocated to the fixed-satellite service in the space-to-Earth direction;

d) that the purposes of ITU include, *inter alia*, promoting efficient use of the radio-frequency spectrum by all radiocommunication services and extension of the benefits of new telecommunication technologies to all the world's inhabitants,

considering further

e) that the conditions set out in No. **S5.502** for the fixed-satellite and radiolocation services are based on technical characteristics, applications and sharing environments that prevailed at the time when they were adopted (WARC-92 and WRC-95);

f) that, since Nos. **S5.502** and **S5.503** were drafted, new technologies and applications have been developed and implemented in the bands allocated to the fixed-satellite service, including the bands allocated to the fixed-satellite service (space-to-Earth) referred to in *considering c)* above;

g) that, in those bands, new applications are currently under development that require both narrow-band and wideband digital transmissions as well as terminals with smaller aperture antennas for use in both geostationary and non-geostationary fixed-satellite service networks,

noting

a) that various studies have shown that the sharing conditions set in No. **S5.502** impose severe constraints worldwide on efficient use of the band 13.75-14 GHz for existing satellite networks, and may also severely restrict access to and efficient use of this band for future satellite networks designed to accommodate emerging technologies and applications;

b) that various studies have shown that adopting off-axis e.i.r.p. spectral density masks like those specified for space transmissions in Section VI of Article **S22** of the Radio Regulations would afford the radiolocation service equivalent or greater protection than that resulting from the sharing conditions set in No. **S5.502**, with respect to interference from the fixed-satellite service;

c) that the maximum limit of 59 dBW specified in No. **S5.502** for e.i.r.p. averaged over one second radiated towards the geostationary-satellite orbit by a station in the radiolocation service affords adequate protection for the fixed-satellite service against interference from the radiolocation service;

d) that various studies have shown that there is no longer any technical justification for the reference in No. **S5.502** to a minimum antenna diameter of 4.5 m for the fixed-satellite service;

e) that the sharing conditions set in No. **S5.503** afford adequate protection to space research services against interference from the fixed-satellite service;

f) that, in virtue of the sovereign rights of each State to regulate telecommunications on its own territory, the administrations are currently applying, at the national level, a wide variety of different operating regimes for the fixed-satellite service in the band 13.75-14 GHz;

g) that there is an urgent need to enable economical and efficient use of the band 13.75-14 GHz by the fixed-satellite service, while continuing to guarantee protection for the radiolocation and space research services,

resolves

1 that, with effect from 3 June 2000, the conditions set in No. **S5.502** relating to a minimum antenna diameter of 4.5 m and a minimum e.i.r.p. of 68 dBW applicable to emissions in the fixed-satellite service (Earth-to-space) shall be suspended, pending their revision by a future competent conference on the basis of the studies to be carried out by ITU-R in line with *instructs ITU-R* 1 below;

2 that, with effect from 3 June 2000, the off-axis e.i.r.p. density of any emission in the fixed-satellite service (space-to-Earth) shall not exceed the limits given in Section VI of Article **S22**;

3 that, until the revision referred to in *resolves* 1 above takes effect, the sharing conditions set in No. **S5.503** applicable to the fixed-satellite service and the condition referred to in *noting c)* above applicable to radiolocation emissions shall continue to apply,

instructs ITU-R

1 as a matter of urgency, to carry out studies and develop sharing conditions worldwide that will lead to more efficient use of the band 13.75-14 GHz by the radiolocation, space research and fixed-satellite services, taking into account their foreseeable evolution and the requirements of those services;

2 to report on the results of those studies to the Conference Preparatory Meeting for WRC-03.

ANNEX 2

MOD E/93/2

S5.502 In the band 13.75-14 GHz, ~~the e.i.r.p. of any emission from an earth station in the fixed-satellite service shall be at least 68 dBW, and should not exceed 85 dBW, with a minimum antenna diameter of 4.5 m. In addition~~ the e.i.r.p., averaged over one second, radiated by a station in the radiolocation or radionavigation services towards the geostationary-satellite orbit shall not exceed 59 dBW.

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PLENARY MEETING

Note by the Secretary-General

ROLE OF THE NOTIFYING ADMINISTRATION IN THE CASE OF AN ADMINISTRATION NOTIFYING ON BEHALF OF A NAMED GROUP OF ADMINISTRATIONS

Attached is a report by the Director of the Radiocommunication Bureau pursuant to Resolution 87 (Minneapolis, 1998).

Yoshio UTSUMI
Secretary-General

Attachment

ATTACHMENT

Director, Radiocommunication Bureau

ROLE OF THE NOTIFYING ADMINISTRATION IN THE CASE OF AN ADMINISTRATION NOTIFYING ON BEHALF OF A NAMED GROUP OF ADMINISTRATIONS

Resolution 87 (Minneapolis, 1998) noted that, under the Radio Regulations, one administration may act as the notifying administration on behalf of a named group of administrations, and there are a number of practical examples of this situation. It also noted that the notifying administration is responsible under the agreement with the organization responsible for multinational networks of this kind, for communicating any information from that entity to the Radiocommunication Bureau.

Resolution 80 also included an instruction to the Director, Radiocommunication Bureau, to prepare a report to the next world radiocommunication conference on the role of notifying administrations when notifying on behalf of a named group of administrations.

In order to assist the Director in this task, the Radiocommunication Advisory Group was invited to provide advice to the Director on these matters. The RAG considered the matter at its eighth meeting (17-20 January 2000) but noted that it is a regulatory matter to be dealt with at WRC-2000 and decided not to consider it further.

The Bureau notes that the issues were addressed comprehensively in the Report of the Conference Preparatory Meeting (CPM), including a summary of the various provisions of the Radio Regulations in which such arrangements are mentioned. The Bureau has nothing further to add to the CPM analysis which is reproduced below:

Extract from Chapter 7 of the CPM Report (Document 3).

7.5.3 Resolution 87 - Role of the Notifying Administration

This Resolution deals with the need to clarify the role of the notifying administration when it is notifying on behalf of a group of administrations. There was one administration which submitted proposals and one administration and a Sector Member which submitted comments not in favour of the original proposal. The original proposal which is included here as an example of how WRC-2000 could address this problem would be to have a Resolution with the following *resolves*:

1 that when an administration acts as the notifying administration of a satellite network on behalf of a group of named administrations in accordance with Nos. **S9.1.1** and **S11.15.1** and the Rules of Procedures for Appendices **S30** and **S30A**, the following procedures shall be applied:

- the group of named administrations shall select one of them to act as the notifying administration for that particular network;
- the administration identified as the notifying administration shall act on behalf of all members of the group of administrations listed in the application of the Radio Regulations with respect to particular networks;

2 that the group of named administrations shall ensure that the notifying administration is able to act on their behalf in carrying out the provisions of the Radio Regulations.

There were concerns expressed by one administration and one sector member as follows:

- Some administrations were of the view that the present provisions are adequate, work well and that such changes are not necessary.
- It was pointed out that intergovernmental organizations are composed of sovereign administrations and that the internal procedures of the organization include the identification of the notifying administration to communicate with the BR on its behalf.
- There were concerns expressed about the proposal that the notifying administration shall be one of the group of listed administrations and that the notifying administration may not wish to associate itself with a particular satellite network.
- The view was also expressed that in the case of intergovernmental organizations with its management organization, these organizations are responsible for carrying out the obligations under the Regulations and that the notifying administration is only requested to convey the collective decisions of the intergovernmental organization to the BR and that the notifying administration has no mandate over the intergovernmental organization to enforce the Radio Regulations.
- There were concerns expressed about the conflicting responsibilities between administrations, especially as regards action in the event of harmful interference, when ownership of satellites, licensing of satellites, location of control stations, etc. may involve administrations other than the notifying administration; accordingly the interaction of their relationships, especially the roles of licensing under Article **S18**, needs to be addressed.
- There were concerns that the present provisions of the Radio Regulations only provide an opportunity for the notifying administration to respond to the BR with respect to its own networks if the notifying administration is one of the listed administrations in the group.

In the contributions to some of the main provisions of the Radio Regulations that relate to the roles and responsibilities of the notifying administration were noted as follows:

- **S4.4** - assignment of frequencies not in conformity with the RR by an administration on the condition of no interference;
- **S8.4** - recording of assignments with a reference to No. **S4.4** only when the administration makes a commitment;
- **S9.3** - no comments within a time period equals no objection by the administration, and administrations shall endeavour to cooperate to resolve any difficulties;
- **S9.4** - the administration shall explore all possible means, etc.;
- **S9.43** - an administration not responding shall be considered as not affected;
- **S9.47-49** - an administration undertakes to not make a claim about harmful interference and to not cause harmful interference;
- **S9.51** - an administration shall act within a specified period;
- **S11.36** - undertaking by the notifying administration to not cause harmful interference;
- **S11.39B** - as per No. **S11.36**;
- **Art**. **S18**.

As for the question of licensing on Article **S18**, this issue is not applicable to Chapter **SIII** of the Radio Regulations, as there is no mention of licensed stations in this Chapter. Article **S18** is a parallel set of obligations under the Radio Regulations and not related to the provisions of Chapter **SIII**.

In addition some administrations do not license or are not authorized by national legislation to license the space stations for which they are the notifying administration and in the case of space stations operated by intergovernmental organizations, they are not licensed by any administration. Also the application of Article **S18** is limited to private stations.

Except for Article **S18** the other provisions listed in paragraph 1.2 fall into one of two categories:

- Those relating to the coordination of specific earth stations and terrestrial stations or between earth stations and the notification and operation of specific earth stations and in this case, it is the administration on whose territory the earth station is situated that is responsible.
- Those relating to the API, coordination, notification and operations of the space station (with typical earth stations as appropriate) and in this case (for non-intergovernmental operating entities) it is the notifying administration of the space station that is responsible. In the case of intergovernmental operating entities, this is the aspect that is not clear and is being addressed in this section.

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PLENARY MEETING

New Zealand

PRINCIPLES FOR EVALUATING IMT-2000 CANDIDATE BANDS

WRC-2000 agenda item 1.6.1: spectrum and regulatory issues for IMT-2000

Introduction

WRC-2000 is considering the issue of additional spectrum for IMT-2000. There are various candidate bands for this purpose. In order to decide in favour of a candidate band(s), there are wide-ranging issues that need to be considered. This paper identifies principles for evaluating candidate bands. Appendix 1 gives examples of applications of these principles.

It is expected that the principles will be useful to the conference delegates in their deliberations.

Principles for evaluation of candidate IMT-2000 extension bands

1) In order to facilitate global roaming there should be common band(s) designated/allocated globally to IMT-2000. Therefore part or all of a band should be capable of being allocated to the mobile service in all three ITU Regions.

2) Individual administrations may only need part of the designated/allocated band and therefore should be able to apportion parts of a band for use by IMT-2000 global roaming, even if other services are operating in other parts of that band.

3) Bands designated or allocated to IMT-2000 should be able to comply with IMT-2000 technical and operational needs (such as parameters identified in ITU-R recommendations, for example ITU-R [IMT.RKEY]) and accommodate apportionment between competitive service providers.

4) Some or all of the existing systems currently using a candidate band should be able to migrate to other bands in the period between [2005 and 2010].

5) There should be synergies with the existing bands identified for IMT-2000 (WARC-92).

6) The needs of developing countries must be met.

WRC-2000 presents a unique opportunity for all three ITU Regions to formulate a Plan that sooner or later achieves global harmonization of some or all of the bands identified for use by IMT-2000. Forecasted bandwidth requirements for the terrestrial component of IMT-2000 are summarized in Table 1-1 of the CPM Report. Frequency bands identified in No. S5.388 are unlikely to be able to be used in a globally harmonized manner in the short term, due to the overlap in the band plans for USPCS and IMT-2000 technologies. By allocating a choice of bands, respective administrations can identify a development path that suits their needs, and approach the global harmonization objective over a number of years.

Additional bandwidth is needed by IMT-2000, from the year 2005, and before the year 2010. There is an urgent need to provide more spectrum for the terrestrial component of IMT-2000 applications, and priority should be given to terrestrial mobile spectrum needs with adjustments to the Table of Frequency Allocations as necessary. Even though decisions on identifying spectrum are sought at WRC-2000, access to the spectrum is some five to ten years away, and gives administrations time to select suitable ways to introduce IMT-2000 in each country.

While considering additional spectrum needs for IMT-2000, it is important that technical issues be taken into account in the evaluations of candidate bands. Technical aspects of IMT-2000 are documented in ITU-R recommendations, such as ITU-R [IMT.RKEY]. Bands identified for IMT-2000 usage will not be fully useable unless all technical needs and conditions are met.

With the various issues in mind, New Zealand proposes that the following principles should be used in the evaluation of candidate bands to be identified by WRC-2000 for future use by IMT-2000.

Appendix: 1

APPENDIX

Examples of applying the six principles

1 In order to facilitate global roaming there should be common band(s) designated/allocated globally to IMT-2000. Therefore part or all of a band should be capable of being allocated to the mobile service in all three ITU Regions

IMT-2000 is an application of the mobile service (MS). So, candidate spectrum for IMT-2000 is already allocated to MS or can be allocated through a modification to Article S5 of the International Radio Regulations by WRC-2000. For global harmonization to be possible, MS allocations are required in all three ITU Regions.

As was the procedure used at WARC-92 for FPLMTS, spectrum for use by IMT-2000 could be identified by way of *designation* from within one or more MS allocations.

2 Individual administrations may only need part of the designated/allocated band and therefore should be able to apportion parts of a band for use by IMT-2000 global roaming, even if other services are operating in other parts of that band

Opportunities for global roaming benefit from harmonized arrangements. Economies of scale for manufacturing mobile equipment are greatest when operating standards and frequency bands are consistent from region to region; that is, globally harmonized. Even if an administration has problems clearing a complete band due to existing services, a part may be cleared to allow for global roaming and then gradually expanded to allow for more IMT-2000 service expansion over time.

Section 1.1.1.3 of the CPM Report mentions that co-channel sharing with other radio services may be feasible only through geographic separation. This means that band segmentation is generally needed in order to introduce IMT-2000 in a shared band. Cost-effective ways of introducing IMT-2000 vary from administration to administration, and also with specific radio-frequency channel arrangements of existing services. Administrations could take a phased approach to meeting spectrum expansion for IMT-2000.

3 Bands designated or allocated to IMT-2000 should be able to comply with IMT-2000 technical and operational needs (such as parameters identified in ITU-R recommendations, for example ITU-R [IMT.RKEY]) and accommodate apportionment between competitive service providers

For an FDD option of IMT-2000, the minimum useful “building block” is 2 x 5 MHz of spectrum. For TDD, the minimum “building block” is 1 x 5 MHz. For data rates 2 Mbps and higher a minimum of three or more carriers may be needed. To accommodate multimedia and high-speed data rate services, the minimum useful building block for FDD may be 2 x 15 MHz of spectrum. As IMT-2000 radio interface consists of a choice of technologies, guardbands between different technologies in adjacent bands may also need to be accommodated.

For FDD the duplexer spacing should be at least 80 MHz to provide for practical and cost-effective mobile equipment. TDD could use the centre gap guardband of paired FDD sub-bands. Multiband multi-mode handsets are likely to be developed, with options depending on market demand. High altitude platform stations (HAPS) may be a delivery method for some IMT-2000 services.

In deregulated environments where administrations encourage multiple service providers, the available spectrum for IMT-2000 should be able to be readily subdivided into useful sized "packages" that would support adequate network capacity. This implies that any small band would be unlikely to be able to meet industry needs for IMT-2000 in a deregulated environment.

4 Some or all of the existing systems currently using a candidate band should be able to migrate to other bands in the period between [2005 and 2010]

This is a matter for individual administrations to consider. All radio equipment has some service or economic life, and a time for replacement presents options for relocation within existing bands, or relocation to other suitable bands, or changes to new technology with different spectrum needs. In bands designated for future use by IMT-2000, other systems due for replacement between the years 2005 and 2010 are in the critical time-frame when additional spectrum is sought for IMT-2000. Individual administrations can develop policies that best suit their national circumstances, possibly in several stages.

5 There should be synergies with the existing bands identified for IMT-2000 (WARC-92)

The bands identified by WARC-92 are the basic bands for IMT-2000. It is highly desirable that new bands for IMT-2000 be in harmony with the bands identified by WARC-92, in terms of:

- **frequency**, to achieve a practical tuning range for multiband handsets;
- **sub-bands**, for suitable capacity for FDD uplinks and downlinks, as well as TDD. Note that the two bands identified by WARC-92 are unequal in size;
- **duplex direction**, so the uplink and downlink directions of a new allocation are not inconsistent with WARC-92 designations or MSS allocations. Usually an FDD lower sub-band is specified for mobile transmit (uplink). A mixture of duplex directions could cause blocking and other forms of local interference to handsets.

6 The needs of developing countries must be met

IMT-2000 is expected to be of benefit to developing countries. Bands for IMT-2000 extension should consider the needs of developing countries so that the allocation/designation does not economically disadvantage developing countries and also require the displacement of existing fixed infrastructure.

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INTERNATIONAL TELECOMMUNICATION UNION

WRC-2000 WORLD RADIOCOMMUNICATION CONFERENCE

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PLENARY MEETING

New Zealand

PROPOSALS FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.6.1 - IMT-2000 ISSUES

MSS operations in the bands identified for IMT-2000 operations

Background

Considerable work has gone on internationally over the last few years to identify the possible long-term needs for the satellite component of IMT-2000. New Zealand has noted that there have been a number of MSS networks both operational, and under planning, that have come under financial difficulties. This brings into question the usefulness of further MSS allocations for IMT-2000 satellite component operations.

In its document, Principles for Evaluating IMT-2000 Candidate Bands, New Zealand made the point that administrations need flexibility when deciding how much spectrum is required nationally on the one hand to meet their IMT-2000 needs, while on the other hand satisfying the requirements of existing services in these bands.

Given this need for flexibility, it would appear to New Zealand that it would be useful for the Conference to identify bands where there are already mobile service allocations within the Table of Frequency Allocations sharing with the MSS[1], for possible use by the terrestrial or satellite component of IMT-2000.

This would mean that if MSS use does not materialize or is not necessary nationally, greater flexibility would be available to administrations to apportion the spectrum requirements between IMT-2000 uses and other services.

It should be noted that geographical separation may be required between MSS and MS IMT-2000 operations in the same frequency band.

[1] This applies to the bands 2 500-2 520 MHz and 2 670-2 690 MHz.

Proposal

NZL/96/1

In the event of the Conference identifying the band 2 520-2 670 MHz for the terrestrial component of IMT-2000 and identifying the bands 2 500-2 520 MHz and 2 670-2 690 MHz, for the satellite component of IMT-2000, then the latter two bands should additionally be identified for use by both the terrestrial and satellite components.

NZL/96/2

The dual identification of the bands should be reviewed at a future conference.

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PLENARY MEETING

New Zealand

PROPOSAL FOR THE WORK OF THE CONFERENCE

AGENDA ITEM 1.18

NOC NZL/97/1

APPENDIX S18

Table of transmitting frequencies in the VHF maritime mobile band

Reasons: The concept of moving to digital technology is being promoted. It is important to consider that the use of Appendix S18 is global, and the channelling arrangements satisfy not only normal commercial communications requirements, but distress, safety, ship movement, and other specific maritime service requirements. Until any new technology can satisfy all of these requirements, New Zealand considers it inappropriate to address the matter. Additionally, it is considered inadvisable to designate some channels for digital techniques since this may reduce the ability of a global change in the future.

New Zealand further considers that the studies outlined in Resolution 342 (WRC-97) have not yet been completed, and that it would be inadvisable for the Conference to address the matter on an ad hoc basis.

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PLENARY MEETING

United States of America

PROPOSALS FOR THE WORK OF THE CONFERENCE

PROPOSAL FOR AGENDA ITEM 1.13.1

On the basis of the results of the studies in accordance with Resolutions 130 (WRC-97), 131 (WRC-97) and 538 (WRC-97): to review and, if appropriate, revise the power limits appearing in Articles S21 and S22 in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service (BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services

Proposal to update the constraints related to the operational applications and technology in the band 13.75-14 GHz (MOD S5.502, ADD S5.502A and MOD S5.503)

Background information

At WARC-92 and as modified at WRC-95, Nos. S5.502, S5.503 and S5.503A were added to the Table of Frequency Allocations to facilitate compatibility between the existing applications of the radio services in the 13.75-14 GHz band. It was agreed that any modifications to any of these footnotes in order to accommodate new technology, new requirements and applications of the FSS should consider the overall interference environment in the 13.75-14 GHz band and be undertaken with great care in order to avoid upsetting the delicate balance previously achieved between the services. The present operational constraints, that satisfy the protection criteria of current operational applications and technology in the band 13.75-14 GHz, are to be found in Nos. S5.502 and S5.503.

Studies that led to the development of these footnotes did not account for non-geostationary-satellite orbit fixed-satellite service systems (non-GSO FSS). With the introduction of non-GSO FSS into this band at WRC-97, Resolution 130 (WRC-97) was, among other things, drafted to focus attention on the need to re-examine the sufficiency of these footnotes in maintaining the delicate balance between the services sharing the 13.75-14 GHz band.

Analysis of sharing between geostationary FSS and the radiolocation and radionavigation services is contained in Recommendation ITU-R S.1068. Some studies have shown that sharing with radiolocation systems is significantly more difficult for non-GSO FSS systems than for GSO FSS systems. Other studies have shown that more restrictive e.i.r.p. density limits are needed on non-GSO FSS systems than on GSO FSS systems for protection of space research systems. The protection criteria of the space research links used are those included in Recommendation ITU-R SA.1155. The CPM Report to WRC-2000 provides guidance on possible methods for maintaining the present balance in the sharing conditions between radiolocation, radionavigation, space sciences and FSS, and accommodates non-GSO FSS systems within the 13.75-14 GHz band. The CPM Report and also studies presented at the WP 4A meeting, 21-29 February 2000, do not provide any substantial evidence to relax the minimum 4.5 metre antenna diameter requirement. This requirement serves to limit the number of FSS earth stations thus maintaining a sharing balance. It would be premature to relax this requirement without further study. The following proposed modifications/additions to the governing footnotes are based on the work of ITU-R.

Proposals

MOD USA/98/1

S5.502 In the band 13.75-14 GHz, the e.i.r.p. of any emission from an earth station in the fixed-satellite service operating with a space station in geostationary-satellite orbit shall be at least 68 dBW, and should not exceed 85 dBW, with a minimum antenna diameter of 4.5 m. In addition the e.i.r.p., averaged over one second, radiated by a station in the radiolocation or radionavigation services towards the geostationary-satellite orbit shall not exceed 59 dBW.

Reasons: Footnotes MOD S5.502, ADD S5.502A and MOD S5.503 retain the delicate balance between the space research, fixed-satellite, radiolocation, and radionavigation services agreed to at WARC-92 and confirmed at WRC-95. Since the earlier studies did not account for non-GSO systems, their allocations requirements are redefined and addressed by new footnote S5.502A. Footnote S5.502 is clarified to apply to geostationary-satellite orbit fixed-satellite service systems.

ADD USA/98/2

S5.502A In the band 13.75-14 GHz, the e.i.r.p. of any emission from an earth station in the fixed-satellite service operating with a space station in non-geostationary-satellite orbit should not exceed 85 dBW and shall have a minimum antenna diameter of 4.5 metres. Receiving space stations in non-geostationary-satellite orbit shall not claim protection from radiolocation and radionavigation transmitting stations operating in accordance with the Radio Regulations.

Reasons: Footnotes MOD S5.502, ADD S5.502A and MOD S5.503 retain the delicate balance between the space research, fixed-satellite, radiolocation, and radionavigation services agreed to at WARC-92 and confirmed at WRC-95. Since the earlier studies did not account for non-GSO systems, their allocations requirements are redefined. Studies have shown that non-GSO receiving space stations will be susceptible to interference from radiolocation and radionavigation stations operating in accordance with the Radio Regulations.

MOD USA/98/3

S5.503 In the band 13.75-14 GHz, geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 shall operate on an equal basis with stations in the fixed-satellite service; after that date, new geostationary space stations in the space research service will operate on a secondary basis. ~~The e.i.r.p. density of emissions from any earth station in the fixed-satellite service shall not exceed 71 dBW in any 6 MHz band in the frequency range 13.772-13.778 GHz u~~Until those geostationary space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 cease to operate in this band~~.~~:

a) the e.i.r.p. density of emissions from any earth station in the fixed-satellite service operating with a space station in geostationary-satellite orbit shall not exceed 71 dBW in the 6 MHz band in the frequency range 13.772-13.778 GHz;

b) the e.i.r.p. density of emissions from any earth station in the fixed-satellite service operating with a space station in non-geostationary-satellite orbit shall not exceed 51 dBW in the 6 MHz band in the frequency range 13.772-13.778 GHz.

Automatic power control may be used to increase the e.i.r.p. density ~~above 71 dBW~~ in ~~any~~the 6 MHz band in this frequency range to compensate for rain attenuation, to the extent that the power-flux density at the fixed-satellite service space station does not exceed the value resulting from use by an earth station of an e.i.r.p. of 71 dBW or 51 dBW, as appropriate, in ~~any~~the 6 MHz band in clear sky conditions.

Reasons: Footnotes MOD S5.502, ADD S5.502A and MOD S5.503 retain the delicate balance between the space research, fixed-satellite, radiolocation, and radionavigation services agreed to at WARC-92 and confirmed at WRC-95. Since the earlier studies did not account for non-GSO systems, their allocations requirements are redefined. Studies have shown that an e.i.r.p. density limit of 51 dB(W/6 MHz) for an earth station operating with a non-GSO fixed-satellite service system will facilitate co-equal sharing with the space research service.

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PLENARY MEETING

Note by the Secretary-General

WBU-TC INFORMATION DOCUMENT

I have the honour to bring to the attention of the Conference, at the request of the World Broadcasting Unions - Technical Committee (WBU-TC), the annexed information paper.

Yoshio UTSUMI
Secretary-General

Annex: 1

ANNEX

World Broadcasting Unions - Technical Committee (WBU-TC)*

INFORMATION DOCUMENT

WBU POSITION ON
WRC-2000 AGENDA ITEMS 1.6.1 AND 1.19

The WBU position on WRC-2000 agenda items 1.6.1 and 1.19 is attached.

* The World Broadcasting Unions Technical Committee (WBU-TC) is the technical arm of the World Broadcasting Unions. This Union is composed of the world's eight Broadcasting Unions:

– Asia Pacific Broadcasting Union (ABU)
– Arab States Broadcasting Union (ASBU)
– Caribbean Broadcasting Union (CBU)
– European Broadcasting Union (EBU)
– International Association of Broadcasters (IAB)
– North American Broadcasters Association (NABA)
– Organisación de Television Ibero-Americana (OTI)
– Union des Radiodiffusions et Télévisions Nationales d'Afrique (URTNA).

WBU POSITION ON
WRC-2000 AGENDA ITEMS 1.6.1 AND 1.19

Agenda item 1.6.1 - review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary

Current situation in bands used for broadcasting services

In relation to broadcasting service and broadcasting-satellite service (sound), administrations participating in Study Groups 10 and 11 have adopted two Questions seeking studies to assess spectrum requirements for these services in the light of their transition to digital technology. The studies are to be completed by 2003. Actual requirements of radio-frequency spectrum for these services in the transitional and full-digital environments would be known only after the results of the studies become available. In the meanwhile, any assessment for possible candidate bands for IMT-2000 in the bands allocated to broadcasting services would be premature and possibly misleading. It may be noted that Resolution 728 (WRC-97), in *considering i*) indicates increased usage of the relevant bands by analogue and digital television services during the transitional period on account of parallel operation of these services.

Analysis of the results of studies

Limited sharing studies conducted to date within the ITU-R indicate that IMT-2000 systems generally can not share spectrum in the same geographical area with other radio operations in the mobile, mobile-satellite and other services. Use of spectrum on a co-channel basis with other radio operations may be feasible only through geographic separation. Nevertheless, it is recognized that the frequency bands most suitable for IMT-2000 are already heavily utilized by other operations in some geographic areas.

WBU position on candidate bands for additional spectrum for IMT-2000

The WBU views on possible candidate bands for additional terrestrial IMT-2000 spectrum are given in the following:

1 Frequency band 470-806 MHz

This band is allocated to the broadcasting service worldwide. The band is mainly used for analogue broadcasting at the present time. The introduction of digital television is planned in many countries. A transition period of perhaps 10-15 years is foreseen during which both digital and analogue transmissions will occur in parallel.

Due to the nature of analogue television planning, the vacant channels in specific areas have found widespread application of low power services such as wireless microphones and biomedical telemetry.

Studies have been initiated in the ITU-R to establish the future spectrum requirements for digital broadcasting.

Disadvantages

In most countries, the availability of TV spectrum following the phasing out of analogue TV is uncertain. Furthermore, the phasing out of analogue TV will vary between countries and is not expected to occur in many countries until after the 2005-2010 time-frame.

It is expected that spectrum demands for TV broadcasting will be greater during the transitional period and possibly beyond.

2 Frequency band 806-960 MHz

This band is allocated worldwide to the fixed, mobile and broadcasting services on a co-primary basis, with some exceptions in Region 2.

In those countries currently using part of this band for analogue broadcasting (up to 862 MHz), the transition to digital broadcasting may, in the future, allow use of this spectrum for IMT-2000. However, due to the nature of analogue television planning, the vacant channels in specific areas have found widespread application of low power services such as wireless microphones and biomedical telemetry.

Studies have been initiated in the ITU-R to establish the future spectrum requirements for digital broadcasting.

Disadvantages

Parts of this band are already used in some countries by other services and such use may continue e.g. TETRA, Railway-GSM, ancillary broadcasting services, radiolocation and Tactical Radio Relay.

In some countries, the availability of TV spectrum following the phasing out of analogue TV is uncertain. Furthermore, the phasing out of analogue TV might not occur in the 2005-2010 time-frame.

3 Frequency band 1 429-1 501 MHz

The band 1 452-1 492 MHz is allocated worldwide on a co-primary basis to the broadcasting and broadcasting-satellite services in accordance with No. S5.345, and is the only worldwide allocation identified for digital audio broadcasting.

Disadvantages

The present and planned usage for aeronautical mobile telemetry, FS and digital audio broadcasting, both terrestrial and satellite, may preclude its use for IMT-2000 in many parts of the world. Several countries in Region 3 have notified the ITU-R of their intention to launch satellite DAB systems operating in the L band allocation. Any consideration of the use of the 1 452-1 492 MHz band for IMT-2000 should take into account the following facts, among several others:

- A number of other Region 3 operators have notified an intention to use the 1 467-1 492 MHz part of the BSS(S) allocation. Current studies in JWP 10-11S aim at developing guidelines to facilitate the management of the available BSS (Sound) spectrum prior to a plan being developed.
- The L band is the only "universal" BSS (Sound) allocation. It provides opportunities through satellite applications to bring large area service deliveries, including to the under served rural and remote centres and communities which have been largely dependent upon inferior short wave services.

In general, phasing out of existing services would have serious cost/operational implications.

4 Frequency band 2 520-2 670 MHz

This band is allocated on a co-primary basis to the fixed and mobile (except aeronautical mobile), and broadcast-satellite services in all 3 Regions. FSS (s-E) is allocated in this band in Region 2 and parts of this band, 2 520-2 535 MHz (s-E) and 2 655-2 670 MHz (E-s) in Region 3.

BSS services have been operating in several Region 1 and Region 3 countries for the last two decades, covering large areas in these Regions, and MSS services are used in some Region 3 countries.

This band is used for different services and applications in different countries e.g. for fixed, ENG/OB (Electronic News Gathering/Outside Broadcasting) and multipoint distribution applications.

Disadvantages

The use by countries for BSS television covers large areas of Regions 1 and 3 and provides important broadcasting services to rural and remote communities. These communities and individual consumers have a large investment in the services. The sharing implications for IMT-2000 and BSS have not been examined. Further, the announced plans for BSS sound services in this band will need to be examined for the possible sharing implications for IMT-2000 before identification of the band for that application.

In a number of countries this band is used for multipoint distribution systems (in some countries extensively) that have been deployed in urban as well as rural areas. Licences for this service have been recently granted for extended periods of up to 20 years. Phasing out of these services and BSS and MSS will therefore be very difficult for the foreseeable future. Therefore the use of these bands may be precluded for IMT-2000 in these countries.

The use of this band for IMT-2000, if considered, would conflict with its current use for ENG and outside broadcast applications in several countries, particularly in areas of high population density.

Agenda item 1.19 - to consider the report of the Inter-conference Representative Group (IRG) submitted by the Director of the Radiocommunication Bureau and determine the basis for replanning by the next conference so as to afford each country an amount of spectrum that permits the economical development of a broadcasting-satellite service system

WBU position

1 Completion of BSS replanning at WRC-2000

1) The WBU considers that the BSS planning process has gone on far too long and it is essential to bring it to a successful conclusion at the earliest possible opportunity.

2) The WBU considers that all major BSS planning issues have either been resolved or are near resolution.

3) Currently, the IRG/GTE planning exercises seem to meet all major requirements enshrined in Resolution 532, including enhanced number of channels for the economical implementation of BSS systems, full digital planning and incorporation of country specific preferences.

4) The only major unresolved issue seems to be that of inclusion in the BSS plan of systems filed under Article 4 modification procedures (since WRC-95). However, several developments have taken place since and the need for such filings may not arise any longer. For instance, modifications seeking only changes in orbital location or beam footprints need not be considered now since the BR has already taken on board country preferences in the GTE exercise.

5) While carrying out the replanning, it should be ensured that the integrity of the Region 2 Plan and its associated provisions is preserved.

In view of the above, the WBU considers that WRC-2000 offers the opportunity to complete the BSS replanning and that this opportunity should be taken without further delay.

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