

WRC-2000 delivers on great expectations

The World Radiocommunication Conference (Istanbul, 8 May to 2 June 2000) took some ground-breaking decisions that will pave the way for the expansion of existing services and the development of new technologies and applications. WRC-2000 attracted some 2037 delegates from 150 countries, including 83 companies registered as part of their national delegations and 326 observers from 95 organizations (operators, manufacturers, international organizations and telecommunications-related organizations). This attendance represents a 30 per cent increase over WRC-97 and is a clear indication of the importance of the decisions made at such events.

IMT-2000 makes a giant leap to the mobile future

For the mobile industry, the stage is now set to deliver on its promise of International Mobile Telecommunications-2000, third generation (3G) mobile systems based on ITU Recommendations. Regarded by many delegations as the largest telecommunications project the ITU has ever undertaken, IMT-2000 is intended to bring high-quality mobile multimedia services to a worldwide mass market estimated to reach some two billion users by 2010.

One of the major outcomes of this world event was the identification of three additional terrestrial



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bands in the mobile service to complement the bands 1885–2025 and 2110–2200 MHz, initially identified for IMT-2000 by the World Administrative Radio Conference in 1992. The three new bands are: 806–960, 1710–1885 and 2500–2690 MHz. A number of bands were also identified for the satellite component of IMT-2000.

When the initial spectrum was identified for IMT-2000 back in 1992, voice services were considered to be the major source of traffic, and only low data rate services were additionally considered. With the passage of time and the advent of the Internet, intranet, e-mail, e-commerce and video services, the vision for IMT-2000 has significantly evolved. Users today have great expectations for multimedia services. It is this demand for higher bandwidth, coupled with the explosion in mobile penetration worldwide, that has given rise to a requirement for



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an extra 160 MHz of common spectrum for IMT-2000 above and beyond what was foreseen in 1992.

Initial proposals tabled prior to WRC-2000 greatly differed both in national preferences and in approach. However, delegations at the Conference decided to work together to identify bands from which each country can determine the amount of spectrum to make available for IMT-2000 use. Seen by many as a giant leap forward for everyone's mobile future, the global consensus reached by ITU Members gives the flexibility to decide on the migration path towards 3G networks and services as well as the timescale for making use of these additional bands. At the same time, the agreement

does not preclude the use of the additional bands for other types of mobile applications or by other services to which these bands are allocated — a key factor that paved the way for the consensus.

As ITU Secretary-General, Yoshio Utsumi put it: "The entire mobile industry was looking forward to



clear signals from this Conference to overcome the last hurdle for global wireless systems. This landmark decision now provides a stable basis for investors to back up the industry and gives a clear go-ahead to manufacturers to start building equipment for IMT-2000 for their customers, operators, and consumers alike."

In summary, the outcome on IMT-2000 comprises:

- A new footnote to the Table of Frequency Allocations, and an associated resolution, identifying for IMT-2000 those parts of the band 806–960 MHz which are allocated to the mobile service on a primary basis.

- A second footnote, and an associated resolution, identifying the bands 1710–1885 and 2500–2690 MHz as additional frequency bands for IMT-2000.

- A third footnote and resolution identifying the mobile-satellite service bands below 3 GHz for possible use by the satellite component of IMT-2000.

- A fourth footnote and resolution contain provisions that will allow high altitude platform stations (HAPS) to be used as a platform for base stations for the terrestrial component of IMT-2000.

The Conference further requested the ITU to conduct a number of studies on the potential sharing

Delegations at the Conference decided to work together to identify bands from which each country can determine the amount of spectrum to make available for IMT-2000 use

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and coordination between the satellite and terrestrial components of IMT-2000, between IMT-2000 and other mobile-satellite services operating in the same bands, broadcasting-satellite (television and sound), terrestrial mobile services and other high-density applications in other services such as point-to-multipoint communication and distribution systems.

In the next three years, ITU will conduct studies on the future evolution of IMT-2000, including the provision of IP-based applications and the impact on spectrum resources. It is also part of ITU's task in the coming years to complete signalling and communication protocols for IMT-2000 and to develop a common worldwide intersystem numbering plan and related network capabilities to facilitate worldwide roaming.



During the hard-fought negotiations, the Conference also addressed the requirements of developing countries and rural areas and requested ITU to provide guidance to ensure that IMT-2000 can meet those needs

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During the hard-fought negotiations, the Conference also addressed the requirements of developing countries and rural areas in their efforts to join the global wireless information society. To this end, ITU has been asked to provide guidance to ensure that IMT-2000 can meet those needs.

The decision on IMT-2000 has come at a time when the licensing process, based on the initial IMT-2000 bands, is already gaining momentum in many countries throughout Europe, Asia and Latin America. Commercial operations in Europe and Asia are expected to commence between 2001 and 2002. More than 100 licences are expected to be awarded worldwide by 2002.

This decision also follows an earlier equally important milestone reached in May 2000 (also in Istanbul) when the ITU Radiocommunication

Assembly unanimously approved the formal adoption of the first release of IMT-2000 radio interface specifications. Several senior government and industry officials expressed satisfaction shortly after the decision on IMT-2000 was taken.

UMTS Forum Chairman Bernd Eylert said: "It is an incredible milestone in the development of tomorrow's mobile networks, and a fantastic result for the entire global mobile industry. It is a clear and positive signal to all players." He remarked that for the UMTS Forum, which represents regulators, operators, manufacturers, media and IT players from all regions of the world, the decision was good news for the estimated two billion mobile users worldwide by 2010.

Mr Eylert added: "This decision is particularly welcome as it provides a solid basis for the regional introduction of 3G services, even in territories that were effectively blocked from the benefits of 3G in the past because of limited spectrum. This means that mobile users will be able to access their personal information services using affordable handheld terminals wherever they travel."

Vino Vinodrai, Director of Industry Relations and Research at Bell Mobility of Canada agreed that "the decision on spectrum now gives the assurance to operators that they can start building and deploying their IMT-2000 networks without capacity constraints. It definitely marks a major step in the IMT-2000 journey towards the global wireless information society and is a decision Bell Mobility applauds."

For Tim Hewitt, IMT-2000 Coordinator for Europe at WRC-2000: "The manufacturers worldwide now know the limits of the frequencies for which the terminals must be designed, within a clearly defined spectrum environment. By having a limited number of globally identified bands, the manufacturers have the best opportunity to reduce costs through economies of scale."

"Motorola is very pleased with the terrestrial IMT-2000 outcome and commends the efforts made in the spirit of compromise to reach the global objectives of IMT-2000", said Michael Kennedy, Corporate Vice-President and Director of Global Spectrum and Telecom Policy at Motorola. "The designation of global bands offers the flexibility that countries want and need in their implementation of IMT-2000 while allowing companies like Motorola to continue to develop ways of bringing low-cost, high-quality wireless Internet to the world", Mr Kennedy also said.

For Japan which has pioneered the mobile Internet, the decision is significant. "The decision taken by the Conference to provide additional spectrum for IMT-2000 is a major milestone", said Katsuya Watanabe, Director of Multimedia Mobile Communications at Japan's Ministry of Posts and Telecommunications. "The global mobile industry can now have the confidence to move ahead in developing 3G systems that will capture this new and exciting multimedia market. With the number of mobile Internet users growing roughly at a rate of 20 000 each day, this is very promising indeed for the rapid uptake of IMT-2000 in Japan", added Mr Watanabe.

"The flexibility built in the decision adopted by the Conference has been the key in rallying countries behind it", said Mofang Li, Chief Technical Officer at *China Mobile Communications Corporation*. "In China, we now have a customer base of over 50 million subscribers with a monthly growth of 2 to 3 million mobile subscribers. The choice of deployment strategies and flexibility in the use of spectrum were critical to China in meeting its particular market demands. With today's decision on harmonized additional spectrum worldwide, coupled with the decision earlier this month on a global standard for interoperable radio interfaces, consumers everywhere will soon reap the fruits of impressive economies of scale and enjoy the convenience of global roaming at affordable price", Mrs Li added.

Regions 1 and 3 get new BSS Plan

The Conference commended the Radiocommunication Bureau (BR) for developing a new broadcasting-satellite service Plan for Regions 1 (Africa and Europe) and 3 (Asia and Australasia) within less than three weeks. "The new BSS Plan is the jewel in the crown of achievements in this Conference. We have worked long and hard and are delighted with the outcome", said Ralph Zeitoun who chaired Working Group 1 of the Plenary that dealt with BSS replanning issues.

In particular, the new Plan accords generally one orbital position per country in Europe and Africa from which an equivalent of 10 analogue channels can be delivered. For Asia and Australasia, 12 analogue channels are available per country's orbital position. The decisions of WRC-2000 secure an economic capacity for each country to take up whenever market conditions are ripe without the fear of a shortage of spectrum in bands which are

highly in demand by rapidly growing space-based systems and a host of other services.

Negotiations early in the day helped this agenda item on BSS replanning to make relatively smooth progress, except in the closing hours of the Conference when the delicate compromise reached



earlier to address the concerns of all looked like it could be blown apart with a puff of wind. But in the end, the spirit of compromise and international cooperation prevailed.

When the World Administrative Radio Conference developed the original BSS Plan for Regions 1 and 3 back in 1977, it allocated 5 channels of 27 MHz bandwidth to each country in those two Regions with a national service area. While some have regarded the original Plan as "a marvel of engineering ingenuity", critics have found it lacking in commercial viability, claiming that allocating five channels to a single satellite which beams to a single country was not a sound basis for business.

Be that as it may, until now, the use of these bands has been mostly through the application of the Plan modification procedure embodied in the Radio Regulations, which allowed a country to request more channels, a different service area or another orbital location. WRC-97, apart from allocating five channels to the 23 new countries created since 1977, updated parameters for the Plan in order to reflect the technological changes. While these new parameters facilitated entry of additional capacity in the Plan (through the

The successful outcome of the negotiations on the BSS Plan is the result of a remarkable spirit of compromise and international cooperation
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modification procedure) they have led to a significant increase in the demand for additional channels.

By way of an example, more than 400 BSS systems had been filed with the BR by year-end 1997. These filings have to undergo a complex evaluation process and can become a part of the BSS Plan, if found acceptable. As experience showed at WRC-2000, very few of the systems filed under the modification procedures qualify to enter the BSS Plan.

The Conference noted that many countries that had applied the modification procedure experienced great difficulty in completing it and in entering additional channels in the Plan. These countries were therefore concerned that all their

In the end, WRC-2000 found a solution to all these concerns. Most of the additional systems (over 30) which had been entered in the Plan in the months and weeks preceding the Conference were taken into account, as were the multinational beams. At the same time, it was possible to provide 10 channels to Region 1 countries and 12 channels to Region 3 countries over a national service area. Thanks to the extraordinary work of BR, this was possible while ensuring full compatibility between all these networks.

WRC-2000 also managed to modify the technical criteria and the procedures so as to facilitate the compatibility with the other services using these bands and the future additional uses in the BSS in the three Regions, giving satisfaction to all parties involved. Additional studies will be conducted by ITU before WRC-2003 in order to refine these elements further.

GSO and non-GSO find a happy medium

Sharing between geostationary satellite (GSO) and non-geostationary satellite (non-GSO) systems in some specific frequency bands around 10–18 GHz was another tough battle that ended well. Intense private sector interest in the potential of satellite systems to deliver mobile voice and broadband data services has resulted in a large number of proposed new systems and services from non-GSOs. A number of these new non-GSO systems, soon to be deployed, and the new wave of GSO networks aim at providing high speed local access to global broadband communications services such as high speed Internet, corporate intranets/extranets, e-commerce, videoconferencing and interactive services.

In 1997, frequency spectrum was made available for the first time to enable the operation of the new non-GSO systems. At the time, it was decided to establish provisional power limits for the operation of these non-GSO systems so that they could share the frequencies with GSO networks. In the period between WRC-97 and WRC-2000, studies were conducted to determine whether those limits were suitable for sharing.

Despite the results of the studies, which seem favourable to the concept of shared use of the bands in question by non-GSO fixed-satellite service systems and GSO networks of the fixed-satellite service and the broadcasting-satellite service, an unexpected debate re-opened at the



Informal discussion among delegates

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projects for an early implementation of economically viable BSS systems would be jeopardized by a replanning process that would only take into account systems having completed the procedure by the start of WRC-2000 while ignoring other systems. Furthermore, after replanning, the doubling of the capacity reserved by the Plan for national uses was expected to make future modifications even more difficult, since they would have to avoid and protect twice as many channels.

For many, the issue of whether or not to replan then boiled down to a question of either allowing viable systems now or enabling equitable access in the future. To make things more difficult, a number of countries requested the use of multinational beams. This resulted in drawing further spectrum/orbit resources into the new Plan.

Conference regarding the possibility to seek protection when there were power limits applicable to sharing between those systems. In the end, the conditions under which non-geostationary satellites will operate were agreed to the satisfaction of all parties. The agreement balances the need to protect GSO networks, ensuring that GSO operators can continue to deliver the highest quality communications services from long-distance and international telephony to television and broadband Internet



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applications, while allowing new non-GSO systems to operate without undue constraints.

Mark MacGann, Vice-President of Strategic Affairs at non-GSO operator SkyBridge LLC, said: "These are very positive results as far as SkyBridge is concerned. WRC-97 allowed new broadband systems to go forward while ensuring that there would be no interference to existing GSO systems and the terrestrial fixed service. We have since worked through ITU-R Study Groups and demonstrated to countries and GSO operators that they have nothing to fear from non-GSO systems like SkyBridge. In our view, WRC-2000 has taken an historic decision to confirm its preliminary decision of 1997."

Kalpak Gude, Vice-President of Government and Regulatory Affairs and Associate General Counsel of US-based GSO operator PanAmSat Corporation said that his company was very pleased with the results of WRC-2000. "We started working on this issue more than two years ago. A lot of technical analysis has been done in the intervening time. We are confident that the pfd limits agreed by the Conference will protect the GSO networks.

We think that WRC-2000 has put in place the right procedures and guidelines to assure that GSO operations will not be negatively affected and that our customers can continue to rely on and receive the same high quality service they have grown accustomed to over many years", he added.

The decisions of the Conference include some limits on earth stations of GSO networks and power limits on non-GSO systems to enable their co-existence without unacceptable interference. These power limits provide a quantitative measure of what is unacceptable and define the rules of sharing in the Ku-band (10–18 GHz). As a result, both GSO and non-GSO operators have the confidence to move ahead with the deployment of their systems to provide advanced services to their customers.

Room for all three: GPS, GLONASS and Galileo

Additional allocations were granted to the radionavigation-satellite service (RNSS) to allow Russia's Global Navigation Satellite System (GLONASS) and the United States' Global Positioning System (GPS) to develop into second-generation systems while providing room for Europe's new system, *Galileo*. The additional spectrum will ensure protection of the GPS and GLONASS signals and at the same time add competitiveness to a highly lucrative market in full expansion.

There are over eight million RNSS receivers in use today in a wide range of consumer and business applications: navigation aids in cars, handheld position location devices like street finders, positioning in sports activity (sailing, mountain trekking, expeditions), location of lost persons in rescue operations or safety-of-life such as air traffic control, fleet tracking, ships and aircraft positioning. Moreover, many telecommunication operators use the GPS, that provides accurate location and timing data to users worldwide, to improve the quality of their wireline and wireless networks.

European countries had sought to obtain 184 MHz of new spectrum for the RNSS so as to accommodate Galileo. A total of 171 MHz of new spectrum was finally allocated in the bands: 1164–1215, 1260–1300, 1300–1350, 5000–5010 and 5010–5030 MHz.

Of this spectrum, 24 MHz are said to be used for new generations of existing global positioning systems and 147 MHz for Galileo. In the band 1164–1215 MHz, the RNSS will be subject to power

limits so as to protect terrestrial services. In addition, in the band 1559–1610 MHz, fixed service applications like microwave links will be phased out over a fifteen-year period to protect Galileo from any interference which could hinder its operation and accuracy.

The US Ambassador Gail Schoettler said: "We are extremely happy with the outcome of the discussions on the global positioning systems and Galileo. We hope the people who worked hard for Galileo feel the same. We were able to get everything we wanted in terms of GPS. Not only did we protect the existing system but we were able to get the spectrum to enhance the global positioning system and Galileo was able to achieve the same so that they can move forward in designing their system."

A jubilant Little LEO industry

WRC-2000 was the most successful conference for the Little LEO industry since WARC-92. "The support of developing and CIS countries who are seeking telecommunications 'equity' through affordable wireless data services largely contributed to the successful outcome at WRC-2000", said Mary Kay Williams, Vice-President, Corporate Relations at Final Analysis. "Through intense preparations in spectrum-related studies and advocacy work with various regulators worldwide, we have achieved the objectives we had set for ourselves at WRC-2000. The top priority of the Little LEO industry at WRC-2000 was the revision of Resolution 127 which provides for consideration of worldwide allocations for feeder links around 1.4 GHz at WRC-2003 in portions of the band 1390–1393 MHz for uplinks, and 1429–1432 MHz for downlinks. The advantage of placing feeder links above 1 GHz is that it would allow scarce spectrum below 1 GHz to be used for service links", she said.

The second priority item for the Little LEO industry, which also met with success at WRC-2000, was Resolution 214 which provides for consideration of worldwide allocations by WRC-2003 for additional spectrum below 1 GHz, concentrating on the 450–460 MHz band.

The Little LEO industry was also successful in getting a third proposal for allocations in the broadcasting band 470-862 MHz placed on the preliminary WRC-2006 agenda.

Thus, the Little LEO industry is now well positioned on the WRC-2003 agenda and beyond to

obtain new global allocations to meet the urgent need for additional spectrum.

Cost recovery for processing satellite filings

This was another hotly debated issue. Following a policy decision of the Plenipotentiary Conference (Minneapolis, 1998) to introduce processing charges for network filings, the ITU Council, had, at its 1999 session, agreed on the methodology and fee schedules. These charges are applicable to filings (new network and modification to existing networks) for which advance publication information was received after 7 November 1998.

The BR is currently experiencing a marked growth in its workload and in the expectations of its membership as to the services it should be providing. This growth has been triggered by rapid technological change, in particular by the development of new digital and mobile communications technology and by a considerable growth in proposed fixed and mobile communication satellite services using geostationary and non-geostationary orbits. It is also attributable, in part, to the growing practice of overfiling for satellite networks.

A study by ITU in 1997 revealed that costs generated by the top 10 countries plus five international operating satellite organizations accounted for some 80 per cent of the total workload of the section of the Radiocommunication Bureau dealing with satellite notifications. Under the present arrangements, all countries fund this service, yet many nations, mostly from developing regions, have no demand for this service. A move to cost recovery was therefore thought to constitute a more equitable approach.

The application of cost recovery to space notifications was expected to bring benefits to the ITU membership in terms of equity and efficiency gains. Equity gains relate to the way in which the costs for the different services offered by the Radiocommunication Bureau are shared. Efficiency gains relate, for example, to the discipline to restrict somewhat the practice of overfiling of space notifications because of the costs involved.

Discussions at WRC-2000 focused on possible regulatory consequences of non-payment of such charges. Despite strong views expressed, the Conference adopted a regulatory provision on the possible cancellation of a filing in case of non-payment. However, this provision can only enter into force at a date to be determined by the

forthcoming Plenipotentiary Conference in 2002. The decision was taken as a compromise to accommodate some delegations which felt that the rights and obligations of Member States are defined in the Constitution and that any modification of these rights, based on financial considerations, could only be decided by the Union's supreme body: the Plenipotentiary Conference.

Administrative due diligence, not yet truly tested

After long-drawn out debates, the Conference concluded that further experience was needed in the application of the administrative due diligence procedure before any sound judgement could be made on its impact and effectiveness in reducing, or eliminating, paper satellites. Alternative proposals by some countries to introduce financial due diligence to deter what they called "frivolous filings" failed to garner support.

The administrative due diligence procedure was introduced in November 1997, following a decision of WRC-97. This procedure aims at minimizing the number of paper satellites by requiring information which becomes available when systems have reached an advanced stage of development and are soon to be deployed.

Administrative due diligence requires disclosure of implementation data for satellite systems such as the identity of the satellite network, the name of the operator, name of the satellite, the name of the space manufacturer for each satellite, the date of execution of the contract, contractual "delivery window", number of satellites procured, name of the launch vehicle provider, date of execution of the contract, a launch or in-orbit delivery window and the name of the launch vehicle.

Experience so far shows that whenever they are asked to provide due diligence information, countries have generally requested the Radiocommunication Bureau to extend the regulatory period for bringing their satellites into use up to the maximum limit authorized by the Radio Regulations. As a result, the effect of administrative due diligence is not likely to be fully apparent until at least the end of 2003.

Measures for improving satellite filing procedures

There now exists a large backlog of satellite filings, 95 per cent of which concern geostationary-satellite networks.

In view of the processing delay which can go up to three years and, in the light of the five-year limit to place a network into operation, countries can be faced with a reduced time window in which to accomplish coordination.

The Conference concluded that extraordinary measures were needed to help eliminate the backlog in processing satellite network coordination requests. This was considered justified on account that the continued viability and credibility of the ITU satellite coordination process was at stake as the current situation seriously compromises the ability of several networks to provide services.

The Conference adopted a resolution that includes measures to help speed up the process such as the electronic submission of data for the advance publication, coordination and notification of all satellite networks, radio astronomy notices and due diligence information in electronic format compatible with the ITU software "SpaceCap". Countries will also be encouraged to submit all graphical data associated with the submissions electronically – although paper submissions will continue to be accepted. Developing countries making no more than three filings a year will be able to continue to submit filings on paper until 3 June 2001.

As from 3 September 2000, forms that are not submitted electronically will be considered as incomplete and returned without being processed. The same will apply to data initially submitted on paper that will not have been resubmitted electronically by 3 October 2000. While the BR will not compare the paper and electronic filings, both filings will be made available to countries who will have until 1 March 2001 to report any inconsistencies.

The resolution further instructs ITU to make available coordination and notification filings, "as received" on its International Frequency Information Circular (IFIC) CD-ROM, as well as on its website within 30 days of receipt.

A more detailed report on the outcome and key decisions made is available at <http://www.itu.int/newsroom/wrc2000/releases/outcome.html>. For those who do not have Web access, a copy can be requested from ITU Press Office. Tel.: +41 22 730 6039. Fax: +41 22 730 5939. E-mail: pressinfo@itu.int.