



ITU Backgrounders

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ITU-R: MANAGING RADIO FREQUENCY SPECTRUM FOR THE WORLD

ITU, through its Radiocommunication Sector (ITU-R), is the sole global agency responsible for management of the radio frequency spectrum and satellite orbit resources.

With the relentless expansion 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 ITU-R work is therefore increasing every day.

ITU-R Sector activities include four main areas:

1. Establishment and updating of international regulations on the use of the radio-frequency spectrum and satellite orbits

Radio Regulations (RR)

A key component of international frequency management is the Radio Regulations, 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, radionavigation, meteorological monitoring, space research and Earth exploration, as well as amateur radio, the Radio Regulations encompass over 2,000 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 (WRCs)

ITU-R reviews and updates the Radio Regulations through World Radiocommunication Conferences, which meet every three to four years. The most recent conference, held in Geneva from 23 January to 17 February 2012, welcomed a staggering 3000+ delegates representing 165 out of ITU's 193 Members States, along with representatives from 100 Observers from among ITU's 700 private sector members and international organizations. The next WRC will be held in Geneva, Switzerland from 2 to 27 November 2015 – see www.itu.int/go/ITU-R/wrc-15.

WRCs revise the way radio spectrum is used and shared around the world, bringing together governments to negotiate the relevant parts of the Radio Regulations and commit to the modifications to this 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 worldwide levels. Many of these stakeholders also serve as members of national delegations at the conference itself. This multi-stakeholder approach enables the necessary consensus



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to be built to ensure that WRCs maintain a stable, predictable and universally applied regulatory environment which secures long term investments for a multi-trillion dollar industry.

The four-week programme of a WRC includes the review and update of 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 attempts 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,
- between the need to accommodate new and innovative systems, applications and technologies as they arise and the need to protect existing radiocommunication services.

KEY TOPICS TO BE ADDRESSED AT THE WORLD RADIOCOMMUNICATION CONFERENCE 2015:

- **Mobile broadband communications:** Provision of additional frequencies to meet the rapidly growing demand for mobile broadband communications.
- **Emergency communications and disaster relief:** Frequencies and guidelines for the operation of advanced public protection and disaster relief communication systems,
- **Monitoring the environment and climate change:** new allocations for Earth observation systems to provide higher resolution imagery.
- **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.
- **Unmanned aircraft and wireless avionics systems:** spectrum requirements for unmanned aircraft systems, and wireless avionics systems to allow the heavy and expensive wiring used in aircraft to be replaced by wireless systems.
- **Road Safety:** frequencies for short range, high resolution radars for collision avoidance systems in cars.
- **Enhanced maritime communications systems:** spectrum demands for on-board communication on ships and provisions for enhanced communications systems.
- **Operation of satellite systems:** spectrum for broadband satellite systems, provisions for earth stations on board moving platforms such as ships and aircraft, and improved coordination procedures to make more efficient use of the spectrum and satellite orbits.



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Radio regulations Board (RRB)

The international regulations on spectrum, as adopted by WRCs, are complemented by Rules of Procedure (RoPs), which, where necessary, explicit or clarify the way in which the provisions of the RR are to be applied. These RoPs are adopted by the Radio Regulations Board (RRB), which consists of twelve elected members selected for their qualification, experience and regional representation.

2. Implementation and application of international regulations on the use of the radio-frequency spectrum and satellite orbits

The RR contain a number of regulatory provisions and procedures which describe how the administrations from the 193 ITU Member States may acquire and exercise rights to use spectrum in the various frequency bands allocated for this purpose, and the corresponding obligations. These rights and obligations may then be transferred to the operators of each specific radiocommunication stations through a license delivered by or on behalf of the government of the corresponding country.

Administrations apply these provisions and procedures on a daily basis, in close interaction with the ITU **Radiocommunication Bureau (BR)**.

International Frequency database

A key element of international frequency management is the **Master International Frequency Register (MIFR)**. The MIFR is a database which contains the spectrum characteristics ("frequency assignments") of the radio stations in operation throughout the world and confers to these stations international recognition and protection against interference. This database is managed by the BR and currently contains 2.3 Million frequency assignments and over 200,000 are added every year.

The procedures to record new frequency assignments in the MIFR are designed to ensure that every new spectrum usage in a particular geographical location is compatible with the ones previously received. In many cases, coordination between the administrations and operators involved is necessary to ensure this compatibility.

Application of these procedures ensures an interference-controlled environment for both terrestrial and satellite systems and guarantees equitable access to use of the resources of the frequency spectrum and geostationary-satellite orbit.

The BR regularly reviews the content of the MIFR to ensure that it is consistent with actual use. It publishes the list of maritime and coast radio stations, which is key element in ensuring safety of life at sea. It also provides assistance to administrations in applying these procedures and in resolving cases of harmful interference, which currently concerns 1 in 10'000 assignments.

When situations arise of disagreement between administrations or between administrations and the BR, the RRB may consider the issue. In this case, any decision by the RRB may be appealed to the following WRC.



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TODAY'S SUCCESSES LEADING 'TOMORROW'S TECHNOLOGY'

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Examples of cutting-edge products and services based on ITU-R Recommendations include broadband wireless access systems, Ultra High Definition Television (UHDTV), 3DTV and Intelligent Transport Systems (ITS), Short-Range Devices (SRDs) and Ultra Wide Band (UWB). See <http://youtu.be/hT2XluvAjwQ> and 3DTV on <http://www.engadget.com/2012/06/01/itu-ultra-hdtv-3d-tv-standards/> What's more, ITU-R is currently extending its IMT framework – the current platform for 3G and 4G mobile – to enhance support for broadband multimedia services and to take into account the rapidly growing requirement for machine to machine communications leading up to 2020 and beyond.

ITU-R is currently finalizing its view of a timeline towards "IMT for 2020 and beyond". The detailed investigation of the key elements of "5G" are already well underway, once again utilizing the highly successful partnership ITU-R has with the mobile broadband industry and the wide range of stakeholders in the "5G" community.

In 2015, ITU-R plans to finalize its "Vision" of the "5G" mobile broadband connected society. This view of the horizon for the future of mobile technology will be instrumental in setting the agenda for the World Radiocommunication Conference 2015, where deliberations on additional spectrum will take place in support of the future growth of IMT.

3. Establishment and updating of worldwide Recommendations, Reports and Handbooks for the most efficient use of the radio-frequency spectrum and satellite orbits

Worldwide technical standards

The Radiocommunication Sector also plays a central role in developing global standards for radio-based telecommunications systems, including terrestrial and space systems. These Worldwide technical standards (ITU-R Recommendations) are developed within the Sector's six [Study Groups](#), which gather experts drawn from government, industry, academia and regional and international organizations, who collaborate in establishing the characteristics of the systems and services that will define tomorrow's wireless landscape. Another important role of ITU-R Study Groups is to conduct the technical, economic, regulatory and operational studies in preparation and in support of WRC decisions.



ITU-R
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In ITU-R Study Group meetings, representatives from different horizons get together to define new platforms, from enhancements to today's IMT-2000/IMT-Advanced systems (3G/4G mobile) to the future development of mobile broadband communications. Together with worldwide allocations and global identification of frequency bands by WRCs for harmonized use, these recommendations ensure maximum economies of scale for the development of affordable radiocommunications for the general public, thus bridging the digital divide.

ITU-R Recommendations aren't just good for business – driving economies of scale and economic development, providing more flexibility in choosing partners and service providers and allowing more efficient use of spectrum to respond to traffic growth and new applications – they are essential to the proper and spectrally efficient functioning of radio equipment in an environment where everyone is now effectively using spectrum resources.

4. Information and assistance to ITU-R membership in radiocommunication matters

In order to inform and assist its membership of the results of its activities in adopting international regulations, global standard and best practices on spectrum use, the ITU-R also holds regularly seminars, workshops and symposia. See www.itu.int/go/ITU-R/seminars.

These address a range of hot issues currently, ranging from broadband and mobile applications, transition to digital television and allocation of the digital dividend, WRC preparations, efficient use of the spectrum/orbit resource, emerging spectrum management techniques, like Dynamic Spectrum Access and cognitive radio, such as TV White Spaces.

This activity is part of the efforts of the ITU to promote at all levels the creation of an enabling environment for the development of a sustainable and efficient use of spectrum at the most affordable price in all regions of the world.