

## Report on ITU World Radiocommunication Conference 2015

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### Abstract

The International Telecommunication Union (ITU) World Radiocommunication Conference 2015 (WRC-15) was held in Geneva, Switzerland in November 2015. This conference is normally held every three or four years to discuss updating the Radio Regulations (RR), a formal document issued by the ITU. The RR is enforced on the ratifying member states as international regulations regarding radiocommunication in the ITU Constitution and Convention. The RR is updated after each WRC, and national regulations such as the Radio Law in Japan are enacted accordingly. This article reports on the results of WRC-15.

*Keywords: WRC-15, World Radiocommunication Conference, RA-15*

### 1. Introduction

The World Radiocommunication Conference (WRC) is the largest international conference in the International Telecommunication Union - Radiocommunication Sector (ITU-R)\*<sup>1</sup> to discuss updating the Radio Regulations (RR) and is normally held every three or four years. The RR provides international rules and regulations for allocation of the spectrum to radio services, use of satellite orbits, and administrative and operational procedures for radio stations. The RR must be updated based on the results of the WRC in order to allocate the spectrum to new services. The last WRC, WRC-15, was held November 2–27 in Geneva, Switzerland (Fig. 1). Approximately 3800 participants from 162 member states attended WRC-15, including 82 delegates from Japan [1].

In the RR, the world is divided into three regions, as shown in Fig. 2, and frequencies are allocated to services in each region. As shown in the figure, there are four regional telecommunication organizations in Region 1, and one organization each in Regions 2 and 3. Japan is a member of the Asia-Pacific Telecom-

munity (APT)\*<sup>2</sup> in Region 3. Reaching consensus in the APT is very important in order to carry out Japan's policy on usage of the spectrum.

The structure of WRC-15 is shown in Fig. 3. The chairman of the Plenary, which coordinates all conference activities, is Mr. Daudu. He is the first WRC chairman from Africa. Under the Plenary, there are seven committees (COMs 1–7), as shown in Fig. 3. COM 4, COM 5, and COM 6 respectively discussed terrestrial/aeronautical/maritime matters, satellite matters, and general issues/new agenda items. At WRC-15, 36 agenda items listed in Table 1 were discussed, and an output document called the Final Acts was produced [2]. The agenda item on Global Flight Tracking (flight tracking system by satellite) was newly established in response to an aviation accident, and the discussion on this item resulted in a

\*1 ITU-R: The sector of ITU that develops regulations and standards for radiocommunication systems.

\*2 APT: A regional telecommunication organization in accordance with the Constitution of the International Telecommunication Union. As of January 2016, 38 countries in the Asia-Pacific region were members of APT.



Fig. 1. WRC-15 meeting in session.

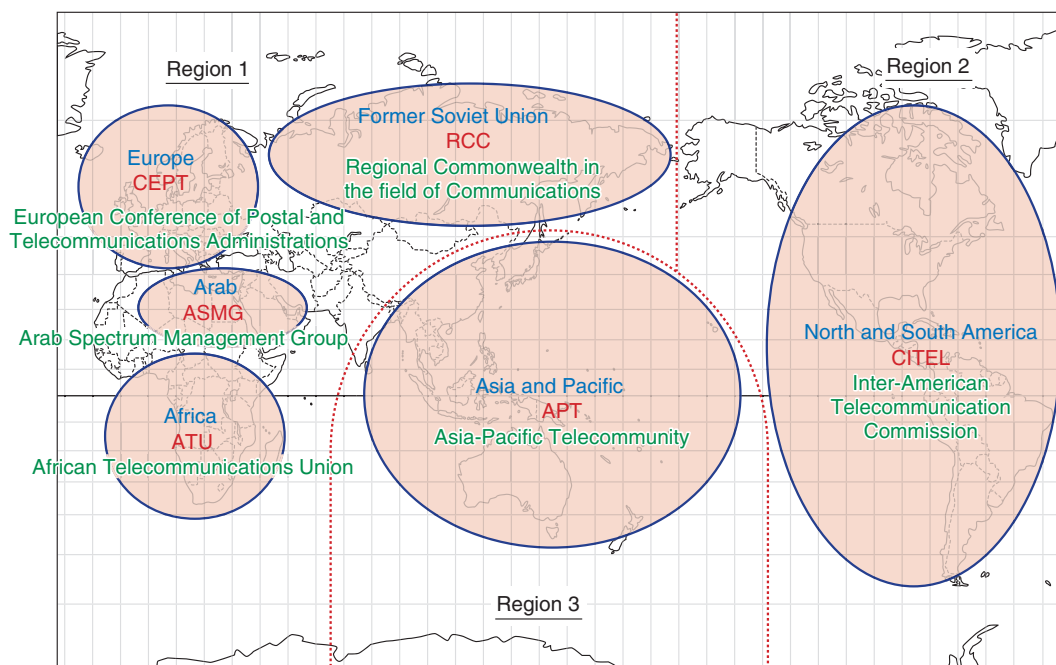


Fig. 2. Regions in the RR and regional telecommunication organizations.

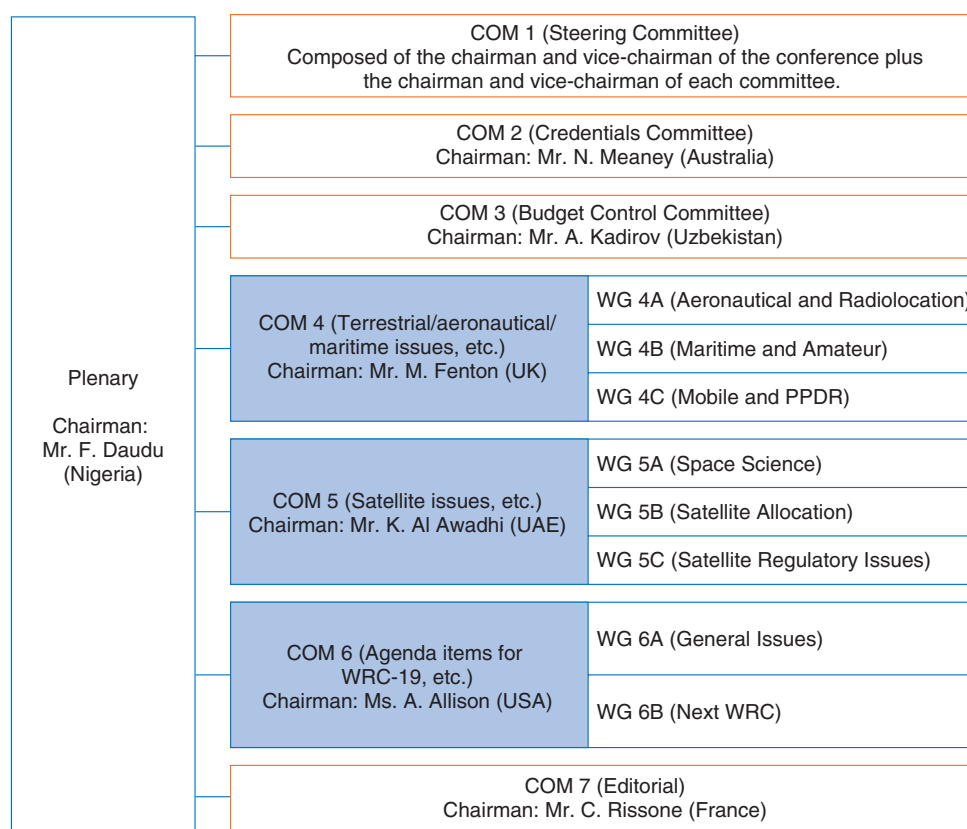


Fig. 3. Structure of WRC-15.

resolution to allocate the same frequency band (1090 MHz) as terrestrial flight tracking systems.

### 1.1 Identification of additional frequency bands for International Mobile Telecommunications

In response to strong demand for International Mobile Telecommunications (IMT), the identification of additional frequency bands for IMT was discussed, after which it was resolved to identify the new frequency band of 1.5 GHz (1427–1518 MHz) as a global IMT band, which is already used in Japan.

### 1.2 Additional allocation to satellite services

Additional allocation to satellite services such as the fixed satellite service (FSS) and the mobile satellite service (MSS) was also discussed at WRC-15. Under agenda item 1.6.2, “Possible primary allocations to the FSS (Earth-to-space) of 250 MHz in Region 2 and 300 MHz in Region 3 within the range 13–17 GHz,” additional allocation in the frequency band of 14.5–14.8 GHz was resolved with some con-

ditions, for example, to prohibit the deployment of earth stations within a distance of 500 km from neighboring countries.

Regarding agenda item 1.10, “To consider spectrum requirements and possible additional allocations for the MSS within the frequency range from 22 GHz to 26 GHz,” although the RCC (Regional Commonwealth in the field of Communications; Russian Federation) was strongly in favor of additional allocations, no allocations were agreed to after a long discussion. As for agenda item 1.9.2, “The possibility of allocating the bands 7375–7750 MHz and 8025–8400 MHz to the maritime MSS (MMSS),” it was resolved to allocate the frequency band of 7375–7750 MHz to the MMSS with the condition that stations in the MMSS shall not claim protection from interference from radio stations in the terrestrial services. The results of these agenda items will therefore have no harmful influence on stations in the terrestrial services in Japan.

Table 1. Agenda items of WRC-15.

No.	Agenda item
1.1	Studies on frequency-related matters on International Mobile Telecommunications and other terrestrial mobile broadband applications
1.2	Use of the frequency band 694–790 MHz by the mobile, except aeronautical mobile, service in Region 1 and related studies
1.3	Studies to support broadband public protection and disaster relief
1.4	Possible allocation to the amateur service on a secondary basis at around 5300 kHz
1.5	Use of frequency bands allocated to the fixed-satellite service not subject to Appendices 30, 30A and 30B for the control and nonpayload communications of unmanned aircraft systems in nonsegregated airspaces
1.6	1. Possible additional primary allocation to the fixed-satellite service (Earth-to-space and space-to-Earth) of 250 MHz in the range between 10 GHz and 17 GHz in Region 1 2. Possible additional primary allocation to the fixed-satellite service (Earth-to-space) of 250 MHz in Region 2 and 300 MHz in Region 3 within the range 13–17 GHz
1.7	Studies on compatibility between new systems of the aeronautical radionavigation service and the fixed-satellite service (Earth-to-space) (limited to feeder links of the non-geostationary mobile-satellite systems in the mobile-satellite service) in the frequency band 5091–5150 MHz
1.8	Provisions relating to earth stations located on board vessels which operate in fixed-satellite service networks in the uplink bands 5925–6425 MHz and 14–14.5 GHz
1.9	1. Possible new allocations to the fixed-satellite service in the frequency bands 7150–7250 MHz (space-to-Earth) and 8400–8500 MHz (Earth-to-space) 2. Possibility of allocating the bands 7375–7750 MHz and 8025–8400 MHz to the maritime-mobile satellite service and additional regulatory measures
1.10	Additional primary allocations to the mobile-satellite service within the bands from 22 GHz to 26 GHz
1.11	Allocation for the Earth exploration-satellite service (Earth-to-space) in the 7–8 GHz range
1.12	Possible extension of the current worldwide allocation to the Earth exploration-satellite (active) service in the frequency band 9300–9900 MHz by up to 600 MHz within the frequency bands 8700–9300 MHz and/or 9900–10,500 MHz
1.13	Use of the band 410–420 MHz by the space research service (space-to-space)
1.14	Future of the Coordinated Universal Time time-scale
1.15	Consideration of improvement and expansion of on-board communication stations in the maritime mobile service in the ultrahigh frequency band
1.16	Consideration of regulatory provisions and spectrum allocations for enhanced Automatic Identification System technology applications and for enhanced maritime radiocommunication
1.17	Consideration of regulatory actions, including allocations, to support wireless avionics intra-communications
1.18	Allocation of the band 77.5–78 GHz to the radiolocation service to support automotive short-range high-resolution radar operations
2	Examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly
4	Review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation
7	Possible changes, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks
8	Delete country footnotes or have country name deleted from footnotes, if no longer required
<AI 9*>	1. Protection of the systems operating in the mobile-satellite service in the band 406–406.1 MHz (Issue 9.1.1) 2. Studies on possible reduction of the coordination arc and technical criteria used in application of No. 9.41 in respect of coordination under No. 9.7 (Issue 9.1.2) 3. Use of satellite orbital positions and associated frequency spectrum to deliver international public telecommunication services in developing countries (Issue 9.1.3) 4. Updating and rearrangement of the Radio Regulations (Issue 9.1.4)
9.1	5. Consideration of technical and regulatory actions in order to support existing and future operation of fixed-satellite service earth stations within the band 3400–4200 MHz, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in Region 1 (Issue 9.1.5) 6. Studies towards review of the definitions of fixed service, fixed stations and mobile stations (Issue 9.1.6) 7. Spectrum management guidelines for emergency and disaster relief radiocommunication (Issue 9.1.7) 8. Regulatory aspects for nano- and picosatellites (Issue 9.1.8)
9.2	Any difficulties or inconsistencies encountered in the application of the Radio Regulations
9.3	Action in response to Resolution 80 (Rev.WRC-07)
<New item>	Global Flight Tracking
10	Preliminary agenda for the 2019 World Radiocommunication Conference

\* Report of the Director of the Radiocommunication Bureau



### 1.3 Review of provisions related to earth stations on board vessels

At WRC-03 held in 2003, it was decided to allow earth stations on board vessels (ESV) to use certain frequency bands allocated to the FSS. In this case, to prevent harmful interference to stations in the terrestrial services, Resolution 902 (WRC-03) was agreed to, which prohibits the use of ESV within a certain distance from coastal lines. The required distances are 125 km for the Ku band (14–14.5 GHz) and 300 km for the C band (5925–6425 MHz). In agenda item 1.8 at WRC-15, the possible revision of these distances was discussed. As a result, it was resolved that no revision to Resolution 902 (WRC-03) would be made, and footnote No. 5.457A in the RR was revised so that the use of ESV is allowed with a separation distance of 330 km from coastal lines with a minimum antenna diameter of 1.2 m for the C band. These results do not affect existing ESV services using the Ku band.

### 1.4 Agenda items for WRC-19

Thirty-three agenda items for the next WRC (WRC-19), to be held in 2019, are listed in **Table 2**. The group responsible for each agenda item at WRC-19 was decided at the first session of the Conference Preparatory Meeting (CPM19-1), which was held immediately after the close of WRC-15. Studies on these agenda items are carried out in ITU-R Study Groups for the study period of 2016–2019 (**Fig. 4**). Japan proposed four agenda items for WRC-19, and all were approved. The proposed agenda items are as follows:

- Global or regional harmonized frequency bands for evolving Intelligent Transport Systems (Agenda item 1.12);
- Identification of frequency bands for the future development of IMT (5G) in the frequency range 24.25–86 GHz (Agenda item 1.13);

- Identification of frequency bands for applications in the land mobile and fixed services operating in the frequency range 275–450 GHz (Agenda item 1.15);
- Studies concerning Wireless Power Transmission for electric vehicles (Agenda item 9.1 Issue 9.1.6).

Some other agenda items for WRC-19 adopted in WRC-15 are as follows:

- Global or regional harmonized frequency bands for railway radiocommunication systems between train and trackside (Agenda item 1.11);
- High-altitude platform stations (Agenda item 1.14);
- Issues related to wireless local area networks in the frequency bands 5150–5925 MHz (Agenda item 1.16).

The discussion on item 1.16 is based on contributions from the Inter-American Telecommunication Commission and multiple European countries. As a result, it was decided that the frequency bands of 5150–5470 MHz and 5725–5925 MHz will be considered. In addition, agenda items of WRC-23, which will be held after WRC-19, were also discussed, and it was decided that a review of the leap second (WRC-15 agenda item 1.14) will be discussed at WRC-23 toward abolishing leap seconds.

## 2. ITU Radiocommunication Assembly 2015 (RA-15)

Preceding WRC-15, ITU Radiocommunication Assembly 2015 (RA-15) was held from 26–30 October 2015 at the same venue as that of WRC-15. RAs are convened to set the overall direction such as to decide study items for the next study period, and they are usually associated in time and place with the WRCs. Approximately 460 participants from 107 member states attended RA-15, including 30

### Column—Languages used in international meetings—

The ITU is a specialized agency of the United Nations (UN) for information and communication technologies. The official languages of ITU are Arabic, Chinese, English, French, Russian, and Spanish in accordance with Article 29 of the Constitution of the ITU as well as the official languages of the UN. The Constitution also states that the original documents are to be written in French, and the seating order at meetings is based on the alphabetical order of the French names of the member states. At the Plenary, simultaneous interpreters of six languages are available, and texts in six languages are provided. Participants can download documents in their preferred language and attend conferences using their preferred language voice channels.

Table 2. Agenda items of WRC-19.

No.	Agenda item	Responsible group
1.1	Allocation of the frequency band 50–54 MHz to the amateur service in Region 1	WP 5A
1.2	Establishment of in-band power limits for earth stations operating in mobile-satellite service, the meteorological-satellite service and the Earth exploration-satellite service in the frequency bands 401–403 MHz and 399.9–400.05 MHz	WP 7B
1.3	Consideration of possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460–470 MHz	WP 7B
1.4	Consideration of possible revision of Annex 7 to Appendix 30 of the Radio Regulations	WP 4A
1.5	Use of the frequency bands 17.7–19.7 GHz (space-to-Earth) and 27.5–29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service	WP 4A
1.6	Studies of technical, operational issues and regulatory provisions for non geostationary fixed-satellite services satellite systems in the frequency bands 37.5–39.5 GHz (space-to-Earth), 39.5–42.5 GHz (space-to-Earth), 47.2–50.2 GHz (Earth-to-space) and 50.4–51.4 GHz (Earth-to-space)	WP 4A
1.7	Studies to accommodate requirements in the space operation service for non-geostationary satellites with short duration missions	WP 4A
1.8	Consideration of regulatory provisions for updating and modernization of the Global Maritime Distress and Safety System	WP 5B
1.9	1. Autonomous maritime radio devices operating in the frequency band 156–162.05 MHz	WP 5B
	2. Consideration of regulatory provisions and spectrum allocations to the maritime mobile-satellite service to enable the satellite component of the VHF Data Exchange System and enhanced maritime radiocommunication	WP 5B
1.10	Studies on spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System	WP 5B
1.11	Railway radiocommunication systems between train and trackside	WP 5A
1.12	Intelligent Transport Systems applications	WP 5A
1.13	Studies on frequency-related matters for International Mobile Telecommunications identification including possible additional allocations to the mobile services on a primary basis in portion(s) of the frequency range between 24.25 and 86 GHz for the future development of International Mobile Telecommunications for 2020 and beyond	TG 5/1
1.14	Facilitating access to broadband applications delivered by high-altitude platform stations	WP 5C
1.15	Studies towards an identification for use by administrations for land-mobile and fixed services applications operating in the frequency range 275–450 GHz	WP 1A
1.16	Studies concerning Wireless Access Systems including radio local area networks in the frequency bands between 5150 MHz and 5925 MHz	WP 5A
2	Revision of references to the text of ITU-R Recommendations incorporated by reference in the Radio Regulations /Use of incorporation by reference in the RR	CPM19-2
4	General review of the Resolutions and Recommendations of world administrative radio conferences and world radiocommunication conferences	CPM19-2
7	Implementation of Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference	---
8	Footnotes to the Table of Frequency Allocations in Article 5 of the Radio Regulations	---
<AI 9*> 9.1	1. Implementation of International Mobile Telecommunications in the frequency bands 1885–2025 MHz and 2110–2200 MHz (Issue 9.1.1)	WP 4C/WP 5D
	2. Compatibility of International Mobile Telecommunications and broadcasting-satellite service (sound) in the frequency band 1452–1492 MHz in Regions 1 and 3 (Issue 9.1.2)	WP 4A/WP 5D
	3. Study of technical and operational issues and regulatory provisions for new non-geostationary-satellite orbit systems in the 3700–4200 MHz, 4500–4800 MHz, 5925–6425 MHz and 6725–7025 MHz frequency bands allocated to the fixed-satellite service (Issue 9.1.3)	WP 4A
	4. Stations on board sub-orbital vehicles (Issue 9.1.4)	WP 5B
	5. Consideration of the technical and regulatory impacts of referencing Recommendations ITU-R M.1638-1 and ITU-R M.1849-1 in Nos. 5.447F and 5.450A of the Radio Regulations (Issue 9.1.5)	WP 5A
	6. Studies concerning Wireless Power Transmission (WPT) for electric vehicles (Issue 9.1.6)	WP 1B
	7. Studies to examine: whether there is a need for possible additional measures in order to limit uplink transmissions of terminals to those authorized terminals, etc. (Issue 9.1.7)	WP 1B
	8. Studies on the technical and operational aspects of radio networks and systems for machine-type communication infrastructures (Issue 9.1.8)	WP 5D
	9. Studies relating to spectrum needs and possible allocation of the frequency band 51.4–52.4 GHz to the fixed-satellite service (Earth-to-space) (Issue 9.1.9)	WP 4A
9.2	Report of the Director on any difficulties or inconsistencies encountered in the application of the Radio Regulations and the comments from administrations	---
9.3	Action in response to Resolution 80 (Rev.WRC-07)	---
10	Preliminary agenda for the 2023 World Radiocommunication Conference	---

\* Report of the Director of the Radiocommunication Bureau



Fig. 4. ITU-R Study Group structure, and chairmen and vice-chairmen for 2016–2019.

delegates from Japan [3]. Dr. Hashimoto (NTT DOCOMO) was appointed chairman of the Plenary. RA-15 approved 7 Recommendations, 33 Resolutions, and 200 Questions proposed from ITU-R Study Groups and members. RA-15 approved a Resolution to name the 5G mobile systems “IMT-2020.” It was also resolved at RA-15 to conduct studies on the Internet of Things in ITU-R, as well as in ITU-T SG 20. Additionally, RA-15 appointed the chairmen and vice-chairmen of the Study Groups. From Japan, Dr. Nishida of NHK was appointed chairman of SG 6, and Mr. Kawai of KDDI and Dr. Atarashi of NTT DOCOMO were appointed vice-chairmen of SG 4 and SG 5, respectively.

### 3. Future activities

The NTT Group will continue to participate and contribute to ITU-R and the relevant meetings towards WRC-19 in Japan and the Asia-Pacific region such as APT Conference Preparatory Group (APG) in order to promote the ongoing development and improvement of telecommunication services and guidelines throughout the world.

### References

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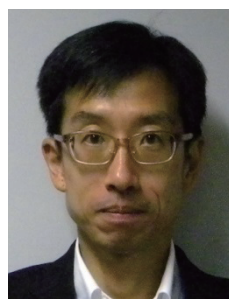
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