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Item 12 of the provisional agenda*
**Use of space technology in the United Nations
system**

The International Telecommunication Union: activities and agenda items of the World Radiocommunication Conference 2023

Paper Submitted by the International Telecommunication Union

1. The **International Telecommunication Union** (ITU) is the United Nations' specialized agency for information and communication technologies – ICTs. Founded in 1865 to facilitate international connectivity via the telegraph, it consists today of three sectors committed to connecting all the world's people: the ITU Radiocommunication Sector (ITU-R) allocates global radio spectrum and associated satellite orbits, the ITU Standardization Sector (ITU-T) develops the technical standards that ensure networks and technologies seamlessly interconnect, and ITU Development Sector (ITU-D) strives to improve access to ICTs to underserved communities worldwide.
2. At the ITU Plenipotentiary conference held in 2022 in Bucharest, Delegates of the 193 ITU Member States elected for a four-year term the Member States of the Council, the twelve members of the Radio Regulations Board and the senior management team of the organization composed of the Secretary-General, the Deputy Secretary-General, the three Directors of the Bureaux of the ITU sectors.¹
3. The **ITU Radiocommunication Sector** mission is to ensure the rational, efficient, economical and equitable use of the radio-frequency spectrum by all radio services, and any associated orbits, including the geostationary-satellite orbit.² In implementing this mission, ITU-R aims at creating the conditions for harmonized development and efficient operation of existing and new radiocommunication systems, taking due account of all parties concerned.
4. The primary objective of ITU-R is to ensure the operations of radiocommunication systems on Earth and in outer space free from harmful radio interference. Another of the ITU-R's objectives is to create harmonized use of the frequency spectrum. This is ensured through the implementation of an international

* A/AC.105/L.333.

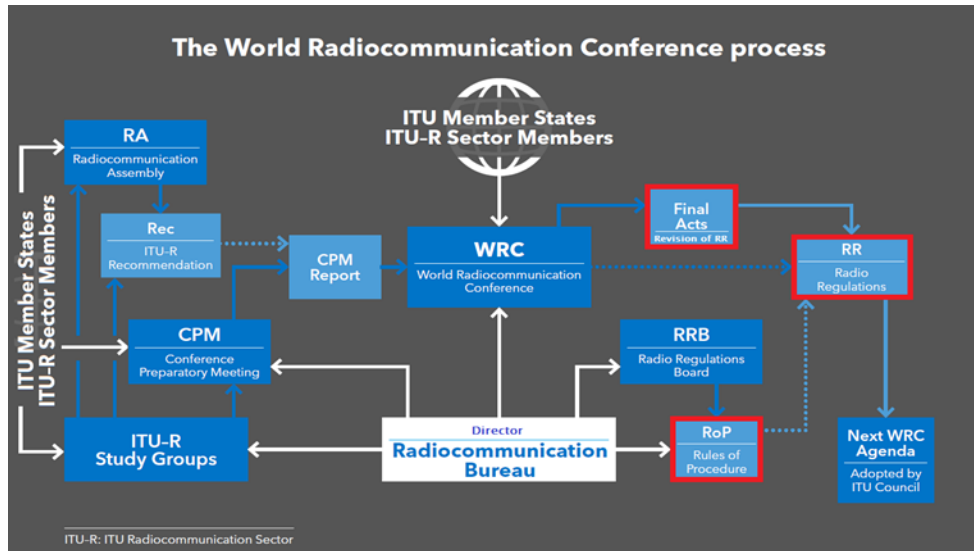
¹ <https://pp22.itu.int/en/elections/elections-results/>.

² Article 44 of the ITU Constitution.



treaty, the Radio Regulations³ (RR). This treaty has been evolving since 1906. It is reviewed and, if necessary, revised in an effective and timely manner within the framework of the World Radiocommunication Conferences (see Schema 1). In a three-to-four-year cycle between conferences, delegates from member States and sector members from industry, the private sector and academia carry out technical and regulatory analysis in study groups.⁴ The six ITU-R Study Groups (SGs) are structured per topic as follows: SG 1: Spectrum management, SG 3: Radiowave propagation, SG 4: Satellite services, SG 5: Terrestrial services, SG 6: Broadcasting service, SG 7: Science services.

Schema 1: The World Radiocommunication Conference process



5. It was in 1963 that space services and radio astronomy entered the RR and the Table of Frequency Allocation (RR Article 5). Since then, more than seventeen space services have been considered.

6. ITU-R establishes Recommendations, Reports and Handbooks on the following topics:

- Use of the radio-frequency spectrum in terrestrial and space radiocommunication and of the geostationary-satellite and other satellite orbits;
- Characteristics and performance of radio systems;
- Operation of radio stations;
- Radiocommunication aspects of distress and safety matters.

The ITU-R also carries out preparatory studies of the technical, operational and procedural matters to be considered by world and regional radiocommunication conferences.

7. For the space radio services, ITU-R manages the detailed coordination and recording procedures for satellite networks and systems, Earth stations and radio astronomy stations. The Radiocommunication Bureau (BR) is the secretariat of the ITU-R. It conducts regulatory and technical compatibility examinations of frequency assignment notices submitted in filings by national governmental authorities – administrations – in accordance with the Radio Regulations and its Rules of Procedure, for recording in the Master International Frequency Register (“Master Register”). ITU-R also develops and manages assignment or allotment plans for equitable access to the geostationary-satellite orbit. The BR publishes its examination

³ www.itu.int/pub/R-REG-RR/en.

⁴ www.itu.int/en/ITU-R/study-groups.

results and updates of the Master Register in the BR International Frequency Information Circular (space)⁵ every two weeks.

8. The ITU reports⁶ annually to the COPUOS Scientific and Technical Subcommittee on the use of the geostationary-satellite orbit and other orbits, including information on the satellite network filings submitted and included in the Master Register.⁷ The data of satellite network filings are available online.^{8, 9, 10}

9. The World Radiocommunication Conference in 2023 (**WRC-23**) will revise the Radio Regulations based on an agenda approved by the ITU Council, which takes into account recommendations made by the previous World Radiocommunication Conference in 2019.

10. The WRC-23 will:

- Revise the Radio Regulations and any associated frequency assignment and allotment plans;
- Address any radiocommunication matter of worldwide character;
- Instruct the Radio Regulations Board and the BR, and review their activities;
- Determine Questions for study by the Radiocommunication Assembly and its Study Groups in preparation for future Radiocommunication Conferences.

11. The Conference Preparatory Meeting (CPM) held from 27 March to 6 April 2023 prepared a consolidated report to support the ITU member States' preparation of proposals to the WRC-23 from 20 November to 15 December 2023. The work of this meeting is based on contributions from administrations, the Radiocommunication Study Groups, and other sources (Article 19 of the Convention (Geneva, 1992)) concerning the regulatory, technical, operational and procedural matters to be considered by World Radiocommunication Conferences. The CPM report contains the progress of the studies and the methods chosen for discussion and decision at the WRC.

12. The WRC-23 has nineteen agenda items (1.1 to 1.19), with eleven separate topics under the Agenda Item 7 and four more topics under Agenda Item 9. Amongst those agenda items and topics, the following are particularly related to the work of the COPUOS and its sub-committees.

13. **Agenda Item 1.6:** Consideration of regulatory provisions to facilitate the introduction of sub-orbital vehicles. Resolution 772 (WRC-19).

14. The ITU-R was invited to study the spectrum needs to accommodate radio stations¹¹ ("stations") on board sub-orbital vehicles in order to facilitate radiocommunications that support aviation to safely integrate sub-orbital vehicles into airspace and to ensure interoperability with international civil aviation. In addition to Method A with no change to the RR, Method B proposes a new WRC Resolution to operate radiocommunications for sub-orbital vehicles with no change to the Table of Frequency Allocation (RR Article 5). Method C aims to clarify the list of possible radio interference scenarios, including scenarios for the use of ground/Earth stations on board a sub-orbital vehicle in the part of the flight path in outer space, to continue studies concerning compatibility and sharing conditions.

15. A key issue under this agenda item is whether a station on a "sub-orbital" vehicle should be treated as a station in the terrestrial or space service since the regulatory

⁵ www.itu.int/en/ITU-R/space/Pages/brificMain.aspx.

⁶ A/AC.105/C.1/2023/CRP.24.

⁷ www.itu.int/en/ITU-R/space/snl/Pages/reportSTS.aspx.

⁸ www.itu.int/en/ITU-R/space/snl/Pages/default.aspx.

⁹ www.itu.int/sns/.

¹⁰ www.itu.int/en/ITU-R/space/ITUSpaceExplorer/Pages/default.aspx.

¹¹ RR No 1.61 defines a station as, "One or more transmitters or receivers or a combination of transmitters and receivers, including the accessory equipment, necessary at one location for carrying on a radiocommunication service, or the radio astronomy service."

procedure for each is different in nature and application. Moreover, if it is defined as a station in the “space service”, regulating “space-to-space” links between such stations may create challenges when the protection of incumbent services is considered.

16. **Agenda Item 1.12:** *Possible secondary allocation to the Earth exploration-satellite service active (EESS) for spaceborne radar sounders in the range of frequencies around 45 MHz Resolution 656 (Rev. WRC-19).*

17. This agenda item seeks a new secondary allocation to the EESS for spaceborne radar sounders within a range of frequencies around 45 MHz while taking into account the protection of incumbent services including those in adjacent bands. The five methods to address this agenda item at the WRC-23 propose the suppression of Resolution 656 (WRC-19). Four methods are proposing a modification of the RR to establish a new global secondary allocation to the EESS in the frequency band 40–50 MHz and a new footnote in the Table of Frequency Allocations (RR Article 5) including options of including relevant technical conditions to protect other services. One method is proposing no change.

18. **Agenda Item 1.13:** *Examination of a possible upgrade to primary status of the secondary allocation to the space research service (SRS) in the frequency band 14.8–15.35 GHz. Resolution 661 (WRC-19).*

19. The ITU-R assessed scenarios of a possible upgrade of the allocation to the SRS to primary status in the frequency band 14.8–15.35 GHz. The studies determined associated technical and regulatory conditions to ensure the protection of the current use and future development of the existing primary services and the radio astronomy service (RAS) in the adjacent 15.35–15.4 GHz band. Methods are proposed to address this agenda item at the WRC-23. All the methods and sub-methods support the suppression of Resolution 661 (WRC-19).

20. Method A proposes no change to the RR and maintains the status of the SRS allocation as secondary.

21. Methods B, C, D and E propose modifying some frequency allocations, specifying power flux-density limits, using protection criteria based on the I/N concept, adding commitments to protect RAS, adding coordination distances around SRS Earth stations and addressing concerns related to existing systems such as the aeronautical mobile service (AMS), and helicopter television transmission systems (HTTS) and deep space missions.

22. **Agenda Item 1.14:** *Review of frequency allocations for the Earth exploration-satellite service (EESS) (passive) in the frequency range 231.5–252 GHz and consideration of possible adjustment according to observation requirements of passive microwave sensors. Resolution 662 (WRC-19).*

23. This review based on studies considers a possible new primary frequency allocation to the EESS (passive) in the frequency bands 239.2–242.2 GHz and 244.2–247.2 GHz, to ensure alignment with more up-to-date remote sensing observation requirements, mainly Ice Cloud Measurements and atmosphere gases measurement, without unduly constraining the operation of other primary services. Two methods in addition to no change are proposed. Method A contains an implementation of power limits on the Fixed Service (FS) and Mobile Service (MS) in the frequency band 239.2–241 GHz. Method B switches the current FS and MS allocations in the frequency band 239.2–241 GHz to the frequency band 235–238 GHz and limitation of the EESS (passive) allocation in the 235–238 GHz to limb-sounding operations.

24. **Agenda Item 7 Topics A and B:** *non-geostationary orbit (non-GSO) constellations orbital tolerance and post-milestone deployment.*

25. Topic A focuses on establishing tolerances for certain orbital characteristics of non-GSO space constellations in the fixed, mobile, or broadcasting satellite services. The aim is to assess differences between recorded values in the Master International

Frequency Register (Master Register) and the actual deployment. Four methods are proposed, including draft resolutions and modifications to the RR and its Appendices. Topic B addresses the post-milestone procedure for non-GSO constellations that have completed deployment milestones but experience a sustained reduction in the number of space stations. Two methods provide options for maintaining operational flexibility while aligning with recorded frequency assignments.

26. **Agenda Item 7 Topics D, E, F, H and I:** *Space Plans for equitable access to GSO in the fixed or broadcasting satellite services.*

27. Topic D comprises three separate topics that achieved consensus within ITU-R. These topics address resolving regulatory inconsistencies and formalizing existing practices. Each topic has a single method to address it.

28. Topic E focuses on enhancing procedures for new member States to add their allotments to the Plan, specifically addressing the challenges they face in conducting coordination. The objective is to ensure equitable access to the GSO for all countries within the fixed-satellite service (FSS) frequency bands. Proposed methods include amendments to RR Appendix 30B and modifying the examination process for new national allotments.

29. Topic F aims to establish mechanisms that prevent one administration from obstructing the establishment of space systems by other countries, particularly in the feeder-link/uplink. This issue has been acknowledged in Resolution 170 (WRC-19). Methods to address this topic include amending RR Appendix 30A and introducing provisions for administrations to request the exclusion of their territory from the feeder-link service area of other satellite networks.

30. Topic H focuses on the enhanced protection of Space Plans in ITU Regions 1 and 3. The aim is to mitigate the degradation of the reference situation of assignments and allotments due to the “implicit agreement” aspect of the process in the RR Appendices 30/30A and 30B. Proposed regulatory solutions involve modifications to the respective articles and annexes of these Appendices.

31. Topic I addresses low overall aggregate carrier-to-interference levels (below 21 dB) in certain national allotments of the Space Plans of the RR Appendix 30B without changing the orbital position. The method proposes improving flexibility with a new type of agreement between administrations until the bringing into use of the assignment stemming from the national allotment.

32. **Agenda Item 7 Topic K:** *review of the special procedure in the Resolution 553 for enhancement of equitable access to broadcasting-satellite networks in the frequency band 21.14–22 GHz in ITU Regions 1 and 3 (Rev. WRC-15).*

33. Topic K aims to eliminate certain restrictions outlined in Resolution 553 (Rev. WRC-15) to enable administrations to effectively utilize the Resolution. These restrictions include limitations on the Resolution’s applicability to an administration only once, regardless of successful satellite network notification, and the inability to apply the Resolution if there is a pending request under the normal coordination procedure. In addition to the “no change” method, a method suggests removing the mentioned restrictions by modifying relevant paragraphs in the attachment to Resolution 553 (Rev. WRC-15). Although this method enhances the resolution’s usefulness, it still maintains limitations on the number of notified networks and the presence of a network in the relevant frequency bands.

34. **Agenda Item 9.1-a:** *Protection of radio spectrum-reliant space weather sensors used for global prediction and warnings. Resolution 657 (Rev. WRC-19).*

35. Space weather observations detect solar activity events that can impact national economies, human welfare, and national security. The ITU-R conducted studies on space weather definitions, potential radio service designations, and solutions for the recognition and protection of space weather sensors to address potential harmful interference. The inclusion of space weather systems under the meteorological aids service (MetAids) is proposed while addressing the need for active and receive-only

space weather sensor definitions in RR Articles 1 and 4. The report also mentions the importance of sharing studies and the possibility of a new WRC resolution on space weather sensor systems. Different views on regulatory considerations and the notification issue are presented.

36. **Agenda Item 9.1-d:** *Protection of EESS (passive) in the frequency band 36–37 GHz from non-GSO FSS space stations.*

37. The ITU-R continued the studies on interference scenarios in EESS (passive) sensors from non-GSO FSS constellations operating in the 37.5–38 GHz frequency band. One scenario focused on interference into EESS (passive) from lower altitude non-GSO FSS constellations, while the other examined interference into the cold calibration channel from higher altitude non-GSO FSS constellations. The studies conclude that an unwanted emission limit would be needed to cover some scenarios. It was recommended to continue studying the topic and develop appropriate recommendations or reports for WRC-27.

38. Other agenda items related to space services are addressed at WRC-23, such as: new aeronautical mobile-satellite service (AMS(R)S) allocation, harmonization of use of spectrum and new communication for Earth Stations In Motion (ESIMs), inter-satellite links allocation, mobile and fixed satellite services amendment or communications of unmanned aircraft systems.

39. **Agenda Item 10:** *proposal of agenda items to recommend to the Council for the next WRC in 2027. Resolution 804 (Rev. WRC-19).*

40. The agenda items proposed for adoption by WRC-23 cover various topics related to spectrum allocations and regulatory provisions for different services, including radiolocation, FSS, MS, space weather sensors, radio astronomy, EESS and maritime frequencies. The ITU Member States can submit more contributions under this agenda. WRC-23 will adopt the draft agenda of the next WRC based on proposals received under its Agenda Item 10.

41. In addition to the preparation of the WRC-23, the ITU-R is conducting other activities related to the work of the COPUOS and sub-committees.

42. A **Small satellites handbook**¹² is developed by the ITU-R Working Party 4A to effectively promote the development of small satellites and better serve the needs of the ITU member States and the whole satellite industry. Its main objectives are to extend international cooperation, to provide detailed guidance on the regulatory environment and procedures, specifically the application of the Radio Regulations, to raise international awareness of current practices and to provide a reference tool for satellite operators and service providers interested in operating or utilizing small satellites.

43. At the ITU level, the Plenipotentiary Conference in 2022 adopted two new **Resolutions 218 and 219** about ITU's role in the implementation of the "Space 2030" agenda and about the sustainability of radio spectrum and associated satellite orbit resources used by space services. The ITU continues to collaborate with UNOOSA and to be represented at Committee on the Peaceful Uses of Outer Space (COPUOS) and sub-committees to assist, if necessary, the delegates in their work.

44. Under our Common Agenda, **Policy Brief 7** for all humanity about the future of outer space governance issued in May 2023, recommends United Nations entities increase their collaboration. The ITU is firmly committed to strengthening the cooperation with COPUOS and the Office for Outer Space Affairs in order to reinforce, each within its mandate, the overall international framework for the sustainability of outer space.

¹² www.itu.int/en/ITU-R/space/support/smallsat/sshandbook/Pages/default.aspx.