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ITU NEWS

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Allocating spectrum for a changing world

Special Edition

World Radiocommunication Conference 2015

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Allocating spectrum for a changing world

Houlin Zhao, ITU Secretary-General

This is a particularly important time for ITU as we make final preparations for the World Radiocommunication Conference 2015 (WRC-15) to be held in Geneva over four weeks, from 2 to 27 November.

During the World Radiocommunication Conference delegates will work day and night to negotiate and discuss the global management of the radio-frequency spectrum and satellite orbits, which is essential to extend the reach of information and communication technologies (ICT) to all corners of the world.

We look forward to welcoming more than 3000 delegates representing ITU's 193 Member States. Many of them will also have participated the week prior to WRC-15 in the Radiocommunication Assembly, which provides the technical basis for the work of WRC-15, sets future work programmes in the field of radiocommunications, and approves worldwide radiocommunication standards (ITU–R Recommendations).

The key to the successful outcome of WRC-15 lies in building consensus on how to balance the demands of services such as broadcasting, satellite, mobile broadband, aeronautical, maritime, amateur, Earth observation and radiolocation services.

The conference will also focus on pressing issues of global interest, such as climate change monitoring, public protection and disaster relief communications, space research, road safety, allocations for IMT-2020 5G mobile broadband, the possible suppression of the "leap second" to achieve a continuous reference time scale (UTC), and maritime communications and navigation systems. This year, the agenda also includes the issue of global flight-tracking for civil aviation, following international concern due to the disappearance of Malaysia Airlines flight MH 370 in 2014.

Within ITU, the responsibility for ensuring the efficient use of the radio-frequency spectrum and interference-free operation of radio systems rests with the Radiocommunication Sector (ITU–R), which also has the task of implementing the ITU Radio Regulations.

The radiocommunication landscape is changing at a faster pace than ever before and WRC-15 will take into consideration current global changes during the decision-making process.

By applying the procedures of the ITU Radio Regulations for satellite networks, Member States acquire rights for international recognition for their space-based spectrum assets, and international protection from harmful interference. The recording of frequency assignments in the Master International Frequency Register ensures that orbital positions are used in a rational, equitable, efficient and economic way. Similar procedures also exist for terrestrial services in the ITU Radio Regulations.

This Special Edition of *ITU News* is devoted to WRC-15, which is set to meet the challenges of allocating spectrum for the rapidly changing world of information and communication technologies.

Other events

ITU has recently held several other important events, highlighting the importance of ICT.

The ITU/UNESCO Broadband Commission for Digital Development launched its annual State of Broadband Report on 21 September, just ahead of the forthcoming meeting of the Broadband Commission for Sustainable Development, held in New York on 26 September. In addition, the Report of the Broadband Commission Working Group on Gender was also released. At a gala event at the United Nations, ITU launched the *ICTs in Sustainable Development Awards* presented to Heads of State and Government to inspire their political commitment to seek technological solutions to meet global aspirations for a sustainable future. These events will be reported on in the forthcoming edition of *ITU News*.

ITU Telecom World took place from 12 to 15 October in Budapest, Hungary. It offered a unique platform for influential figures from government and industry to connect with start-up companies and digital entrepreneurs in the ICT sector to explore partnership solutions, investment opportunities, shared ideas and best practices. ITU's *Emerge* initiative was launched at the event to enable and accelerate sustainable development through innovative ICT, as well as showcase and leverage relevant national and regional strategies and initiatives to promote ICT-related small business ecosystems. ITU Telecom World 2015 will also be covered in the next edition of *ITU News*.

The first meeting of our new standardization expert group, ITU–T Study Group 20, took place 19–23 October. The group will take an innovative approach to Internet of Things (IoT) standardization, particularly with respect to IoT applications in Smart Cities, by placing ITU's technical expertise at the service of national and local governments, city planners and a wide range of vertically oriented industries.

The year will close with the 13th World Telecommunication/ICT Indicators Symposium (WTIS-15) organized by the ITU Telecommunication Development Bureau (BDT) in Hiroshima, Japan, from 30 November to 2 December 2015, hosted by the Government of Japan. WTIS-15 will feature several high-level debates addressing key questions related to ICT policy and measurement, including the role of ICT as a driver of innovation and entrepreneurship, in both developed and developing countries.

In the meantime, we look forward to the forthcoming World Radiocommunication Conference 2015. I hope that the articles, from key experts in the field, will offer you a well-informed read about some of the main issues at stake.

Allocating spectrum for a changing world

World Radiocommunication Conference 2015

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Editorial Assistant: Angela Smith
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Tel.: +41 22 730 5234/6303
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E-mail: itunews@itu.int

Mailing address:
International Telecommunication Union
Place des Nations
CH–1211 Geneva 20 (Switzerland)

Subscriptions:
Tel.: +41 22 730 6303
Fax: +41 22 730 5935
E-mail: itunews@itu.int

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Today's successes leading tomorrow's technology

François Rancy

Director, ITU Radiocommunication Bureau

The World Radiocommunication Conference 2015 (WRC-15), mandated to review and revise the Radio Regulations, the international treaty governing the use of radio-frequency spectrum and satellite orbit resources, will be held in Geneva, 2–27 November 2015, in an era of rapid changes in radiocommunications and the wider sphere of information and communication technologies (ICT).

WRC-15 will review the international regulatory framework for radiocommunications — the Radio Regulations — and revise them as needed taking into account the rapid evolution of ICT, ensuring that reliable radio services are available everywhere, enabling people to live and travel safely and enjoy high performance radiocommunications.

The agenda of a world radiocommunication conference includes a number of topics of worldwide character. In 2012, more than 3000 delegates representing 165 countries participated in the deliberations, along with representatives from 100 Observers from among ITU's 700 private Sector Members and international organizations. This year we expect as many, if not more, delegates to attend WRC-15.

With the relentless expansion and importance of wireless services worldwide, all services relying on radio waves are competing for a share of the radio-frequency spectrum to support new applications, growing user numbers and exploding traffic. The importance and relevance of the ITU Radiocommunication Sector (ITU–R) is therefore increasing constantly.

The Radio Regulations are a key component of international frequency management and constitute the binding international treaty that determines how the radio-frequency spectrum is shared between different services and how satellite orbits are to be used. Covering fixed and mobile radio services, satellite systems, radio and TV broadcasting, aeronautical, maritime, radionavigation, meteorological monitoring, space research and Earth exploration, as well as amateur radio, the Radio Regulations encompass over 2000 pages of texts and charts that prescribe how equipment and systems must operate to ensure peaceful cohabitation in today's increasingly crowded airwaves.

World radiocommunication conferences are held every three to four years. Throughout the month of November, representatives of governments and regulators will come together, along with other stakeholders, to negotiate the relevant parts of the Radio Regulations and commit to the modifications to the international treaty. This process involves extensive studies and preparatory discussions among all stakeholders (equipment makers, network operators, industry forums and users of spectrum) at national, regional and global levels. Many of these stakeholders also serve as members of national delegations at the conference itself. This multi-stakeholder approach enables the necessary consensus to be built to ensure that WRCs maintain a stable, predictable and universally applied regulatory environment that secures long-term investments for a multi-trillion dollar industry.

Preparatory work

Preparatory measures have been painstakingly undertaken for the WRC-15 decision-making process to take place. Administrations and regional groups, supported by international organizations, the private sector and the Radiocommunication Bureau, have built the foundations for WRC-15 to successfully address the needs and concerns of spectrum users worldwide.

The first session of the Conference Preparatory Meeting (CPM15-1) for WRC-15, held immediately after WRC-12, identified and assigned the studies to be carried out by the ITU–R study groups in preparation for WRC-15. It agreed on a structure for the draft CPM Report to WRC-15, and appointed rapporteurs for the six chapters of the Report to assist the chairman and vice-chairmen in managing the development of the draft CPM Report.

A variety of spectrum-related matters dealing with the future development of radiocommunications, enabling convergence and coordination of all radio services, were addressed at the Second Session of the Conference Preparatory Meeting (CPM15-2). It concluded on 2 April this year with the adoption of the CPM Report to WRC-15, focusing on technical, operational and regulatory materials to be considered by ITU Member States in developing their proposals to the conference.

CPM15-2 reached consensus on the possible ways to address many of the topics on the WRC-15 Agenda.


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The implementation of wireless avionics intra-communications, the use of digital technologies for more efficient usage of existing frequencies for on-board communications and critical functions of ships in restricted waters, and the sustainable availability of the 5 GHz band for feeder-links to non-geostationary orbital (GSO) systems in the mobile-satellite service will be brought to the table.

CPM15-2 also addressed many other complex and controversial issues related to terrestrial and space radiocommunication services — from narrowband systems for maritime and aeronautical mobile communications and navigation to broadband wireless access systems — as well as the future use of a wide range of frequency bands allocated by the Radio Regulations. CPM15-2 agreed on the description of the various possible options to be considered by WRC-15.

To assist national and regional preparations, the World Radiocommunication Seminars held in December 2012 and 2014 focused on the regulatory aspects of the use of the radio-frequency spectrum and satellite orbits, in particular the application of the provisions of the ITU Radio Regulations. Regional Radiocommunication Seminars were also held in each of the ITU regions, which helped focus attention on issues of regional concern and were a major step in the preparations for WRC-15. While the seminars covered procedures associated with the recording of frequency assignments for satellites in the Master International Frequency Register (MIFR) as well as best practices regarding the use of spectrum for both terrestrial and space services, workshops held in conjunction helped participants to get hands-on experience with ITU notification procedures as well as with the software and electronic publications made available by the ITU Radiocommunication Bureau to Member States and to ITU–R Sector Members.

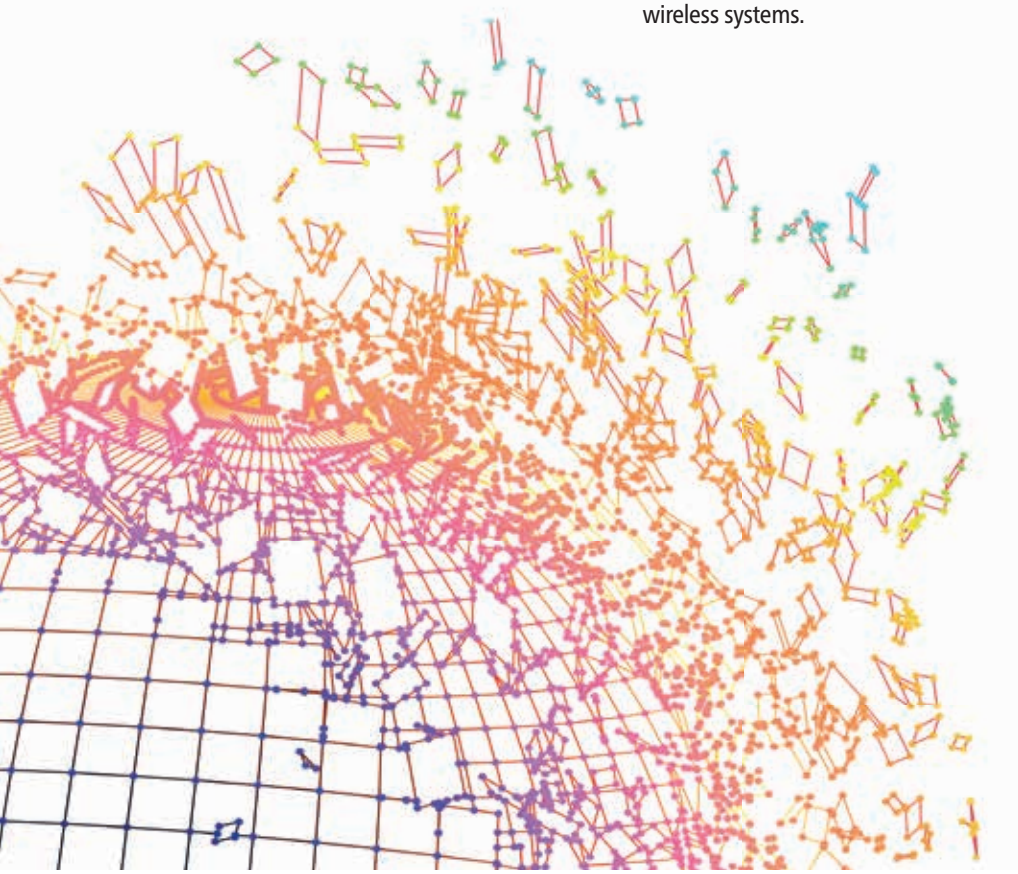
Three inter-regional workshops on WRC-15 preparation were also held on a yearly basis to provide participants with explanations of the ITU–R preparatory studies and give them the opportunity to exchange views and have a better understanding of the common positions and/or proposals of the concerned entities.

WRC-15 is now set to review and update the global technical, operational and regulatory provisions that govern the use of the radio frequency spectrum for terrestrial and satellite applications. In conducting its activities, the conference will attempt to cast a proper balance between the need for worldwide harmonization (to benefit from economies of scale, connectivity and interoperability), and the need for flexibility in spectrum allocations, while accommodating new and innovative systems, applications and technologies as they arise with the need to protect existing radiocommunication services.

WRC-15 agenda

The scope and complexity of the agenda items to be discussed at WRC-15 encompass a wide gamut of issues. In summarizing the main topics to be dealt with by the conference, the specific concerns and interests of some groups or entities will inevitably be subject to compromise. But having said that, WRC-15 will address a number of key issues, in particular:

- **Mobile broadband communications:** Provision of additional frequencies to meet the rapidly growing demand for mobile broadband communications (International Mobile Telecommunications, or IMT).
- **Emergency communications and disaster relief:** Allocation of frequencies and guidelines for advanced public protection and disaster relief communication systems.
- **Monitoring the environment and climate change:** New allocations for Earth-exploration satellite services with higher resolution radar imagery for improved global environmental monitoring.
- **Unmanned aircraft and wireless avionics systems:** Spectrum for the aeronautical sector, related to the use of unmanned aircraft systems, and wireless avionics intra-communications to allow for the heavy and expensive wiring used in aircraft to be replaced by wireless systems.
- **Global flight tracking for civil aviation:** The ITU Plenipotentiary Conference 2014 instructed WRC-15 to consider allocating spectrum for global flight tracking for improved safety and environmental benefits.
- **Enhanced maritime communication systems:** Maritime communications, facilitating the use of on-board digital transmissions and automatic identification system on vessels, aimed at improving navigation safety at sea.
- **Road safety:** Allocation of frequencies for short range, high-resolution radars for collision avoidance systems in vehicles for increased road safety.
- **Operation of satellite systems:** Allocation of spectrum for broadband satellite systems; and improving coordination procedures to make more efficient use of spectrum and satellite orbits, including for earth stations.
- **Space research:** Use of spectrum for operations when space vehicles are communicating with orbiting manned space vehicles.
- **Universal time:** Examining the feasibility of achieving a continuous reference time-scale, by the modification of Coordinated Universal Time (UTC) or another method.



From Conference Preparatory Meeting to WRC-15

Aboubakar Zourmba

Chairman, Conference Preparatory Meeting for WRC-15

This article outlines the main activities of the Conference Preparatory Meeting (CPM) for the 2015 World Radiocommunication Conference (WRC-15). It begins with some background, and then discusses the CPM and the CPM Report.

Managing the radio-frequency spectrum

There are two ways to provide telecommunications: by wire (aluminium, copper, waveguide, fibre optic…), and wireless, i.e. using radiocommunications. The basic information (voice, image, data…) is transformed into a telecommunication signal which, in its simplest terms, comprises three basic technical parameters: amplitude, frequency and phase. Of these three parameters, frequency requires particular care when it comes to radiocommunications. Indeed, propagating through free space with no physical means of guidance, the frequency (or wave) is subject to harmful interference, and this is a form of pollution. Moreover, frequencies are ignorant of the geographical borders separating our different countries, making radio-frequency propagation a matter of great international importance.

Taking care of the radio-frequency spectrum (i.e. the entire set of frequencies) means introducing frequency management, which comprises all the technical and administrative procedures that go towards ensuring the use of radio frequencies is free from harmful interference. Such management involves a number of operations, including allocation, assignment, notification, coordination, monitoring and registration.

Allocation of frequency bands

The Radio Regulations (RR), the international treaty governing the use of the radio-frequency spectrum and geostationary-satellite and non-geostationary-satellite orbits, define "allocation" as the entry in the Table of Frequency Allocations of a given frequency band for the purpose of its use by radiocommunication services worldwide. In fact, it constitutes the "wholesale" distribution of frequencies, whereas assignment represents their "retail" distribution. It is the dividing up of portions (bands) of available and usable frequencies among different, pre-defined uses (radiocommunication services).

Allocation of radio-frequency spectrum is essentially the remit of the WRC, which allocates frequency bands to the different radiocommunication services, establishes the conditions of access to the bands, sets the technical parameters governing operations, and puts in place the necessary management procedures. The outcomes of the WRC are set down in the Radio Regulations and submitted to the ITU Member States for signature and ratification.

The WRC is an important conference that addresses all aspects of radiocommunications globally, and it demands detailed preparation to help ensure that it runs smoothly, and that its length and associated costs can be reduced.

The CPM for WRC-15

The CPM was introduced in order to make WRC preparation both systemic and systematic. The CPM is established and organized by the Radiocommunication Assembly (RA), the dates and venue of which are often linked to those of the WRC. Thus, RA-12, held the week before the 2012 World Radiocommunication Conference, set up the CPM for WRC-15, and WRC-12 activated it.

The outcome of the work carried out by the CPM takes the form of the CPM Report, which provides the synthesis of the results of the studies requested under the items on the agenda of the WRC. The agenda of WRC-15 contains over thirty items on extremely varied and complex issues. It was put forward by WRC-12, agreed upon by the ITU Council at its 2012 session, and completed by the 2014 ITU Plenipotentiary Conference (PP-14) held in Busan, Republic of Korea. The work of the CPM is based on this agenda and on the structure of the study groups (SGs) of the ITU Radiocommunication Sector (ITU–R).

The CPM cycle comprises three major periods: the holding of the first meeting, at which the work is organized, the holding of the second meeting, at which the Report is finalized, and the period between the two, devoted to the studies required and preparation of the Report.

The activities carried out at the first session of the CPM for WRC-15 (CPM15-1), held in February 2012, immediately after WRC-12, included consideration of the agenda for WRC-15, identification of groups to address the required studies (including the creation of the Joint Task Group (JTG) on IMT — the ITU global standard for International Mobile Telecommunications), distribution of the required studies among the different study groups, and the establishment of working methods.

In the period between CPM15-1 and the second session of the CPM for WRC-15 (CPM15-2), technical studies were carried out, the draft CPM texts were developed by the groups responsible for the studies. All those texts were consolidated in September 2014 by the CPM management team in the draft CPM Report itself. It was made available in the six official languages of the ITU in December 2014. In the period between CPM15-1 and CPM15-2, two inter-regional workshops were held and preparations continued at the national and regional levels and at the level of certain international organizations.

Taking into account the draft CPM Report, in particular, the report by the Special Committee on regulatory/procedural matters, the preliminary draft Report of the Director of the ITU Radiocommunication Bureau (BR) to WRC-15, and contributions from the membership, CPM15-2 finalized the CPM Report in March/April 2015, following which it was published in the six official languages of the ITU (English, Arabic, Chinese, Spanish, French and Russian).

The CPM Report to WRC-15

The Report, comprising almost a thousand pages, provides elements relating to the technical, operational and regulatory/procedural items to be considered by WRC-15. It is divided into six chapters, in addition to the preface by the Director of BR, introduction, annexes and list of abbreviations.

For each WRC-15 agenda item, the Report summarizes and analyses the results of the studies, provides suggestions for the positions that the Member States could take in the form of methods, and proposes the regulatory way in which to amend the Radio Regulations.

In his preface, the Director of BR notes that the Report should provide a good basis for discussions at WRC-15. I fully agree with him as the Report provides the membership with a tool that is virtually indispensable in its preparation for WRC-15.

Conclusion

The activities carried out by the CPM for WRC-15 have made it possible to master the challenges presented in the conference agenda, better understand the evolution of radiocommunication technologies and the related needs of industry, and more effectively demystify the complexities faced by WRC. This will certainly make the conference more enjoyable.

It is thus essential that the CPM process be maintained within the WRC framework. It can, nevertheless be perfected by streamlining the way it functions and the way its meetings are held, and by improving its structure.

Radio Regulations for smart use of radio spectrum

Yasuhiko Ito

Chairman, ITU Radio Regulations Board
Adviser to KDDI Corporation

The Radio Regulations are based on the principle of mutual respect among ITU Member States, as well as the concept of sharing the radio-frequency spectrum. Since ITU's foundation, Member States have respected these principles, which have contributed to the remarkable progress in radiocommunications over the years. However, due to the extremely rapid increase of wireless communications, it is becoming somewhat more complicated nowadays to obtain access to a band of frequency spectrum that is required for new services, as well as for broadening existing services. The ITU Radio Regulations Board (RRB) received many requests after WRC-12 to mitigate some difficult issues between administrations. The Resolution 80 report prepared by RRB to the World Radiocommunication Conference 2015 (WRC-15), describes the difficulties we faced in the interim period. We believe that by resolving them through negotiations, goodwill and consensus, we will re-create the ideal environment for the continued equitable use of the radio-frequency spectrum.

Sharing spectrum

Article 5 of the Radio Regulations (RR) specifies frequency bands (slices of the spectrum) that are allocated to the different radiocommunication services worldwide. The tables in Article 5 show that several different services are allocated on a co-primary basis for each segmented frequency band. This is in accordance with the principle of the Radio Regulations, as specified in RR provision No. 4.8, that the radio-frequency spectrum must be shared under the "equality of right to operate" principle when a band of frequency is allocated to different services of the same category.

The Board, however, frequently sees cases where an administration may reserve a number of orbital locations for the use of geostationary satellite networks, but some of the filings seem to be unused. This situation is sometimes created when an administration intends to obtain a new frequency assignment. The administration may request multiple orbital slots in the hope of successfully achieving frequency coordination for either one of the locations. However, even after achieving this objective, it may sometimes retain the remaining locations at the coordination stage for the purpose of contingency use. Thus the filings continue to remain unused.

The situation described above makes sharing between users a complicated matter, not only for satellites, but also for other co-primary allocated services in the same frequency band. Likewise, if a service requirement is unnecessarily enlarged, it will become a blockade to other co-primary services, resulting in a monopolization of the band, which is effectively in breach of Article 44 of the ITU Constitution.

Bringing satellites into use

A satellite network must be brought into use before it is registered in the Master International Frequency Register (MIFR). WRC-12 introduced RR Provision No. 11.44B, defining the process of "bringing into use (BIU)". Under the new provision, "a frequency assignment shall be considered as having been brought into use when a space station in the geostationary-satellite orbit with the capability of transmitting or receiving that frequency assignment has been deployed and maintained at the notified orbital position for a continuous period of 90 days. The notifying administration shall so inform the Bureau, within 30 days from the end of the 90-day period".

The RRB considers it a significant step to have clarified BIU, since the issue of whether or not the number of days reported by an administration was appropriate to justify BIU had been under discussion for quite some time. On the other hand, sometimes administrations fail to inform the ITU Radiocommunication Bureau (BR) of the completion of BIU within 120 days, but then request notification and registration after the 120-day limit. Currently, there is no provision for treating such cases of non-compliance with Article 11.44B. If similar actions continue, this will not only jeopardize the accuracy of the MIFR but possibly also hinder the efficient use of the geostationary-satellite orbit (GSO).

As with RR No. 11.44B, there is currently no provision for treating non-compliance of provision No. 11.49, which deals with suspension of a satellite. We are expecting that these issues will be dealt with at WRC-15.

Provision No. 13.6 of the Radio Regulations

Radio Regulations No. 13.6 is one of the most important provisions used for the maintenance of the MIFR and World Plans. Whenever it appears from "reliable information available" that a recorded assignment has not been brought into use, or continues to be in use but not in accordance with the notified required characteristics, BR will apply RR. No. 13.6, and request the notifying administration to clarify the situation.

The Board noticed that the number of appeals has been growing, where an administration questions the bringing into use and/or the continuing operation of another administration's frequency assignments and requests the Bureau to verify the information in question in accordance with RR. No. 13.6. Increasing congestion of the GSO and the radio-frequency spectrum, and resulting coordination difficulties seem to underline many of these requests. In some cases, pursuing cancellation of another administration's assignments rather than continuing negotiation was the remedy sought to overcome these difficulties.

The most important — and also most controversial — point regarding the application of No. 13.6 is to decide what constitutes "reliable information". Indeed, the answer to this question is very difficult. But in many cases, when BR receives an appeal, the requests are sometimes supported by information obtained from websites of launch providers, satellite manufacturers, and other sources.

Based on BR's past experience, ascertaining the reliability of the previously provided information can best be achieved through the receipt of supplementary information from the notifying administration directly. Through exchange of information with the notifying administration, the Bureau and the RRB may then be able to determine what information is indeed accurate and complete enough to be used as the basis for its further actions. The Board believes that "reliable information" is actually in our hands and becomes available through the exchange of information.

Leasing is everywhere

In the ITU environment, although the term "leasing of a satellite" is not precisely given, it is common practice for an administration to use a satellite of another administration under a certain licensing agreement.

When an administration intends to bring into use, or bring back into use, a frequency assignment, it is often found that a space station licensed by another administration is being used temporarily. The space station may already be operating on the GSO and could be moved from its original location. This type of arrangement for using a space station often occurs when a notifying administration has completed Advanced Publication and is undertaking

coordination, but the planned satellite is not yet ready for operation before the expiry date of seven years. Leasing is one way to maintain the proposed frequency assignments.

When planning to use satellite leasing in order to realize BIU, or bringing back into use of a frequency assignment, a notifying administration needs to consider provision No. 18.1 of the Radio Regulations, and the process described therein. The process of acquiring the rights for use of a satellite licensed by another administration is a delicate subject, and a clear "hand shake" between the two administrations is necessary.

Wishes to WRC-15

The world is evolving much faster than we realize, and the radiocommunication sector is expected to provide the basic infrastructure to support transforming technologies.

The issues described in this article are only a part of the items to be discussed during the month of November in Geneva, but they give an indication that the Radio Regulations need to be flexible enough to adapt to these changes.

WRC-15 may take some decisions that could enable a change of course to take place in the field of worldwide radiocommunications. The RRB hopes to contribute to the work of WRC-15, and to play a significant role in helping to find a balance between regulation and competition.

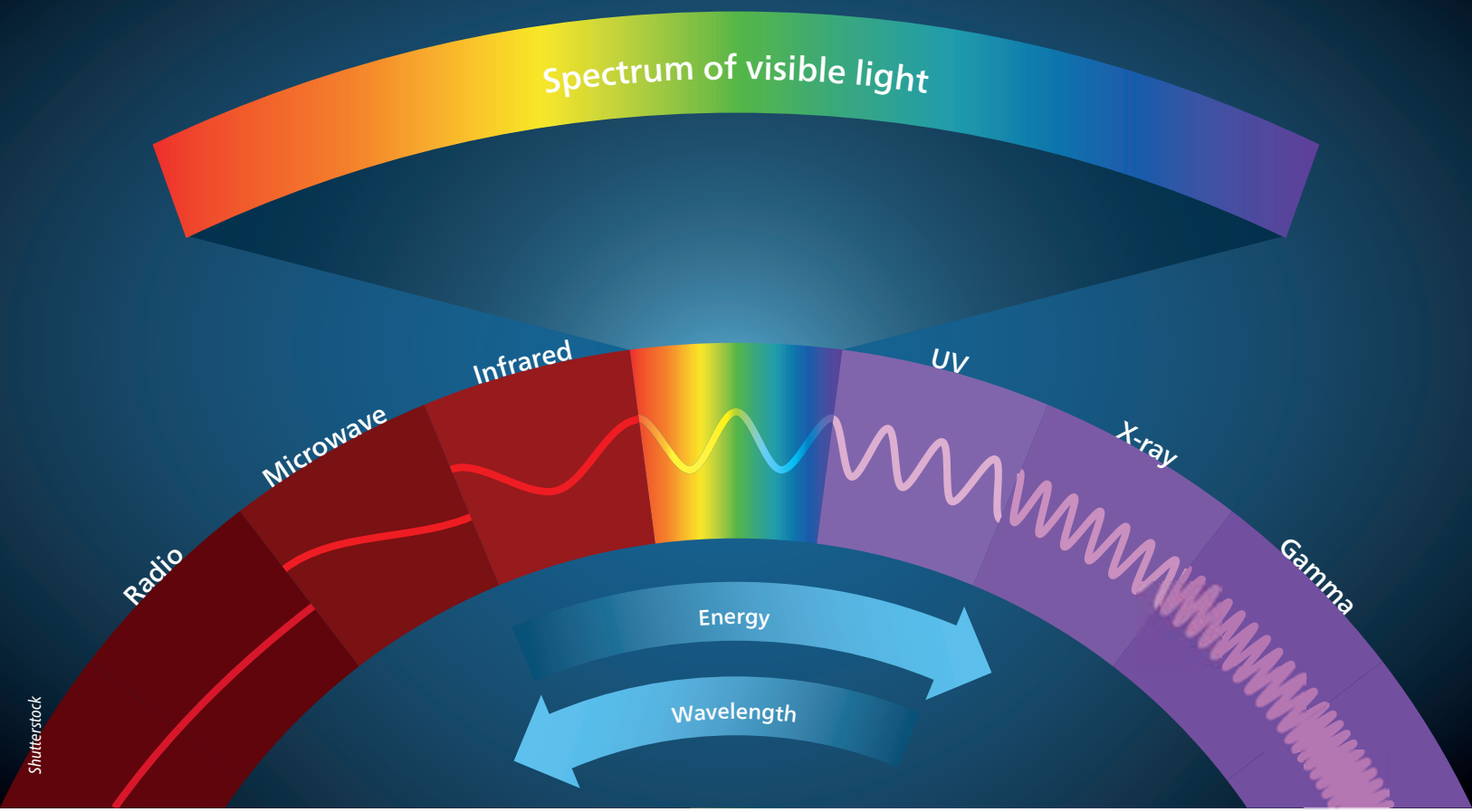
The radio spectrum

The radio spectrum is part of the electromagnetic spectrum

When we tune our radio, watch TV, send a text message, or cook in a microwave oven, we are using electromagnetic energy. We depend on this energy every hour of the day. Without it, the world we know could not exist. Electromagnetic energy travels in waves and spans a broad spectrum from very long radio waves to very short gamma rays. The human eye can only detect a small portion of this spectrum called visible light. An x-ray machine detects a different portion of the spectrum, and a radio uses yet another portion.

Source: Introduction to the electromagnetic spectrum (NASA)

The electromagnetic spectrum



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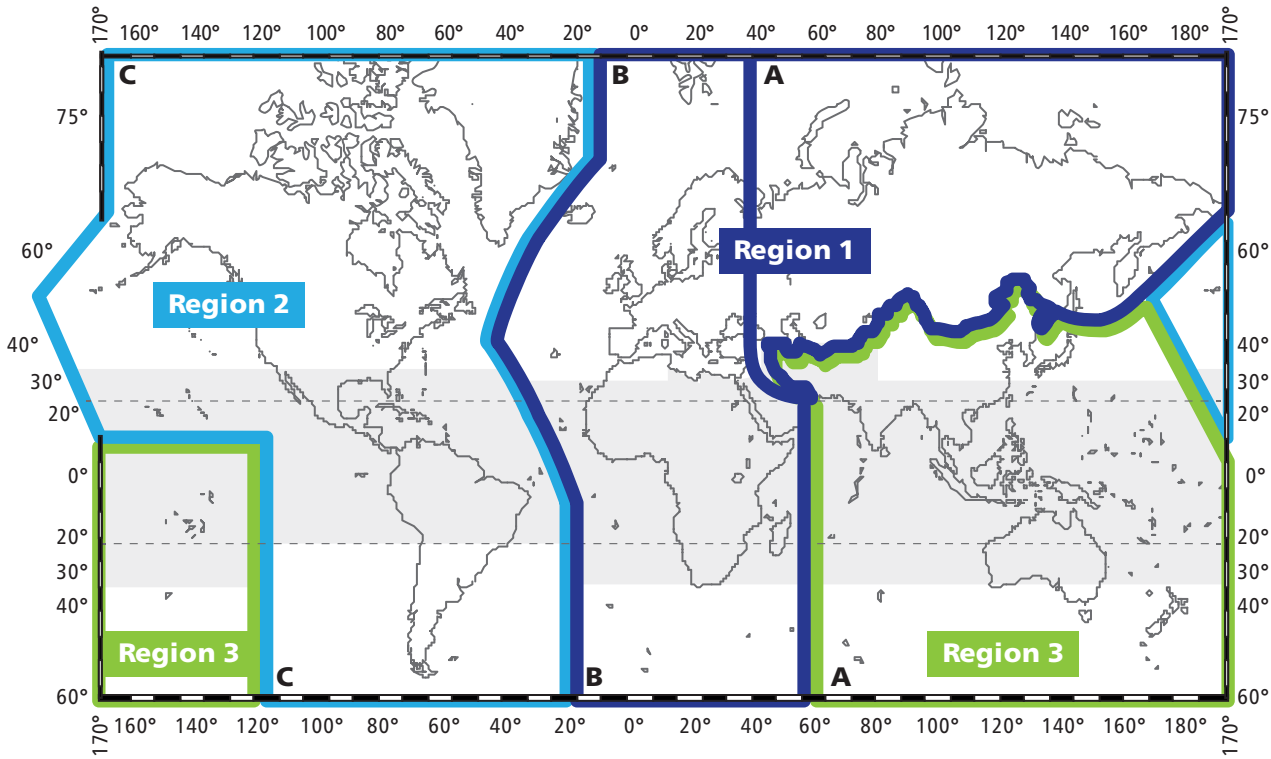
For the allocation of radio spectrum frequencies the world is divided into three regions

Region 1	Region 2	Region 3
Arab States	Americas	Asia-Pacific
Africa		
Europe		
Commonwealth of Independent States		



Representing the Arab States

Tariq Al Awadhi (United Arab Emirates)

Executive Director, Spectrum Affairs
Chairman, Arab Spectrum Management Group (ASMG)

The decisions of the World Radiocommunication Conference (WRC) have a huge impact on the use of the limited resource of radio spectrum in the Arab region. They also play a crucial role in identifying future trends in technology and infrastructure development in the Arab States.

The Arab Spectrum Management Group (ASMG) has held five preparatory meetings for WRC-15, the last in August 2015. These meetings were a platform for shaping the views of the region on the different agenda items for WRC-15 and in crystalizing the Arab common proposals for the conference. In addition, the meetings provided the opportunity for other regional organizations and industry members to participate, ensuring the exchange of information and continuous coordination to facilitate the work and decisions ahead of the conference.

Following the results of the preparatory meetings, ASMG's views on different agenda items have been prepared. These relate to mobile broadband and international mobile telecommunications (IMT), such as Agenda items 1.1 and 1.2, where ASMG administrations have a particular interest in supporting the allocation of spectrum for IMT in certain frequency bands, specifically the 700 MHZ band, to come into effect after WRC-15. Furthermore, ASMG has prepared proposals for other key agenda items under satellite technical and regulatory issues, such as Agenda items 1.6 and 7, and proposals for future conference agenda items under Agenda item 10 relating to IMT.

The ITU Radiocommunication Sector (ITU–R) has had a big role to play during the WRC preparatory process. It has facilitated the meetings of different study groups and working parties, and has significantly contributed in converging different views between the regional organizations, in particular by organizing three successful inter-regional workshops where regional groups were able to express their opinions and discuss their positions for each agenda item.

ASMG is looking forward to continuing this collaborative participation at WRC-15, along with other countries, international, regional and intergovernmental organizations, scientific and industrial institutions, manufacturers, and specialized agencies of the United Nations. Together, all parties will discuss and find consensus-based solutions for the various issues at stake under the agenda items of the conference. In addition, ASMG is also aspiring to successfully lead the works of Committee 5 and Working Group 4B of the conference.

Representing Africa

Abdoulkarim Soumalia (Niger)

Secretary-General, African Telecommunication Union (ATU)

Acknowledging the importance of world radiocommunication conferences, and taking into account the many complex agenda items for WRC-15, and based on the experience of WRC-12, the region under the African Telecommunication Union (ATU) framework commenced preparations for WRC-15 in good time. Specifically, the 1st African Preparatory Meeting for WRC-15 (APM15-1) was held in Dakar, Senegal from 18 to 20 March 2013, which was only three months after WRC-12. The main outcomes of APM15-1 were the establishment of an ATU work plan for WRC-15 preparations; appointment of chapter coordinators; adoption of the African Spectrum Working Group (AfriSWoG) framework; setting up of templates for proposals for subsequent APMs; establishment of a future work plan on the GE-06 frequency plan modifications; and coordination in view of the second digital dividend.

In accordance with the work plan established at APM15-1, APM15-2 was held in Khartoum, Sudan from 27 to 30 January 2014. APM15-3 was held in Abuja, Nigeria from 26 to 29 January 2015, and finally, APM15-4 was held in Nairobi, Kenya from 20 to 23 July 2015. APM15-4 attracted a record number in the history of APMs — around 300 participants from 36 African countries. The region also convened two AfriSWoG meetings which enabled the region to input technical papers to the work of ITU on the technical aspects for use of the second digital dividend. AfriSWoG also undertook studies on the current and future planned use of the C-band; IMT spectrum requirement estimates by the year 2020 in the African region; and the introduction of digital sound broadcasting, including optimization of the GE84 (the frequency modulation (FM) plan).

As well as the African Preparatory Meetings, the region has actively participated in the ITU WRC-15 preparatory activities, notably the two Conference Preparatory Meetings, the Joint Task Group 4-5-6-7, and the radiocommunication study group meetings.

Representing Europe

Alexander Kühn (Germany)

Chairman, Conference Preparatory Group
The European Conference of Postal and Telecommunications Administrations (CEPT)

When the World Radiocommunication Conference 2015 (WRC-15) discusses the 33 different agenda items in detail, the 193 Member States of ITU will most likely show the strength of consensual decisions based on the common understanding that radiocommunication does not stop at territorial borders. The European Conference of Postal and Telecommunications Administrations (CEPT) has contributed actively during the last four years to the preparation of technical, operational and regulatory studies on all subjects to be discussed during the month of November at WRC-15. Acknowledging that some items may be of more public interest than others, the broadness of the agenda indicates clearly the high dynamic of technological development in all information and communication technology sectors, and the necessity to address corresponding questions towards spectrum, from 4G to amateur radio, from manned space missions to modern maritime data exchange systems, and from safety of car traffic to the safety of air traffic. Therefore, it is the clear understanding of CEPT members that WRC-15 underlines the importance of globally harmonized solutions for radiocommunication.

In particular, CEPT has put emphasis on, and supports, the development towards the future of mobile broadband. CEPT is of the view that globally harmonized frequencies are the essential key to achieving the benefits of ICT for everyone, in particular, economies of scale, easy roaming, and bridging the digital divide.

Other items on the agenda on regulation and spectrum for ICT systems within the aviation and maritime sectors also indicate that the trend to use radiocommunication technology to enhance the effectiveness and efficiency of ICT systems remains unbroken. This is also underlined by the numerous proposals for new agenda items for consideration by subsequent world radiocommunication conferences.

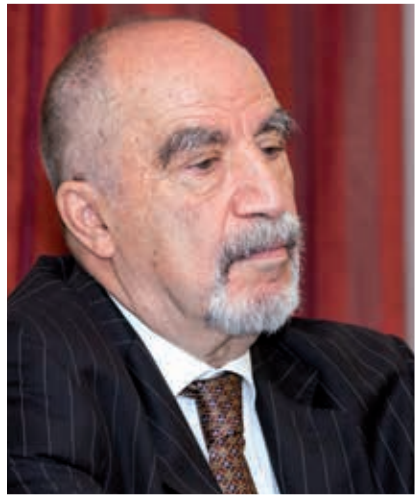
WRC-15 has also to decide on several questions regarding satellites. New spectrum for the fixed-satellite service, either uplink or downlink in various bands are under consideration. Extension bands usable for Earth-exploration satellites will provide much more detailed information on the impact of climate change, which is one great challenge of our time.

Finally, taking into account the review of existing regulations for specific services, such as for terrestrial (like public protection and disaster relief) or for satellites, the following conclusion comes to mind: WRC-15 is important for everyone!

Representing the Commonwealth of Independent States

Albert Nalbandian (Armenia)

Chairman, Working Group on WRC-15/RA-15
Regional Commonwealth in the Field of Communications (RCC)



Increasing demands for more spectrum access by users means that it is necessary for the Radio Regulations to be updated in an efficient and timely manner. Revising the Radio Regulations, the international treaty governing the use of the radio-frequency spectrum and geostationary-satellite and non-geostationary-satellite orbits, is the prerogative of the ITU World Radiocommunication Conference (WRC).

The WRC-15 agenda covers a wide range of topics, relating to spectrum (from 8.3 kHz to 3000 GHz) as well as almost all radiocommunication services and radio applications, from analogue narrowband systems to digital wireless broadband access systems. This illustrates the importance of a WRC to governmental, civilian and commercial users of the radio spectrum. Furthermore, the loss of a Malaysia Airlines flight in March 2014 prompted the ITU Plenipotentiary Conference to take quick action and include the issue of global flight tracking for civil aviation, including various aspects of the matter, on the current agenda for WRC-15.

Common proposals developed by six regional groups are being submitted to the conference, and will greatly facilitate building consensus on the various agenda issues to be discussed.

The Regional Commonwealth in the Field of Communications (RCC) administrations common proposals are based on the need to ensure:

- The smooth operation and continuing improvement of radiocommunications, taking into account the development of new technologies.
- The balance of interests between existing and new radiocommunication systems of the various radiocommunication services.
- The continued existence of the different technical and economic capabilities of ITU Member States.

The ITU membership accords increasing importance to the WRC process to improve regulatory procedures, to provide frequency and orbit resources for new technologies, as well as the technical framework for the interference-free operation of radiocommunication systems.

The key to a successful WRC is good preparation through cooperation within each region, coordination among the regions, and compromises to reach consensus. This is the key to facilitate broadband access to information for everyone, anywhere and at any time.

Representing the Americas

Hector Budé (Uruguay)

Chairman, Working Group for Regional and World Radiocommunication Conferences, Inter-American Telecommunication Commission (CITEL)

In mid-August, after a period of over three years in the course of which numerous meetings were held in beautiful cities of the Americas, the Inter-American Telecommunication Commission (CITEL) completed its work of discussing, preparing and consolidating the proposals it is to present to WRC-15.

The geographical dimensions of the Americas region, along with its very varied needs, interests, and characteristics, mean that the actions it has undertaken and approaches it has adopted in order to satisfy requirements and contribute to the advance and development of societies, is quite complex. It has also meant that consensus has not yet been reached on each and every topic related to radiocommunications that will be discussed at the forthcoming WRC.

But paradoxical as it may seem at first sight, the results achieved have raised the degree of comprehension and understanding. In many cases, similarities can be highlighted between the criteria employed, and in fact consensus has been reached on the vast majority of subjects.

In summary, these are a few of the proposals that CITEL will put forward at WRC-15:

- Identify the bands 1435–1518 MHz and 3400–3600 MHz for international mobile telecommunications (IMT).
- Do not identify the bands 2700–2900 MHz, 3600–4200 MHz and 4500–4800 MHz for IMT.
- Add global primary allocations to the Earth exploration-satellite service in the bands 7190–7250 MHz and 9900–10500 MHz.
- Adopt Coordinated Universal Time (UTC) without the leap second.
- Add the primary allocation to the radiolocation service at 78 GHz for vehicle collision warning system applications.
- Add the primary allocation to the aeronautical mobile-satellite service to allow operation of the ADS-B system at 1090 MHz destined for the global flight tracking of aircraft.
- Include, as topics for WRC-19, the undertaking of studies: a) for the possible identification of frequencies for IMT between 10 and 76 GHz in certain bands and b) for the global aeronautical safety system.

Lastly, we are convinced that, in keeping with the tradition of goodwill and cooperation on the part of everyone, WRC-15 will mark another significant milestone for ITU.

Representing Asia and the Pacific

Dr Alan Jamieson (New Zealand)

Chairman, APT Conference Preparatory Group for WRC-15 (APG-15), Asia-Pacific Telecommunity (APT)

In line with preparatory activities within the Asia-Pacific region in previous study periods, the Asia-Pacific Telecommunity (APT) has continued, through its preparatory group APG-15, to develop harmonized views and APT common proposals for WRC-15 during the 2012–2015 study period. The APG-15 met on five occasions during the current period and has become recognized within the region as the largest APT programme in terms of attendance, which reflects the importance placed on its WRC preparatory activities for the Asia-Pacific.

While regional needs have remained as a key focus of the work of the APG, preparatory activities within the Asia-Pacific region have evolved to include a broader perspective, since so many of the issues confronting conferences have become global in extent. With this broader view on issues, along with the need for global approaches, has come increased interest and participation from outside the region. This, in turn, has led to improved communication with other regional groups, fostering productive exchange of views throughout the preparatory process. Communication of this type is helping to identify what can be elusive solutions to complex conference issues; solutions that achieve a balance between, on the one hand, protection of existing services, while on the other, providing opportunities for new services and applications, such as in mobile telecommunications and satellite systems, to be developed. During WRC-15, APT looks forward to working with representatives from other regional groups in reaching agreements on such solutions.

On a more specific matter, the decision taken by the ITU Plenipotentiary Conference 2014 (PP-14), held in Busan, Republic of Korea, for the issue of Global Flight Tracking to be included in the agenda of WRC-15, has been especially welcomed by APT. This is an excellent example of where the ITU community has responded quickly to an identified need of widespread general interest and opened the way for action to be taken in a timely manner. In this instance, it is indeed encouraging that ITU procedures have been applied in such a way that will ultimately be for the benefit of all.

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Protection of critical spectrum for satellite services

Rupert Pearce

Chairman, EMEA Satellite Operators' Association (ESOA)
Chief Executive Officer, Inmarsat

The World Radiocommunication Conference 2015 (WRC-15) in Geneva from 2 to 27 November, will address a number of matters of great significance to the satellite industry. In particular is the harmonization of satellite frequency allocations, as satellite systems have large, often global, coverage. Satellite coordination procedures are also vital for efficient use of the geostationary arc and frequency spectrum. Therefore, ESOA supports new allocations to satellite services under various WRC-15 agenda items (1.6, 1.9), and the adoption of other provisions to facilitate the operation of satellite services, e.g. under Agenda items 1.5, 1.8, 7 and 9.

ESOA's efforts for WRC-15 however largely focus on safeguarding sustainable access for satellite services, today and for the future. Proposals to identify two critical satellite frequency bands for terrestrial international mobile telecommunications (IMT) in the C-band (3400–4200 MHz) and Ka-band (27.5–29.5 GHz) are currently being considered for IMT sharing studies, either at WRC-15 (C-band), or WRC-19 (Ka-band).

The C-band

C-band spectrum is used for numerous important satellite applications, such as banking, mobile backhaul, oil and gas exploration, maritime services, broadcasting distribution indirectly to cable headends and directly to millions of end users, distribution of meteorological data, telemedicine, humanitarian agencies, disaster management, and government services. In many regions, C-band satellite systems provide the only reliable communications infrastructure, such as in countries with vast rugged terrain and in many rural and remote areas. C-band satellite services are also first on call when disasters strike and terrestrial infrastructure is destroyed. ESOA members frequently support ITU and the wider humanitarian community in restoring and enabling communications after a disaster. In 2015 alone, multiple disasters, including floods in Myanmar, the tropical cyclone in Vanuatu, and the earthquake in Nepal, were supported by C-band satellite services. Furthermore, more than 180 geostationary satellites operate in the C-band today.

The Ka-band

The Ka-band represents one of the growth bands for satellite. Today, the number of operational geostationary satellite orbit (GSO) Ka-band satellite systems is over 60. As C- and Ku-bands become increasingly saturated, the satellite industry is now investing in Ka-band, as most new broadband and other satellites will deploy high-throughput Ka-band technology in the coming years. Thus the number of Ka-band satellites is set to grow significantly.

Ka-band satellite technology provides increased spectrum efficiency, enabling greater volumes of traffic to be transmitted. The Ka-band presents an attractive offering to many industries because of the smaller end-user antennas (VSATs), increased mobility, and higher bandwidths and speeds, coupled with cost-effective network deployments.

Over the next decade, demand for more Ka-band satellite capacity is expected to grow for communication applications, as trunking and cellular backhaul services, broadband access, enterprise networks and government communications expand across the globe.

By 2020, there will be more than 100 geostationary satellite systems and several more non-geostationary satellite systems operating in the Ka-band.

Spectrum for mobile broadband

Demand for mobile data services continues to grow and solutions must be found to accommodate this growth. However, as any identification of spectrum for IMT directly affects existing services, it is important to carefully consider the requirements for IMT as well as which bands are most appropriate for accommodation. Extensive studies in ITU have shown that sharing between IMT and FSS in the C-band requires large exclusion zones around FSS earth stations to prevent interference. Sharing in the Ka-band will entail similar constraints.

It should not automatically be assumed that because mobile demand is growing, more spectrum is needed. Other technological solutions exist to increase capacity in mobile networks:

- More spectrally efficient technology can be deployed (e.g. MIMO and beam forming).
- Traffic can be offloaded from mobile networks to alternatives such as Wi-Fi (noting that the 5 GHz Wi-Fi band currently has very little use).
- Additional cell sites can be built, increasing the reuse of the spectrum for IMT.

It is also important to ensure that the spectrum already identified for IMT is fully used. A study carried out by spectrum experts LS telcom examined licensing data for over 90 countries. It looked at whether the spectrum that should and could be used

for IMT services has been made available, and further examined the results of a survey of 20 regulators to assess whether the spectrum that has been licensed is actually in use. The findings were that:

- Most regions of the world have licensed around 70 per cent of spectrum that should be easily available for IMT services.
- Most countries should be able to find at least another 150 MHz of IMT spectrum from within that which is regionally harmonized.
- Almost every country should be able to find at least a further 200 MHz of spectrum that has been identified for IMT but is not necessarily fully harmonized.
- The 700 MHz band still remains to be licensed in many parts of the world.
- With the exception of the European Union, the 2600 MHz bands, which represent nearly 200 MHz of IMT spectrum, remains to be licensed.
- The European Union has by far the greatest amount of spectrum licensed for IMT services. However, this is still only around two-thirds of that which is identified for IMT and could potentially be licensed. Despite having the largest amount of spectrum licensed for IMT, it is still less than 50 per cent of that which the ITU predicted would be required by 2015.
- In the rest of the world, the amount of spectrum licensed for IMT services is below 50 per cent of that which could potentially be made available.
- Whilst nearly 80 per cent of licensed spectrum is in use by those operators to which it is licensed, the use of licensed time-division duplex (TDD) spectrum is only around 50 per cent.

Furthermore, several studies, including the study by LS telcom have shown that forecasts for IMT spectrum requirements are exaggerated. These studies identify flaws in the modelling and the assumptions used to derive forecasts for IMT. The mobile terrestrial industry has itself commissioned studies to show the economic value of C-band for IMT. These studies ignore the cost of reallocation and the impact on existing users; take an incorrect approach to calculations and use incomparable benchmarks in order to inflate the results. Therefore, we believe these forecasts and economic assessments should not form a basis on which to take important decisions at WRC-15.

Lessons learned and a look ahead

The identification of spectrum for IMT in the C-band at WRC-07 made it more difficult for satellite operators to get authorization to deploy earth stations, despite the fact that very little use has been made of the band by IMT to date. ESOA believes that WRC-15 should not adopt any further identification of spectrum for IMT at C-band, as it is not necessary and will further negatively impact satellite systems and, in particular, existing services that often, for example in a disaster scenario, can only be provided via satellite.

A new proposal at WRC-15 is made for a future agenda item for WRC-19 to seek additional spectrum for IMT to support the development of 5G systems. ESOA does not oppose such an agenda item but ESOA does recommend that care is taken (i) to avoid unnecessarily affecting other services, such as those extensively deployed in the Ka-band and (ii) to avoid "a new Agenda Item 1.1 scenario" which has been divisive, controversial and resource-intensive. ESOA advocates that any frequency identification should employ the guiding principle of protecting and excluding frequency bands where sharing is difficult, or even impossible, due to the characteristics of the existing allocated services.

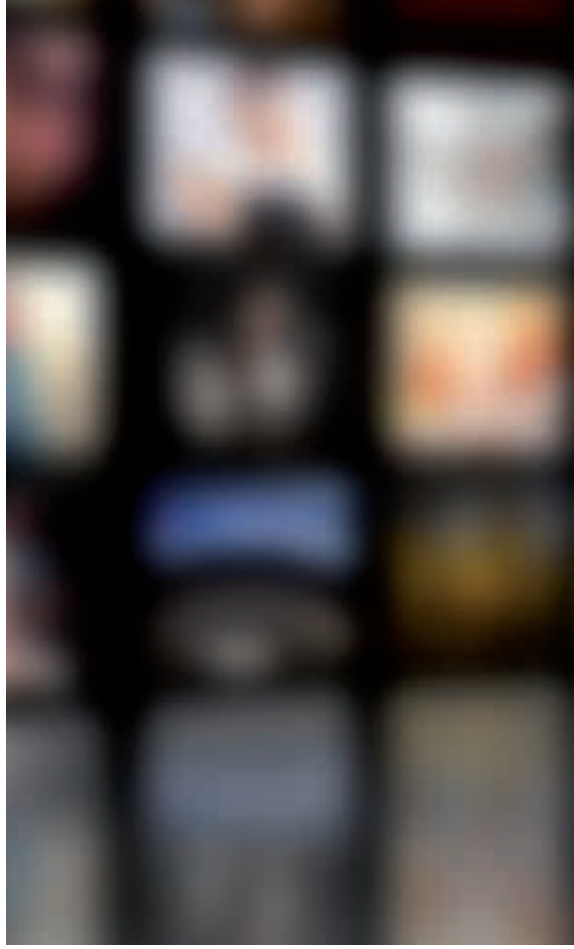
While 5G is still under development, it is understood that the primary objective is allocating new spectrum in "mmwaves" for very high data rates, as very large bandwidths are required with contiguous bandwidth of at least 1 GHz. A win-win solution to accommodate 5G requirements is possible with minimum or no impact on incumbent users and with the potential for global harmonization of spectrum for 5G: that solution is in bands above 31 GHz.

Spectrum for broadcasting

Simon Fell

Director of Technology and Innovation,
European Broadcasting Union (EBU)

Spectrum has become a major topic over the years, due to its scarcity and popularity for a broad range of services. There is no doubt that broadcasters make very good use of spectrum for a variety of services. Public service media and commercial TV providers rely on it for free-to-air (FTA) delivery as it reaches people who are unable to afford or unwilling to take a subscription for pay TV service. The foundation of an FTA digital TV service is most often delivered terrestrially. In addition, changes are taking place in digital radio delivery as spectrum is deployed using DAB+ providing a wider variety of programmes, delivered with digital quality, across many territories, and growing in popularity. There are about 250 million households across Europe alone relying on digital TV delivered terrestrially on the main family TV set, and many more TV sets are deployed in kitchens and bedrooms and other areas of the house. These services are delivered on robust networks, built with



resilience in mind, and regulated to operate with very high reliability (99.98 per cent in some countries), universal coverage and free at the point of use.

National TV content is mainly funded by public and commercial FTA TV channels, contributing to a wide cultural benefit from such programming. In some European countries, such as France and the United Kingdom, between 80 per cent and 90 per cent of investments into original TV productions are funded by FTA broadcasters. Furthermore, FTA still attracts a viewing share of around 80 per cent in Europe, even in countries with pay-TV penetration, which is greater than 50 per cent (like the UK), or over 80 per cent (such as the Netherlands or Denmark).

Increasingly, digital TV services are used as the foundation for new innovative services offered to the public on top of a basic FTA package of channels. In recent months, we have heard of the new high-definition (HD) terrestrial services planned for Germany that will deploy high efficiency video coding (HEVC) codecs, and are targeted at portable devices utilizing the very successful European standard DVB-T2. In Poland, we have seen digital terrestrial television (DTT) grow from a small percentage of the population in 2010 to nearly 40 per cent market share by 2015, increasingly offering hybrid broadcast broadband TV (HbbTV) services, including a trial of 4k ultra high-definition TV (UHDTV) delivered in tandem over broadband networks to connected TVs. This open standard is bringing popular interactive services to viewers without requiring a subscription service or yet another set-top box, as it is built in to all TV sets made or sold in Europe. In the UK, we have just seen the launch of a UHDTV Sports channel from BT delivered on a next-generation Youview box — this time as a subscription channel tied to broadband, but the backbone of the TV service is free-to-air DTT. This hybrid approach is proving how flexible and innovative broadcasting can be in this era of multiple access to services on multiple outlets and devices. However, broadcast DTT television is in many countries the foundation of the public's entertainment, education, sporting events, news and culture. The public have a right to continue to enjoy such services, and these need to grow and develop naturally without a threat to their existence. In some regions the DTT rollout is still in its infancy and services should be allowed to develop to maturity.

At the same time, as broadcasters, we fully appreciate the flexibility of smart phones and the utility created from IP delivery to portable devices, such as tablets and phablets that are often used to view content in and around the home — mainly by connecting via Wi-Fi, since its ubiquity and ease of use especially at home make this the *de facto* choice for using portable devices. However, we are not immune to the popularity of portability and can see 4G and even 3G allowing much use when out and about, but we disagree with the inflated claims for bandwidth, often seen in representations for mobile spectrum.

Broadcasting and mobile

At the same time, mobile operators and the devices we use rely on a successful and developing TV production industry for exciting and appealing content for subscribers, to help make such heavily subsidized devices popular. This is the dilemma: broadcasters want to and do use such devices for delivering content, but we do not yet agree that consumers necessarily want the same experience on their portable devices as they get from the big screen TV in their homes. We can therefore see exciting developments in the technologies that broadcasters and other content creators will of course want to see develop.

We are perfectly happy to work together to see if future mobile standards will offer benefits to our community, whether it be for content production, or for reaching audiences equipped with mobile

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devices. However, for broadcasting to make sense in a 5G future, it has to incorporate the needs of universally available broadcasters, i.e. free-to-air services, no need for a subscription to receive signals for such services, universal coverage (since the clue is in the name BROADcasters — we reach every citizen), and reliability and resilience — who do the public turn to in times of national debate for national events and news? We must provide the reliability the public expects.

We are not alone in this discussion. We have reached out to ITU and 3GPP to express our wishes for any future standards and we held an open workshop with ETSI to debate the issue. We have not yet had a large engagement from the mobile industry, and we would welcome their participation.

Spectrum is precious and needs to be used as efficiently as possible. While mobile is experiencing increasing demand, it is not the only service that is receiving such pressure. Most, if not all, radiocommunication services predict an increase in capacity demand in the future. The emerging demand for UHDTV services is one such key area. It is our view that allocating even more spectrum to mobile services will not solve their capacity problem in the long run and may harm other major industries, not least broadcasting, cultural and creative production, as well as the satellite industry. The only way a sustainable solution can be found is if everyone uses the allocated spectrum more efficiently and is capable of sharing the spectrum without causing interference. The existing plan for ultra-high frequency (UHF) bands allows for flexibility where Programme Making and Special Events (PMSE) and White Space services can share with DTT. For its part, DTT is moving to DVB-T2, making use of single frequency networks and new compression standards. This innovation will continue only if we as an industry continue to invest, and for this we need long-term certainty of the availability of suitable spectrum.

EBU at WRC-15

To sum up — at WRC-15, EBU will of course defend the broadcasting sector's remaining UHF spectrum, as we need to ensure that every citizen has access to broadcast services, wherever they may be. We believe that as an industry we have been more than generous in releasing the 800 MHz band for mobile in Region 1, and the 700 MHz band is now also planned to be released. It is essential that enough time is given for a well-planned migration out of 700 MHz, with due consideration of the costs for any re-assignment, and for careful frequency planning to measure the resulting impact. Moreover, we will defend the use of the C-Band as a critical component of content delivery worldwide in satellite distribution and, critically, in areas that suffer rain fade through normal means.

There is much we can do together, but let us not persist with a winner-takes-all approach. Let's be honest about our positions, and also generous in working together to find productive solutions for the future, whilst allowing our industries to develop and grow as they should.

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Safeguarding the future of mobile

Daniel Pataki

Vice President of Regulation, GSMA

Mobile connectivity is a socio-economic enabler the likes of which has never been seen before. As of 2015, mobile communications connect roughly half the global population — a phenomenal feat considering it has only been 25 years since the world's first digital cellular networks were launched.

Yet the lifeblood of mobile connectivity — radio spectrum — is a finite, natural resource. And with the explosive growth of mobile devices, the amount of available spectrum is dwindling, making the pace of adoption and the corresponding pace of change unsustainable.

Throughout the month of November, the World Radiocommunication Conference (WRC-15) will take place in Geneva. Held every three to four years, WRCs are a crucial opportunity to address spectrum requirements for all radiocommunication systems globally and to consider necessary trade-offs between stakeholders to ensure

that these requirements are met and that widespread harmonization is achieved.

The time is now for mobile broadband

It has never been more evident that the Internet is driving universal progress, increasingly enriching all spheres of people's lives and altering economic, social and cultural patterns.

Mobile is a key enabler, but the industry is so dynamic that past predictions have vastly underestimated demand, highlighting an urgent need to address spectrum requirements. The number of unique mobile subscribers worldwide has jumped from 3.2 billion in 2012, the year of the last WRC, to nearly 3.8 billion as of September 2015, and is forecast to reach four billion next year.

There is also an accelerating technology shift to faster networks. Mobile broadband connections (i.e. 3G and 4G technologies) accounted for just under 40 per cent of total connections at the end of 2014, but by 2020 are expected to increase to almost 70 per cent of the total. As 4G users generate far more data than 3G users, a significant increase in traffic is expected over the next six years, with 4G users typically consuming twice as much data per month as other users.

Vodafone reported that data traffic on its global networks jumped 80 per cent in the year ending Q2 2014, with growth driven by 4G in Europe and 3G in India.

While China Mobile, China's largest mobile operator, reported its mobile data traffic grew by 158 per cent annually to reach 490.3 billion megabytes in Q1 2015.

So why is more spectrum so important?

The main agenda item at WRC-15 will consider the identification of additional spectrum to facilitate the development of International Mobile Telecommunications (IMT) and the role of wireless in making broadband accessible to all. The last time IMT spectrum was identified worldwide was back at the WRC in 2007, at which point the original iPhone (2G only) had yet to be launched globally, 3G had not truly taken off, and 4G was still in the offing. Put simply, at WRC-07 mobile broadband usage was minimal by today's standards.

YouTube stated in October 2014 that mobile devices now generate 50 per cent of its global traffic. Cisco estimates that smartphones generate 37 times more data traffic than feature phones and 4G smartphones generate almost three times as much data traffic as 3G smartphones.

In eight years, the world has changed dramatically and consumer behaviour has evolved, prompted by widespread 3G and 4G accessibility and take-up. Affordable smartphones are now driving the use of data-intensive applications, such as video streaming, on mobile networks.

The Republic of Korea is one of the most advanced 4G markets, with 100 per cent population coverage and over two-thirds 4G adoption at the end of 2014. The market is so mature that unlimited data plans are commonplace and users even eschew Wi-Fi networks in favour of 4G to maintain the consistency of their experience, with the 4G network providing a faster download/upload speed than Wi-Fi.

But while information and communication technology is a global success story, large disparities remain between those who have access to ICT and those who do not. In particular, the broadband divide between developed and developing countries remains large, at 87 per cent versus 39 per cent penetration for mobile broadband in 2015.

Yet change is coming, and it is being enabled by mobile broadband. Global mobile Internet penetration is expected to hit just shy of 50 per cent in 2020. On a typical day, an average of 1.5 million people start to use mobile communications for the first time and this trend is driving social and economic changes globally.

The Philippines is home to approximately 100 million people, and the country is typical of developing markets in that socio-economic realities often hinder education by limiting individuals' means and ability to regularly attend school. The country has more than six million young people who are out of education due to circumstances beyond their control. But for these young people, m-Education is proving to be transformative. Rather than having to

spend limited time and money to travel to a school or college each day, students can access lessons prepared by expert teachers on their mobile devices at work or at home.

In the more developed world, the imbalance between healthcare capacity and healthcare demand is a major obstacle facing the United Arab Emirates (UAE) which, along with many other Gulf States, is tackling exceptionally high rates of diabetes and obesity. But by leveraging the high level of mobile broadband and smartphone penetration in the region, health ministries in the Gulf Cooperation Council (GCC) can reduce stress on the system. Research shows that m-Health solutions are a cost-effective tool for improving access to care, raising health awareness, and helping chronically ill patients to manage their conditions, with even basic text messaging resulting in healthcare cost reductions of approximately USD 800 per patient.

What does all this mean?

For this tremendous growth in mobile data to continue, additional spectrum must be made available at WRC-15 in order to be ready for potential use by 2020. Additional mobile spectrum is by far the most cost-effective means of enhancing mobile capacity therefore helping to keep consumer prices down.

It is true that some of the spectrum that has been earmarked for mobile allocation is already occupied by other spectrum users. But the rapid evolution of modern wireless technologies, which make more efficient use of available spectrum, means the ability to do more with less is continually increasing, and the potential for resource sharing is significant.

Incumbent services need not lose out and there is a wealth of studies that show that compatibility between the services in adjacent bands and mobile broadband can be achieved through appropriate technical conditions and operational measures.

Moreover, there is significant opportunity for other wireless markets to benefit from growing mobile allocations. With 60 per cent of all mobile traffic in 2020 expected to be video, more eyes on more screens in more places can only be a positive for the TV industry.

New IMT identifications provide regulators and governments with more options when reacting to the rapid evolution of all wireless services. Supporting new mobile bands at WRC-15 does not mean existing services must suddenly stop. Each individual country will decide how and when to license new mobile bands based on its national priorities and the needs of its citizens.

Why now?

Mobile is a significant contributor to the global economy. Research shows the mobile industry (both directly and indirectly) created 3.8 per cent of global GDP (equivalent to USD 3 trillion) and directly supported 13 million jobs in 2014 — this is expected to rise to 5.1 per cent of GDP and 15.4 million jobs by 2020.

But the success of the mobile economy is dependent on spectrum. The clock is ticking, and WRC-15 is the single most important factor in determining future availability of affordable, ubiquitous, high-speed mobile broadband services worldwide and cementing this economic growth.

Given that it takes around ten years to prepare spectrum for allocation, the world cannot afford to wait to address these issues. In a decade, current spectrum will have been exhausted, the costs of networks will rise rapidly, users will be suffering from a disappointing mobile experience and innovation will be stifled. In short, a failure at WRC-15 puts at risk the major socio-economic benefits that are being delivered by the mobile revolution.

By ensuring sufficient coverage and capacity spectrum are allocated to mobile services at WRC-15, national administrations will have the flexibility to assign the amount they choose rather than having their future confined by existing allocations. The finite supply of spectrum means harmonious sharing of bands between services is more important than ever to allow national administrations to continue to support existing services while also harnessing the flexibility to make new mobile spectrum available when, and where, needed.

Ultimately, WRC-15 is the only major opportunity to achieve key consensual and harmonious outcomes, to the benefit of all.

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Safety and efficiency of global aviation

Dr Fang Liu

Secretary-General, International Civil Aviation Organization (ICAO)

The International Civil Aviation Organization (ICAO), like ITU, is, a specialized agency of the United Nations. ICAO develops standards and recommended practices (SARPs) enabling today's global air transport network to operate safely, efficiently and securely throughout the world. At any given moment, there are around a million aircraft passengers being carried by our global network across the world's skies, and over 100 000 flights are managed each and every day. Last year alone, aviation moved some 3.3 billion passengers in total, fostering greater peace and economic prosperity wherever aircraft fly.

States have recognized that the future development of international civil aviation could greatly help to create and preserve friendship and understanding among the nations and peoples of the world.

The States who established the Convention on International Civil Aviation agreed on certain principles and arrangements in order that international civil aviation could be developed in a safe and orderly manner, and such that international air transport services would be established on the basis of equality of opportunity and operated soundly and economically.

In the ITU World Radiocommunication Conference context, ICAO's role is to convey the coordinated position of the entire international civil aviation community, including States, airlines, airport and air navigation services operators, and other stakeholders. And given the extensive use of the radio-frequency spectrum for functions critical to the safety and efficiency of aircraft operations, it should come as no surprise that the aviation community has strong views on a number of WRC-15 agenda items.

On behalf of ICAO, I am pleased to have the opportunity to address three items of particular importance to the safety and efficiency of international civil aviation, in advance of WRC-15, namely: global flight tracking (GFT); unmanned aircraft systems (UAS); and the protection of aeronautical use of very-small aperture terminals (VSATs) in the African and Indian Ocean region.

Global flight tracking for civil aviation

One of the reasons why aviation has consistently improved upon its renowned levels of safety and efficiency over the decades has been its willingness to invest significant effort and resources to learn important lessons — even from rare events. While 2014 represented one of aviation's safest years in terms of the number of accidents, the tragedy of missing Malaysia Airlines flight 370 in March 2014 highlighted vulnerabilities in the global air navigation system, requiring urgent mitigation.

In order to address those vulnerabilities, the aviation community has embarked on a global effort under the joint auspices of ICAO and the International Air Transport Association (IATA) to develop and implement a Global Aeronautical Distress and Safety System (GADSS), encompassing all phases of flight under all circumstances, including distress.

A fundamental component of the GADSS objectives is global flight tracking (GFT), which enables aircraft operators and air navigation service providers to obtain a real-time record of aircraft positions worldwide. ICAO is currently developing international SARPs for GFT using a "performance-based" approach, whereby ICAO SARPs set minimum performance requirements but do not prescribe the specific technological systems or solutions needed to meet those requirements. Several viable candidate technologies are already available to address this new requirement, and developments are also underway to enhance the capability of some of them to track commercial aircraft.

One such development builds on currently available automatic dependent surveillance — broadcast (ADS-B) technology, whereby aircraft can broadcast position reports at 1090 MHz. ADS-B, in principle, provides all the information required for GFT. A significant limitation, however, is that its broadcasts can only be received by ground stations within line of sight of an aircraft, and not over the remote and high seas territories where flight tracking needs are most acute.

To remove this limitation, a new satellite constellation is currently being deployed which can capture ADS-B reports from aircraft located in polar, oceanic and other remote areas and then re-broadcasts them to GFT ground systems. An important advantage of this solution is that it leverages and complements existing ADS-B aircraft capabilities without requiring aircraft retrofits.

Early indications of system performance are promising, but one regulatory hurdle persists. While current ADS-B transmissions use an existing ARNS allocation, reception of ADS-B by satellite would require an Earth-to-space aeronautical mobile satellite (route) service (AMS(R)S) allocation, consistent with the physical location of the receivers (on a satellite) and with the purpose of the reception (safety-of-life). But no such allocation exists today.

Fortunately, thanks to ITU's prompt response to the MH 370 tragedy and to the foresight of the recent ITU Plenipotentiary Conference (PP-14), an opportunity to introduce the necessary spectrum allocation is now available. We should recall that Resolution 185, adopted at PP-14, resolved to instruct WRC-15 to include in its agenda,

as a matter of urgency, the consideration of global flight tracking.

ICAO certainly shares the sense of urgency voiced by PP-14, and believes that this unique opportunity should be seized without delay to introduce the necessary Earth-to-space AMS(R)S allocation at 1090 MHz. This band should be used for the satellite reception of existing aircraft ADS-B signals that operate in accordance with recognized international standards, under the condition that existing aeronautical safety systems are not constrained.

In light of the progress in the ITU Radiocommunication Sector (ITU–R) studies, and the great benefits offered by this spectrum allocation, ICAO is confident that the radio regulatory community will again step forward proactively to help global civil aviation States and operators maintain and improve their ability to protect the lives of aircraft passengers and crew.

Unmanned aircraft systems

The level of impact of the ongoing introduction of unmanned aircraft systems (UAS) in civil aviation has been compared to what was seen in air transport after the arrival of jet engines in the 1950s. UAS have been breaking many paradigms underpinning the existing global aviation system, and are opening new and exciting frontiers of operational innovation for many citizens and businesses in every world region. Their safe and efficient incorporation into the aviation system is a challenge that will involve far-reaching changes and the determined cooperation of all aviation stakeholders, and as part of this process ICAO is committed to developing a comprehensive, safe and harmonized international UAS aviation regulatory framework.

Along with its aeronautical regulatory aspects, the introduction of UAS also poses challenges to the existing radio-frequency regulatory framework. In particular, it now seems likely that the available AMS(R)S allocations for beyond-line-of-sight (BLOS) control and non-payload communications (CNPC) will be insufficient to meet UAS requirements.

Existing satellite networks operating in the fixed-satellite service (FSS) at 14/12 GHz and 30/20 GHz have potential capacity available which could be used for UAS CNPC under certain conditions. The FSS is not recognized in the ITU as a safety service, however, and therefore its use for CNCP raises potential concerns.

To address these issues, studies ongoing within the ITU–R are focusing on performance and compatibility matters. For its part, ICAO has identified seven conditions that should be satisfied in order to enable the use of FSS for UAS, partitioned into two sets: three to be addressed in the ITU Radio Regulations (RR), and four which must be dealt with through ICAO. The set of conditions relevant to ITU jurisdiction focus on providing a radio regulatory framework

for the safe operation of UAS CNPC links in FSS bands, thus obtaining international recognition along with the basis for avoiding harmful interference. It includes the following conditions:

1. That the technical and regulatory actions be limited to the case of UAS using satellites, as studied, and not set a precedent that puts other aeronautical safety services at risk.
2. That all frequency bands which carry aeronautical safety communications be clearly identified in the ITU Radio Regulations.
3. That the assignments and use of the relevant frequency bands be consistent with provision No. 4.10 of the ITU Radio Regulations, which recognizes that safety services require special measures to ensure their freedom from harmful interference.

The availability of a robust radio regulatory framework meeting these conditions would enable the development of ICAO SARPs for UAS CNPC, addressing technical and operational requirements for specific airspace types and frequency bands.

Protection of aeronautical VSATs

The provision of air navigation services requires a ground communication infrastructure with high availability, reliability and integrity. In parts of the African and Indian Ocean Region, the difficulty of fulfilling these requirements through the terrestrial infrastructure has led to the widespread use of very small aperture terminal (VSAT) technology operating in the 3.4–4.2 GHz range.

Today, VSATs constitute a critical infrastructure network spanning the African continent, such that availability of the entire band is crucial in that region to support the continued growth of air traffic, while maintaining required safety parameters.

However, following the allocation by WRC-07 of the 3.4–3.6 GHz band to the mobile service (MS) in some countries (RR No. 5.430A), the deployment of mobile service (MS) systems in the vicinity of airports has led to an increased number of cases of interference into aeronautical VSAT receivers. In order to prevent such occurrences in the future, additional measures need to be adopted to improve the protection of the FSS links supporting aeronautical communications. This is recognized by Resolution 154 (WRC-12), which calls for the ITU–R:

"to study possible technical and regulatory measures in some countries in Region 1 to support the existing and future FSS earth stations in the 3400–4200 MHz band used for satellite communications related to safe operation of aircraft and reliable distribution of meteorological information".

ICAO has participated in the ITU–R studies and supports the modification of Resolution 154 as exemplified in the CPM report (Section 5/9.1.5/4), including the introduction of a reference to the Resolution in RR No. 5.430A.

Looking to the future

The onset of our 21st Century digital communications environment, inclusive of all its benefits in terms of technical progress and cultural and information exchange, could not have been realized without the solid foundation that ITU has established over the past 150 years, as well as its vision and forward-looking decisions in more recent global forums.

Air transport serves as an important enabler of socio-economic development in States and regions all over the world, and is an essential contributor to achieving the UN Sustainable Development Goals. The significance of obtaining the required frequency spectrum allocations needed urgently by the aviation sector to ensure the safe and efficient future operations of civilian aircraft is more critical today than at any point in the history of international civil aviation.

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Ships and shipping — Relying on radio

Koji Sekimizu

Secretary-General, International Maritime Organization (IMO)

The International Maritime Organization (IMO) is the United Nations specialized agency with responsibility for the safety, security and efficiency of shipping and the prevention of marine pollution by ships. Allocation of, and regulation on, the use of spectrum for radiocommunication is of utmost importance for the safe, secure, efficient and environment-friendly operation of ships.

To put this into context, around 90 per cent of world trade is transported by sea. This totals some 7.5 billion tonnes (32 000 billion tonne miles), of which about 33 per cent is oil, 27 per cent is bulk (ore, coal, grain and phosphates), the remaining 40 per cent being general cargo. Operating these merchant ships generates an estimated annual income of USD 380 billion in freight rates within the global economy.

Ships and radiocommunication

A ship at sea might appear to be a lonely and isolated place, often spending weeks traversing huge distances on ocean passages between ports. Certainly this used to be the case. But today, thanks to radiocommunication, modern ships are actually "on the grid" almost continually. The ability to communicate instantly and reliably between ship and shore has become a key management tool for an industry on which the entire global economy depends.

Shipping also relies on radio spectrum for navigation, for distress and safety communication, for on-board communication, and for social communication between crews at sea and their friends and families ashore. As the UN agency with responsibility for the safety, security and environmental performance of shipping, IMO has a keen interest in the forthcoming World Radiocommunication Conference 2015 (WRC-15).

Ships and satellite communication

Ships have historically made extensive use of the High-Frequency (HF), Medium-Frequency (MF) and Very High-Frequency (VHF) bands, using Morse telegraphy, radio telex and radio telephony. More recently, satellite communication has become an integral part of maritime radiocommunications. The Global Maritime Distress and Safety System (GMDSS), for example, is an integrated communication system that uses satellite and terrestrial radiocommunication systems, among others, removing the dependence on Morse telegraphy in the key areas of distress and safety communication.

Under the GMDSS, all passenger ships and all cargo ships over 300 gross tonnage on international voyages must carry specified terrestrial and satellite radiocommunication equipment for sending and receiving distress alerts and maritime safety information, as well as for general communications.

Ships also rely on radiocommunication for navigational purposes. The use of radar, both on board as well as on-shore, the provision of radionavigation satellite services, terrestrial navigational aids and Automatic Identification Systems (AIS) are vital in this respect. Over one million marine radars operate in the frequency band 9200–9500 MHz.

Ships and broadband communication

From an operational perspective, ships are now increasingly managed with on-shore assistance. Data reflecting key criteria, such as cargo condition, engine performance and fuel consumption are regularly transferred from ship to shore, while use of broadband aboard ships in close proximity to shore for transmission of port entry and exit documentation is also becoming routine. Currently, around 12 000 vessels use Very-Small-Aperture Terminals (VSATs) for broadband communication. This service is limited to distances offshore of 125 kilometres for the frequency band 14–14.5 GHz, and 300 kilometres for the frequency band 5925–6425 MHz.

All of this comes against a background of continuous growth in demand for spectrum from almost all radiocommunication sectors. Shipping, through IMO, has a clear interest at WRC-15 in safeguarding the current use of spectrum allocated to existing maritime services.

Looking ahead, two major projects currently under consideration within IMO will require amendments to the Radio Regulations in the near future: notably the review of the Global Maritime Distress and Safety System; and the implementation of e-navigation — which, collectively, will serve to enhance both efficiency and safety at sea.

Since its establishment in 1959, IMO and its member States, in close cooperation with ITU and other international organizations, notably the World Meteorological Organization (WMO), the International Hydrographic Organization (IHO), the International Mobile Satellite Organization (IMSO) and the Cospas-Sarsat partners, have striven to improve maritime distress and safety radiocommunications, as well as security-related and other maritime radiocommunications.

At WRC-15, IMO will continue to provide the necessary information for consideration of these along with other important items, while seeking to ensure that spectrum allocated for maritime related use remains adequate and appropriate.

Spectrum saves lives — Harmonization saves money

Phil Kidner

Chief Executive, TCCA

As society embraces the benefits that come with mobile broadband services, emergency services such as police, fire and ambulances can also benefit from broadband. But over and above what is available on the commercial market, emergency services have additional requirements that must be met. Emergency service employees work in difficult and sometimes very dangerous situations in order to help us. At the 2015 ITU World Radiocommunication Conference in Geneva (WRC-15), there will be an opportunity to make spectrum available for emergency service communication, or "mission critical communication", to help Save Lives and Save Money.

Mission critical communication is facilitated by reliable and secure mobile communication systems which are vital to ensure the continuous availability of critical

services during emergencies. Typical users of mission critical communications are law enforcement and other emergency services for public protection and disaster relief (PPDR) operations. Mission critical mobile communication equipment includes hardware and software, as well as the radio-frequency band (spectrum) capacity needed to transmit and share information between field units and command centres.

PPDR organizations are mandated by law to deliver an extremely high standard of service to society. In order to successfully perform mission critical operations, they require mission critical information and communication solutions for voice and broadband data. These communication systems are essential for PPDR organizations to solve crimes, fight fires, rescue accident victims, and otherwise respond to public emergencies, saving lives and property every day.

Mission critical operations require robust, available and secure communications, which cannot be ensured by relying solely on commercial radio providers. The view of the PPDR community is that it is essential for government organizations to control enough radio spectrum harmonized in one global range in order for them to deliver critical services to society. Consequently, the entire PPDR sector encourages governments, through their regulators, to recognize the societal needs for effective PPDR services and to work towards securing a global harmonized broadband range at WRC-15.

Considerations for mission critical communications

Mobile broadband offers the opportunity for the development and use of enhanced communication for mission critical operations. However, since there is a tendency to auction off spectrum to commercial mobile network operators, it is very easy to fall into the trap of attempting to source mission critical communication services through the commercial market. When PPDR services are provided by commercial mobile network operators, spectrum capacity is shared with businesses and the general public, even during major incidents where life and property are at stake. Experience teaches us that commercial operators are unable to always guarantee the availability, security and stability of communications, especially when reliable communications are most needed, and when time is a vital factor.

If mission critical services from commercial MNO providers are to be considered for delivering PPDR communication services, questions about coverage, priority access, pre-emption, roaming, interoperability and security need to be taken into account and discussed in detail — specifically from a PPDR perspective. PPDR also needs coverage where there is no population. While MNO networks do have the ability to prioritize traffic, it is based on static differentiation between subscriptions, whereas PPDR needs a dynamic situational differentiation based on the task at hand, the situation, location and urgency. Such priorities are currently unavailable in commercial networks, and mobile network operators are not inclined to allow a PPDR Priority Management solution to operate as an application function on their networks.

Unlike broadband systems, today's narrowband PPDR radio systems are based on what has become known as the "4 Cs:"

- **Coverage:** Designed to meet an organization's specific requirements, whether people live there or not.
- **Capacity:** Engineered to address peak usage, using dedicated licensed spectrum and right-sized to each organization's specific needs, thus ensuring that calls always get through.
- **Cost:** Predictable costs, with no additional airtime fees such as those which can be associated with cell phones.
- **Control:** High degree of control over system requirements, design, priorities, features, and operation — allowing a control room to be fully in control.

It is important that mobile broadband systems for PPDR are not lacking in any of the 4 C elements inherent to narrowband PPDR radio systems that are in use today.

Traditional business cases for mobile communications that produce impact assessments often have difficulty in establishing clarity on the societal value of effective emergency services, as this subject can be highly political. Several regulators have stated that the societal value of effective emergency services cannot be included in establishing criteria for mobile operators. However, there are two overriding factors that make the case in favour of

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harmonized and identified spectrum for the emergency services — the need for better communication in the event of disasters, and the possibility of improved economics to provide more effective everyday emergency services.

How can harmonization save money?

It is not just about the equipment, the operator you use, the backhaul you use, or how you implement public safety services. PPDR services need allocation of additional frequency spectrum to improve the efficiency of mission critical communications as well as the safety of people and property. Spectrum is the most valuable resource in the wireless world. It is also a finite resource, and all reports indicate that broadband spectrum will become even scarcer under pressure from ever-increasing demand. The cost of trying to identify the necessary spectrum for PPDR later will be even greater, and it will continue to grow as time passes. It would be a travesty to miss the opportunity now.

If PPDR systems were to operate on harmonized spectrum globally, then law enforcement and other emergency services could also benefit from being able to use equipment from the same vendors, greatly reducing the cost to build and operate their mission critical communication systems. This would also allow them to provide international mutual aid support when emergencies occur across borders, since they would all use similar equipment. Thus, not only would the cost of acquiring spectrum be lower, the cost of acquiring and maintaining equipment would also be much lower with the global harmonization of spectrum.

PPDR service agencies have to be in control. By exercising control over traditional narrowband voice services, many public safety organizations across the world have benefited from the best voice service they have ever had. This has drastically reduced communication problems in dealing with public order situations. We need to have similar control over mobile data spectrum.

Now is the time!

WRC-15 is a unique opportunity — we cannot let this chance slip between our fingers. The organizations responsible for PPDR are convinced that their need for mission critical broadband services can only be met by an agreed spectrum, coordinated on a global scale and identified at the national level.

The PPDR community needs your help — "Spectrum saves lives".

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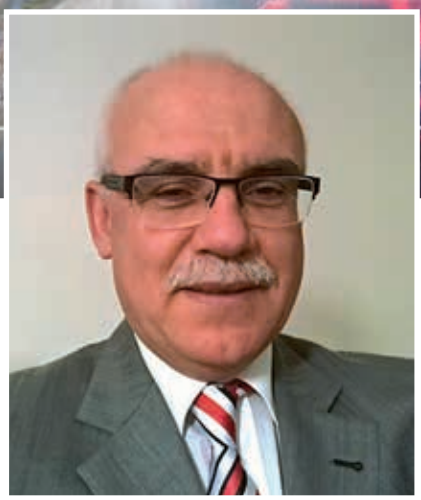


Radars in cars

Fatih Mehmet Yurdal

Ex-President, Information and Communication Technologies Authority (ICTA), Turkey

Road safety is a public health priority and a crucial element in the protection of people and the environment. About 1.3 million people die each year in traffic accidents on the world's roads and between 20 and 50 million sustain non-fatal, albeit often serious, injuries. On average, 3500 people die on the roads every day. Children, pedestrians, cyclists and older people are among the most vulnerable road users.

According to data provided by the United States National Highway Traffic Safety Administration (NHTSA), traffic fatalities were recorded as follows for 2011–2013 in the United States:

- 2011 — 32 367 fatalities
- 2012 — 33 561 fatalities
- 2013 — 32 719 fatalities

Taking into account the high number of road accident fatalities worldwide, the United Nations, in 2010, officially proclaimed a Decade of Action for Road Safety

2011–2020, with the aim of stabilizing and then reducing global road deaths by 2020.

Leading road safety experts believe that, with the right action, up to five million lives could be saved and 50 million injuries prevented worldwide during the 2011–2020 Decade of Action.

People cannot abstain from mobility even though it carries the risk of negative consequences. Safer mobility can be achieved by reducing the negative impacts.

Apart from the standard measures in place to prevent road accidents, the use of information and communication technologies (ICT) is needed, more and more, to enhance security.

Preventing accidents with radar

One possibility with a high potential for reducing accidents are radar systems mounted in every type of vehicle. Automotive radar applications are playing a key role in the long-term goal of reducing accidents.

Demanding requirements in this regard are higher range resolution, better object discrimination, high spatial resolution and reduced mutual interference.

Studies have shown that the use of collision avoidance technology can reduce the severity of a significant number of traffic accidents. In certain parts of the world, automotive radars have successfully operated in recent years, particularly in the 76–77 GHz band, without increased reports of interference to licensed services operating in this band.

Considering frequency ranges

In order to facilitate the development and deployment of automotive high resolution radar systems, the radiocommunication frequency ranges have been considered at 24 GHz on a temporary basis due to incompatibilities with existing services, and 79 GHz on a permanent basis in a number of countries, in particular in Europe.

The 79 GHz band (76–81 GHz) is thus considered to be the long-term operating frequency for automotive high-resolution radar systems.

The 76–77 GHz band has already been in use for automotive radar applications, for low-resolution applications up to 300 m away from the front end of the car, whereas the 77–81 GHz range is foreseen for high-resolution radars, up to 100 m distance from the car, to detect smaller objects, such as children and bicycles in order to brake in a timely manner.

The 77–77.5 GHz and 78–81 GHz bands are already allocated to the radiolocation service on a primary basis, which are intended to be used by high-resolution automotive radars. The only non-allocated band of 500 MHz is 77.5–78 GHz, and the ITU Radiocommunication Sector (ITU–R) is considering allocating this band also to the radiolocation service (RLS) to be used by automotive radar applications.

The World Radiocommunication Conference (WRC-12) adopted a resolution and an agenda item (AI 1.18) for WRC-15, which reads "… to consider a primary allocation to the radiolocation service for automotive applications in the 77.5–78.0 GHz frequency band in accordance with Resolution 654 (WRC-12)".

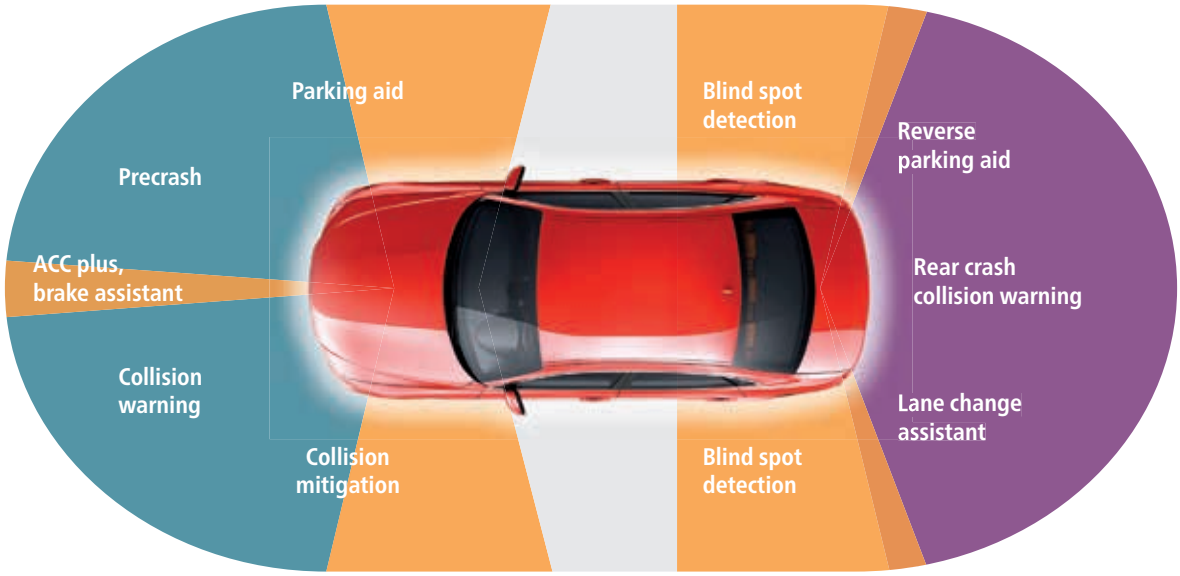
The additional allocation of this band segment for the RLS will lead to a contiguous band for the RLS between 76 and 81 GHz on a primary basis to support automotive radar applications. The use of these frequencies will enable automobile manufacturers to develop a range of applications that will improve safety in a vehicle's immediate environment.

Advantages of radar

The main advantage of radar systems is independence against varying light conditions and robustness against adverse weather conditions (rain, snow, fog).

The main projected applications of high-resolution automotive radars are:

Adaptive Cruise Control (ACC), Collision Warning System (CWS), Collision Mitigation



System (CMS), Vulnerable Road User Detection (VUD), Blind Spot Detection (BSD), Lane Change Assistance (LCA) and Rear Cross Traffic Alert (RCTA). Some of these applications are used for safety related aspects, while some others are meant to augment the comfort of drivers and passengers.

These applications are shown in the figure on the basis of placement of the radars (front, sides or rear) around the car.

Several studies have shown different advantages of the use of the 79 GHz band for automotive radar applications. Because of the possibility of using the 4 GHz contiguous band in the 79 GHz range, better target discrimination capability will be available. Also, spatial resolution to enhance precise location determination, essential for safety-critical applications, is directly linked to the available bandwidth.

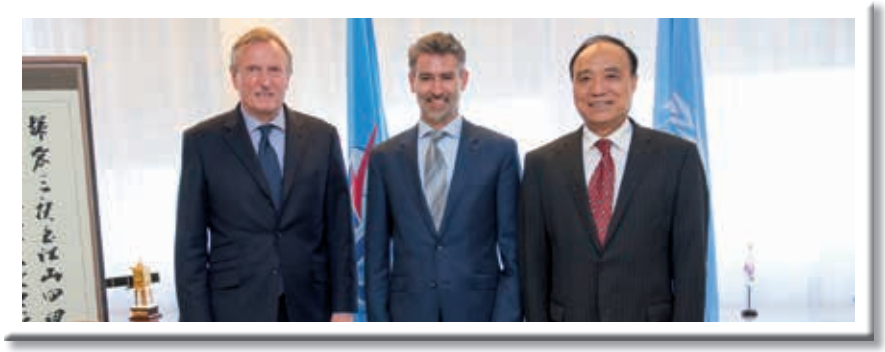
The last word is: "The wider the used bandwidth, the better the spatial resolution will be".

Allocation of the 77.5–78.0 GHz band to the radiolocation service (in accordance with Agenda item 1.18) by WRC-15 is, therefore, essential for the proper implementation of automotive radars in cars to successfully reduce traffic fatalities worldwide.

Official Visits

During June, July, August and September 2015, courtesy visits were made to ITU Secretary-General Houlin Zhao by the following ministers, ambassadors to the United Nations Office and other international organizations in Geneva.

Houlin Zhao, ITU Secretary-General and Beatriz Londoño Soto, Ambassador of Colombia



From left to right: Malcolm Johnson, ITU Deputy Secretary-General; Julian Braithwaite, Ambassador of the United Kingdom; and Houlin Zhao, ITU Secretary-General

John Paton Quinn, Ambassador of Australia

Ana María Menédez Pérez, Ambassador of Spain

Guled Hussein Kassim, Minister of Post and Telecommunications, Somalia

Rytis Paulauskas,
Ambassador of Lithuania

Eviatar Manor,
Ambassador of Israel

Elisabeth Laurin,
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Atageldi Haljanov,
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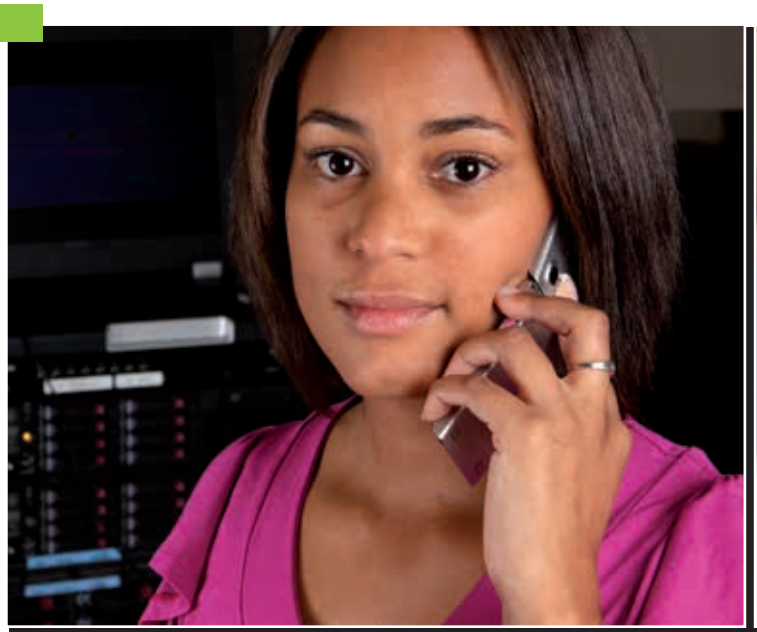

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