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(ITU) للاتصالات الدولي الاتحاد في والمحفوظات المكتبة قسم أجراه الضوئي بالمسح تصوير نتاج (PDF) الإلكترونية النسخة هذه والمحفوظات المكتبة قسم في المتوفرة الوثائق ضمن أصلية ورقية وثيقة من نقلاً.

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ITU/I.M. Ferré

WRC-07 decisions secure wireless future

A plenary session of WRC-07



ITU/I.M. Ferré

François Rancy, Director-General of France's Agence Nationale des Fréquences and Chairman of WRC-07

The World Radiocommunication Conference (WRC-07) that took place in Geneva on 22 October–16 November 2007 ended with the signing by 155 countries of revised and updated Radio Regulations, the international treaty governing the use of the radio-frequency spectrum and satellite orbits. Over 2800 delegates, representing 164 Member States, and 104 Observers attended the four-week conference, which was marked by intense negotiations on the future of radiocommunications.

Rapid technological developments and growth in the information and communication technologies (ICT) sector have fuelled the demand for radio-frequency spectrum. WRC-07 considered some 30 items, dealing with almost all terrestrial and space radio services and applications. These included International Mobile Telecommunications (IMT) — the concept that embraces advanced broadband mobile technology for use on a global basis, systems in the fixed and broadcasting-satellite services, aeronautical telemetry and telecommand systems, meteorological applications, maritime distress and safety signals, digital broadcasting, and the use of radio in the detection of natural disasters.

Upon his election to the helm of WRC-07, François Rancy, Director-General of France's *Agence Nationale des Fréquences*, said that it was an honour for him, for France and for

Europe to serve as chairman of the event. Mr Rancy underlined that the conference would influence the future of international wireless communications. He added that its objective was to "allow each country to use the spectrum for its own needs, as long as it does not affect the capacity of other countries to share the resource".

Addressing his first World Radiocommunication Conference as Secretary-General of ITU, Dr Hamadoun I. Touré told delegates that to meet the Millennium Development Goals by 2015 "we will have to rely on ICT". He stressed that ICT have profound implications for all economic sectors. "The convergence of broadcasting, telecommunication and information technologies creates more potent and effective tools," Dr Touré said. He then pointed to the critical need to connect remote and underserved regions of the world, and to the importance of radiocommunications in mitigating natural disasters.

To prepare for a truly wireless future, the conference was required to decide the most rational and efficient ways to exploit the radio-frequency spectrum and to manage satellite orbits. These are critical for achieving global connectivity goals in the 21st century. As Valery Timofeev, Director of the ITU Radiocommunication Bureau put it, WRC-07 was to "continue the development that has taken place through recent conferences to improve regulatory procedures and to pro-





Left to right: Dr Hamadou I. Touré, ITU Secretary-General; Fabio Leite, Deputy to the Director of ITU's Radiocommunication Bureau; François Rancy, Chairman of WRC-07; and Valery Timofeev, Director of the Radiocommunication Bureau

vide frequency and orbit resources for new technologies, which are essential for the operation of all wireless services".

New spectrum identified for IMT

One of the main issues for WRC-07 was the consideration of new allocations and identification of spectrum for International Mobile Telecommunications (IMT). This is the name of ITU's vision of global mobile access, encompassing both IMT-2000 (also known as 3G) and IMT-Advanced. New spectrum was sought to expand coverage and capacity for future IMT development.

"Mobile services are now part of everyday life in all countries and there is a need to ensure that this service can continue to grow in the future to adjust to new requirements: higher transmission rates and new mobile applications. In the near future, people will want the same type of service on mobile as already provided in their homes by ADSL, optical fibre or cable," said Mr Rancy. "The importance of this agenda item is related to the fact that there is a need to earmark spectrum at worldwide level to facilitate this development. Currently, most mobile systems are located in the 1 GHz band but, as spectrum requirements increase, there is a need to tap into the higher frequencies."

Universal Mobile Telecommunications System (UMTS) Forum Chairman Jean-Pierre Bienaimé emphasized the need for timely allocation of sufficient harmonized spectrum to support current and future demand for mobile broadband services. "It's vital that crucial spectrum decisions are made without delay at WRC-07, giving operators and manufacturers a clear target to plan their technical and commercial strategies for the

years ahead", said Mr Bienaimé. "Now is the right time to identify new spectrum for IMT. Typically, it has taken around a decade from spectrum being identified to its availability and licensing," he noted.

Two frequency bands created the most difficulty for the conference. These were the ultra-high frequency (UHF) 470–862 MHz band, used by broadcasters, and the 3 400–4 200 MHz band for the fixed-satellite service (FSS). Many countries are heavily dependent on fixed-satellite service links in this band. This is particularly the case for tropical countries with high rainfall, where higher frequency bands may not offer a viable alternative.

Expanding coverage

The conference identified the band **450–470 MHz** for IMT. This band is extensively used for private mobile networks and may not be available for IMT in Europe and the Americas until these networks have migrated to other frequency bands.

A significant result of the conference is the additional allocation of the band **790–862 MHz** to the mobile service in those parts of the world where such allocation was not yet available. This made possible the identification of spectrum within the upper part of the UHF band (470–862 MHz) spectrum for mobile broadband services, as well as spectrum in the higher frequency bands for the next generation of advanced mobile services.

As the world goes digital, the switchover from analogue to digital television broadcasting may result in less spectrum requirement for traditional television broadcasting and the release of part of the UHF spectrum



A delegate uses his phone during WRC-07

Delegates during WRC-07



in the 470 MHz to 806/862 MHz band for other applications. According to mobile operators, this band is particularly attractive because radio waves can travel further and deeper within buildings than is the case in existing mobile spectrum bands. This would help the mobile industry achieve much broader and more cost-effective mobile broadband coverage.

In the end, the conference identified an additional 72 MHz of frequencies in the range from 790–862 MHz for IMT use in countries in Region 1 (Europe and Africa), and in Region 3 (Asia and Australasia). The **698–806 MHz** band was identified for IMT use in Region 2 (the Americas) and for nine countries in Region 3 (Asia and Australasia). These include China, India, Japan, Republic of Korea, and Singapore — representing a potential IMT market of 2.8 billion people.

Actual availability of these UHF frequencies depends on national timescales for the switchover from analogue to digital television broadcasting. This is due to occur between 2010 and 2015, although some countries have indicated that they will complete the switchover sooner.

Going into the negotiations, some European administrations had made it clear they wanted to postpone decisions on the allocation of UHF frequencies for mobile until the next WRC in 2011. Mr Bienaimé commented: “The 72 MHz that has been allocated now gives an excellent platform for further harmonization of this band, plus a start to actual deployments as analogue television is progressively switched off.”

Increasing capacity

The **2 300–2 400 MHz** band was identified globally for IMT, with the support of countries of the Asia-Pacific Telecommunity, and African countries, through the African Telecommunications Union.

C-band frequencies in the **3 400–3 600 MHz** range were identified for IMT use in Regions 1 and 3, with the endorsement of around 100 supporting countries. Although less than expected, this 200 MHz tranche of frequencies was nonetheless seen by much of the mobile industry as a good start for the development of high-capacity, next-generation mobile networks for IMT-Advanced services.

The needs of broadcasting

The frequency band **470–806/862 MHz** is allocated to the broadcasting service on a primary basis in all three ITU Regions, and is used predominantly by this service. The conference said administrations must take into account the need to protect existing and future broadcasting stations, both analogue and digital, in the 470–806/862 MHz band, as well as other primary terrestrial services. In addition, administrations planning to implement IMT in these bands must coordinate with all neighbouring administrations prior to implementation.

Studies by ITU

The conference invited the ITU Radio-communication Sector (ITU-R) to study the sharing situation between mobile and the other services using the band **790–862 MHz** in Region 1 and Region 3, and to report re-





Delegates during WRC-07

sults for consideration by WRC-11. ITU-R should also develop harmonized frequency arrangements for the **450–470 MHz** band for operation of the terrestrial component of IMT, and develop appropriate Recommendations. For both bands, ITU-R will study compatibility between mobile systems with different technical characteristics, and provide guidance on any impact on spectrum arrangements. The results of these compatibility studies are to be included in a Recommendation (or Recommendations) by 2010.

ITU-R is also invited to study the implications of the 2 300–2 400 MHz band being shared by IMT and other applications and services. ITU-R should develop harmonized frequency arrangements for the band for operation of the terrestrial component of IMT, taking into account the results of the sharing studies.

ITU-R should also continue its studies on further enhancements of IMT, including the provision of Internet Protocol (IP)-based applications that may require unbalanced radio resources between mobile and base stations. It should continue providing guidance to ensure that IMT can meet the telecommunication needs of developing countries and rural areas in the context of these studies.

An important step towards closing the digital divide

ITU and industry leaders saw the allocation changes and the identification of new IMT frequency bands as a major achievement of WRC-07. "There is a convergence

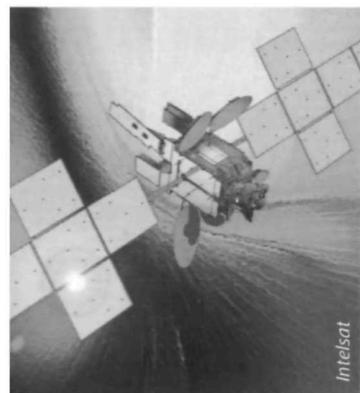
of the needs of developing countries and developed countries to reduce the digital divide, and this is the main success of this conference," said Mr Rancy. He added that "the regional groups fully collaborated to produce the spectrum identification for IMT".

The GSM Association (GSMA) also emphasized the achievement. (The GSMA is the global trade association representing 700 GSM mobile phone operators across the world.) "This decision by WRC is an important step towards enabling hundreds of millions of people in the developing world and rural parts of the developed world to gain affordable access to broadband services," said Tom Phillips, Chief Government and Regulatory Affairs Officer of GSMA. "Radio signals in the UHF spectrum will travel further than signals in the higher bands, enabling future mobile broadband networks to reach as far as 2G networks do today," he added.

The CDMA Development Group (CDG) praised the conference too. "The CDG is pleased that ITU approved the inclusion of the 450 MHz and 700 MHz bands in the frequency allocations identified for IMT services," said Perry LaForge, CDG's Executive Director. "Because of their excellent propagation characteristics, these bands are able to deliver 3G services most affordably to urban and rural communities alike. The ITU's endorsement of both of these valuable spectral resources will accelerate universal access to state-of-the-art 3G telecommunications in those regions that need it the most."



"This conference has taken an important opportunity to shape the spectrum landscape for the next decade of mobile telecommunication services, giving both operators and their suppliers a valuable road map for future investments," said Tom Phillips, Chief Government and Regulatory Affairs Officer of GSMA.



Intelsat

"The results from the conference were very positive for the satellite industry," Phil Spector, General Counsel of Intelsat, commented. "The satellite industry and our customers worked together in an unprecedented manner to raise the awareness of regulators to how critical satellites are to the global telecommunications infrastructure."



Satellite industry safeguards the C-band

The global satellite industry emerged from the four-week negotiations with the decision to protect users of the C-band spectrum (3 400–4 200 MHz and 4 500–4 800 MHz) from terrestrial interference. In effect, the Table of Frequency Allocations in the Radio Regulations remains unchanged. However, countries in Regions 1 and 3 can opt to use the band 3 400–3 600 MHz for IMT (through "opt-in" footnotes in the Table of Allocations), while countries in Region 2 did not choose this possibility. Stringent power limits and coordination requirements have also been imposed, to protect existing and future satellite services in the C-band.

Main proponents of a "no change campaign" were regional and international satellite operators, spearheaded by SES Global, Inmarsat and Intelsat, as well as regional operators such as Arabsat and RASCOM. A number of administrations from Asia, Africa, and Latin America also made clear their broad support for keeping the status quo for satellite services and called for no change to the current use of the C-band. Some emphasized the role of satellite communications in disaster and emergencies, and the growing demand for those services. It was mainly European governments and Japan that sought identification for IMT in the C-band.

WRC-07 concluded that there is a need for continued interference-free operation of C-band satellite services, which are essential for the provision of national over-the-air and cable television services, emergency and disaster recovery communications, Internet

services, and mobile and wireline telephony trunking services.

"This outcome represents a strong endorsement by a large number of administrations of the critical nature and value of C-band satellite services as they exist today," said Rob Bednarek, CEO of the Dutch operator of communications spacecraft SES NEW SKIES, a company owned by *Société Européenne des Satellites (SES)*. "The certainty and stability provided by today's outcome allows us to continue our further development of new markets and services, including mobile broadband, by an industry well acquainted with customers' real needs."

Andrew Sukawaty, Chairman and CEO of Inmarsat, stated: "We would like to thank all WRC-07 delegates for recognizing the importance of the C-band for the satellite industry. Their decision to protect the C-band will enable us to continue offering essential communications to mobile users where terrestrial networks cannot reach, including aeronautical and maritime safety services."

The conference's decision recognizes "the central role that broadcasting — and in particular pay-television services — plays within the Asian communications market," said Simon Twiston Davies, CEO of the Cable and Satellite Broadcasting Association of Asia (CASBAA). "The interference-free operation of C-band satellite services is essential for mainstream satellite television and cable television platforms, mobile communications, Internet delivery and disaster recovery communications."



Penelope Berger

Civil aviation

Radio waves are also fundamental for ensuring aircraft safety. The conference approved new spectrum allocations for the aeronautical mobile service in the bands **960–1 164 MHz** and **5 091–5 150 MHz**.

The allocation of the 960–1 164 MHz band to the aeronautic mobile (route) service (AMRS) is intended to support the introduction of applications and concepts in air traffic management which are data-intensive and could support links carrying data that is critical for safety.

The allocation of the band 5 091–5 150 MHz to the aeronautic mobile service (AMS) is intended to support several applications, such as aeronautical telemetry (AMT) — used for flight testing — aeronautical security transmissions and surface applications at airports. In addition to the global allocation in the 5 091–5 150 MHz band for AMT, the conference identified other bands for AMT on a regional basis: several countries in Region 2 (the Americas) can use mobile service spectrum in the 4 400–4 940 MHz and 5 925–6 700 MHz bands, while countries in Region 1 (Europe and Africa) opted for a regional allocation in the 5 150–5 250 MHz band.

In commenting on the results of WRC-07 regarding aviation issues, the Head of the United States' delegation, Richard Russell, noted that "these services are very important for safety of life and the future development of aviation technologies. Additional aeronautical spectrum is needed to meet the demand for aircraft testing and communica-

tions. This action will help lower the cost of airplane development and assist governments and the aviation industry in meeting their air traffic management needs."

Science services

(Earth-exploration satellite, meteorological-satellite, space research, and radio astronomy)

Several agenda items were related to further development of science services. The conference extended existing primary frequency allocations for Earth-exploration satellite services (EESS). This should facilitate research and exploration of the environment and Earth's resources. Although only a few countries operate scientific and meteorological satellites, EESS are key global assets that serve the world as a whole. As well as being used to monitor resources, they are invaluable in the prediction and monitoring of natural disasters, for meteorology and in the monitoring and prediction of climate change.

Improving the worldwide fixed-satellite service plan

Another difficult agenda item related to reviewing the regulatory procedures and associated technical criteria of the worldwide allotment plan for the fixed-satellite service (FSS). The plan was first established in 1988 and is contained in Appendix 30B of the Radio Regulations. It guarantees access to the orbit and spectrum resources associated with the frequency bands governed by these provisions in the Radio Regulations, so as to satisfy FSS requirements in all countries.



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Second-generation Meteosat satellite

ITU Secretary-General Dr Hamadoun I. Touré presents the ITU silver medal to François Rancy, Chairman of WRC-07, in acknowledgement of his work



After almost 20 years of application, these regulatory procedures needed to be improved and technical parameters modernized. At the same time, many developing countries, and those with a low population density or situated on islands, said that revising the FSS Plan offered a unique chance to provide their citizens with wideband access to such resources as digital broadcasting, the Internet, and high-rate data exchange. Frequency bands regulated by the FSS Plan are very attractive for countries in all climatic zones. The C-band portion provides very good propagation conditions for tropical and northern countries, and the Ku-band is very attractive for countries with a temperate climate.

WRC-07 again reached a compromise acceptable to all. Appendix 30B has been updated to take into account new technological developments (digital modulation, improved antenna patterns, adjusted protection criteria, and so on), as well as the requirements of many countries that have joined ITU since 1988 and are still not part of the FSS Plan. In particular, the conference revised the technical and regulatory provisions in the 4/6 and 10–11/13 GHz frequency bands, which provides all countries with 800 MHz bandwidth that can be used in various climatic conditions for such applications as radiocommunications, direct-to-home (DTH) and access to the Internet.

The conference approved the “non-sequential regulatory approach” for treatment of submissions related to modification of the FSS Plan and its List of Assignments. This will improve the flexibility of Appendix 30B and eliminate delays. The plan’s effectiveness will be enhanced and access made easier to the associated orbit and spectrum resources for FSS systems.

Calls for further work

The conference called for studies between now and 2011 aimed at improving the international regulatory framework to accommodate the increasing demand and multiplicity of existing and future applications for radiocommunications.

It also called for studies to address the feasibility of achieving worldwide and regional harmonization of spectrum for electronic news gathering (ENG). In addition, a need was seen for further study of how to protect radiocommunication services from emissions from short-range radio devices, including those using ultra-wideband (UWB) technologies, radio-frequency identification (RFID), and other similar applications that generate and use radio frequencies.

WRC-07 approved proposals concerning the use and further development of high altitude platforms, sharing criteria for satellite systems using highly inclined orbits, and compatibility and sharing between various space and terrestrial services. It also called for further harmonization of the Radio Regulations. **/**



Maritime procedures

International regulations for the maritime mobile service were successfully reviewed by the conference and brought into line with current maritime communications technology, including distress and safety transmissions within the Global Maritime Distress and Safety System (GMDSS).