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| **Subject** | Agenda Items for WRC-23 Relevant to IARU with corresponding Resolutions |
| **Society** | IARU | **Country:** | N/A |
| **Committee:** | C3, C4, C5, C7 | **Paper number:** | NS20\_C3\_10 |
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This document lists the various WRC-23 agenda items that IARU have found relevant for our work in protecting the amateur and amateur satellite spectrum leading up to WRC-23.

The table shows the agenda item (AI) with its corresponding Resolution, its responsible ITU-R Working Party (WP) together with a short description and comments.

The full agenda for WRC-23 can be found in Resolution 811 and this resolution, together with the other listed resolutions are all included in this document.

Only a short extract from the Preliminary agenda for the 2027 world radiocommunication conference is included.

Agenda Items for WRC-23 Relevant to IARU

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| Agenda Item | Corresponding Resolutions | Responsible. ITU-R WP | Description and Comments |
| 1.2 | Res 245 (WRC-19) | WP5D | Identification of frequency bands for International telecommunications (IMT).The Resolution asks for sharing studies with **primary** users in **Region 2** for the following bands where we have a secondary amateur allocation: 3300 -3400 MHz and 10 – 10,5 GHz.  |
| 1.12 | Res 656 (REV.WRC-19) | WP7C | Allocation for spaceborne radar sounders around 45 MHz. Studies on spectrum needs and sharing in 40-50 MHz and in **adjacent bands.** |

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| Agenda Item | Corresponding Resolutions | Responsible. ITU-R WP | Description and Comments |
| 1.14 | Res 662 (WRC-19) | WP7C | Adjustments or new primary allocations to Earth exploration satellite EESS (passive) service. Study impact of changes in 231,5 – 252 GHz on other primary users. **Amateur primary 248 – 250 GHz**. |
| 1.18 | Res 248 (WRC-19) | WP4C | Studies relating to spectrum needs and potential new allocations to the mobile-satellite service for future development of narrowband mobile-satellite systems,Sharing and compatibility studies with **primary** users in some bands including 300-3 315 MHz, 3 385-3 400 MHz **in Region 2**; **Amateurs are secondary in 3300 – 3400 MHz in R2 and R3, R1 only have national use.** |
| 9.1a | Res 657 (Rev.WRC-19) | WP7C | Review the results of studies relating to **space weather sensors** with a view to describing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services. |
| 9.1b | Res 774 (WRC-19) | WP5A (1)WP4C (2) | Review of the amateur service and the amateur-satellite service allocations in the frequency band 1 240‑1 300 MHz to determine if additional measures are required to ensure protection of the radionavigation-satellite (space-to-Earth) service operating in the same band.The Resolution says:1. Detailed review of the different systems and applications used in the amateur service and amateur-satellite service allocations within the frequency band 1 240-1 300 MHz.
2. Study possible technical and operational measures to ensure protection of RNSS receivers from the amateur and amateur-satellite services within the frequency band 1 240-1 300 MHz, without considering the removal of these amateur and amateur-satellite services allocations.
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In addition, IARU Region 1 have identified the following two agenda items for consideration:

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| Agenda Item | Corresponding Resolutions | Responsible. ITU-R WP | Description and Comments |
| 1.6 | Res 772 (WRC-19) | WP5B  | * to consider, regulatory provisions to facilitate radiocommunications for sub-orbital vehicles
 |
| 1.10 | Res 430 (WRC-19) | WP5B | * to conduct studies on spectrum needs, coexistence with radiocommunication services and regulatory measures for possible new allocations for the aeronautical mobile service for the use of non-safety aeronautical mobile applications.

**At the moment none of our bands are included in the resolution, but IARU needs to watch this to be able to react swiftly if any of our bands (especially 144 MHz) are added** |

RESOLUTION 811 (WRC‑19)

Agenda for the 2023 World Radiocommunication Conference

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

considering

*a)* that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference should be established four to six years in advance and that a final agenda shall be established by the ITU Council two years before the conference;

*b)* Article 13 of the ITU Constitution relating to the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention relating to their agendas;

*c)* the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

recognizing

*a)* that this conference has identified a number of urgent issues requiring further examination by WRC‑23;

*b)* that, in preparing this agenda, some items proposed by administrations could not be included and have had to be deferred to future conference agendas,

resolves

to recommend to the Council that a world radiocommunication conference be held in 2023 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC‑19 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the frequency bands under consideration, to consider and take appropriate action in respect of the following items:

1.1 to consider, based on the results of the ITU‑R studies, possible measures to address, in the frequency band 4 800-4 990 MHz, protection of stations of the aeronautical and maritime mobile services located in international airspace and waters from other stations located within national territories, and to review the pfd criteria in No. **5.441B** in accordance with Resolution **223 (Rev.WRC‑19)**;

1.2 to consider identification of the frequency bands 3 300-3 400 MHz, 3 600‑3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **245** **(WRC‑19)**;

1.3to consider primary allocation of the band 3 600‑3 800 MHz to mobile service within Region 1 and take appropriate regulatory actions, in accordance with Resolution **246 (WRC‑19)**;

1.4to consider, in accordance with Resolution **247** **(WRC‑19)**, the use of high-altitude platform stations as IMT base stations (HIBS) in the mobile service in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level;

1.5 to review the spectrum use and spectrum needs of existing services in the frequency band 470-960 MHz in Region 1 and consider possible regulatory actions in the frequency band 470‑694 MHz in Region 1 on the basis of the review in accordance with Resolution **235 (WRC‑15)**;

1.6 to consider, in accordance with Resolution **772 (WRC‑19)**, regulatory provisions to facilitate radiocommunications for sub-orbital vehicles;

1.7 to consider a new aeronautical mobile-satellite (R) service (AMS(R)S) allocation in accordance with Resolution **428** **(WRC‑19)** for both the Earth-to-space and space-to-Earth directions of aeronautical VHF communications in all or part of the frequency band 117.975-137 MHz, while preventing any undue constraints on existing VHF systems operating in the AM(R)S, the ARNS, and in adjacent frequency bands;

1.8 to consider, on the basis of ITU‑R studies in accordance with Resolution **171** **(WRC‑19)**, appropriate regulatory actions, with a view to reviewing and, if necessary, revising Resolution **155 (Rev.WRC‑19)** and No. **5.484B** to accommodate the use of fixed-satellite service (FSS) networks by control and non-payload communications of unmanned aircraft systems;

1.9 to review Appendix **27** of the Radio Regulations and consider appropriate regulatory actions and updates based on ITU‑R studies, in order to accommodate digital technologies for commercial aviation safety-of-life applications in existing HF bands allocated to the aeronautical mobile (route) service and ensure coexistence of current HF systems alongside modernized HF systems, in accordance with Resolution **429** **(WRC‑19)**;

1.10 to conduct studies on spectrum needs, coexistence with radiocommunication services and regulatory measures for possible new allocations for the aeronautical mobile service for the use of non-safety aeronautical mobile applications, in accordance with Resolution **430** **(WRC‑19)**;

1.11to consider possible regulatory actions to support the modernization of the Global Maritime Distress and Safety System and the implementation of e‑navigation, in accordance with Resolution **361 (Rev.WRC‑19)**;

1.12 to conduct, and complete in time for WRC‑23, studies for a possible new secondary allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, including in adjacent bands, in accordance with Resolution **656 (Rev.WRC‑19)**;

1.13 to consider a possible upgrade of the allocation of the frequency band 14.8-15.35 GHz to the space research service, in accordance with Resolution **661** **(WRC‑19)**;

1.14 to review and consider possible adjustments of the existing or possible new primary frequency allocations to EESS (passive) in the frequency range 231.5-252 GHz, to ensure alignment with more up-to-date remote-sensing observation requirements, in accordance with Resolution **662** **(WRC‑19)**;

1.15 to harmonize the use of the frequency band 12.75-13.25 GHz (Earth-to-space) by earth stations on aircraft and vessels communicating with geostationary space stations in the fixed-satellite service globally, in accordance with Resolution **172** **(WRC‑19)**;

1.16 to study and develop technical, operational and regulatory measures, as appropriate, to facilitate the use of the frequency bands 17.7-18.6 GHz and 18.8-19.3 GHz and 19.7-20.2 GHz (space-to-Earth) and 27.5-29.1 GHz and 29.5-30 GHz (Earth-to-space) by non-GSO FSS earth stations in motion, while ensuring due protection of existing services in those frequency bands, in accordance with Resolution **173** **(WRC‑19)**;

1.17 to determine and carry out, on the basis of the ITU‑R studies in accordance with Resolution **773** **(WRC‑19)**, the appropriate regulatory actions for the provision of inter-satellite links in specific frequency bands, or portions thereof, by adding an inter-satellite service allocation where appropriate;

1.18 to consider studies relating to spectrum needs and potential new allocations to the mobile-satellite service for future development of narrowband mobile-satellite systems, in accordance with Resolution **248** **(WRC‑19)**;

1.19to consider a new primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 2, while protecting existing primary services in the band, in accordance with Resolution **174** **(WRC‑19)**;

2 to examine the revised ITU‑R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with *further* *resolves* of Resolution **27 (Rev.WRC‑19)**, and to decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in *resolves* of that Resolution;

3 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the conference;

4 in accordance with Resolution **95 (Rev.WRC‑19)**, to review the Resolutions and Recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

5 to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the Convention;

6 to identify those items requiring urgent action by the radiocommunication study groups in preparation for the next world radiocommunication conference;

7 to consider possible changes, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, on advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86** **(Rev.WRC‑07)**, in order to facilitate the rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit;

8 to consider and take appropriate action on requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account Resolution **26 (Rev.WRC‑19)**;

9 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention;

9.1 on the activities of the Radiocommunication Sector since WRC‑19:

– In accordance with Resolution **657 (Rev.WRC‑19)**, review the results of studies relating to the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors with a view to describing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services;

– Review of the amateur service and the amateur-satellite service allocations in the frequency band 1 240‑1 300 MHz to determine if additional measures are required to ensure protection of the radionavigation-satellite (space-to-Earth) service operating in the same band in accordance with Resolution **774 (WRC‑19)**;

– Study the use of International Mobile Telecommunication system for fixed wireless broadband in the frequency bands allocated to the fixed services on primary basis, in accordance with Resolution **175** **(WRC‑19)**;

9.2 on any difficulties or inconsistencies encountered in the application of the Radio Regulations; and[[1]](#footnote-1)1

9.3 on action in response to Resolution **80 (Rev.WRC‑07)**;

10to recommend to the Council items for inclusion in the agenda for the next WRC, and items for the preliminary agenda of future conferences, in accordance with Article 7 of the Convention and Resolution **804 (Rev.WRC‑19)**,

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC‑23, and to initiate as soon as possible the necessary consultations with Member States,

instructs the Director of the Radiocommunication Bureau

1 to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC‑23;

2 to submit a draft report on any difficulties or inconsistencies encountered in the application of the Radio Regulations referred in agenda item 9.2 to the second session of the CPM and to submit the final report at least five months before the next WRC,

instructs the Secretary-General

to communicate this Resolution to international and regional organizations concerned.

RESOLUTION 245 (WRC-19)

**Studies on frequency-related matters for the terrestrial component of**

## International Mobile Telecommunications identification in the frequency bands

3 300-3 400 MHz, 3 600-3 800 MHz,

6 425-7 025 MHz, 7 025-7 125 MHz, and 10.0-10.5 GHz

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

*considering*

1. that International Mobile Telecommunications (IMT) is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;
2. that IMT systems have contributed to global economic and social development;
3. that IMT systems are now being evolved to provide diverse usage scenarios such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and lowlatency communications, and applications including fixed broadband;
4. that ultra-low latency and very high bit rate applications of IMT will require contiguous blocks of spectrum for use by administrations wishing to implement IMT;
5. that compared with the low and high frequency bands, the mid-band spectrum can provide better balance for meeting needs for both coverage and capacity;
6. that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;
7. that the properties of high frequency bands, such as short wavelength, would better enable the use of advanced antenna systems including MIMO and beam-forming techniques in supporting enhanced broadband;
8. that ITU-T has been working on the network standardization for IMT-2020 and beyond;
9. that adequate and timely availability of spectrum and corresponding regulatory provisions are essential to support the future development of IMT;
10. that harmonized worldwide bands and harmonized frequency arrangements for IMT are highly desirable in order to achieve global roaming and the benefits of economies of scale;

1. that identification of frequency bands as of *considering* *e)* for IMT may change the sharing situation regarding applications of all services to which the frequency band is already allocated, and may require additional regulatory actions;
2. the need to protect existing services and to allow for their continued development when considering frequency bands for possible additional allocations to any service,

*noting*

1. that Resolution ITU-R 65 addresses the principles for the process of development of

IMT for 2020 and beyond;

1. that IMT encompasses IMT-2000, IMT-Advanced, and IMT-2020 collectively, as described in Resolution ITU-R 56-2;
2. that Question ITU-R 77-8/5 considers the needs of developing countries in the development and implementation of IMT;
3. that Question ITU-R 229/5 seeks to address the further development of IMT;
4. that Question ITU-R 262/5 addresses the study of usage of IMT systems for specific applications;
5. Recommendation ITU-R M.2083, on the framework and objectives of the future development of IMT for 2020 and beyond;
6. Recommendation ITU-R M.2101, on modelling and simulation of IMT networks and

systems for use in sharing and compatibility studies;

1. Recommendation ITU-R P.2108, on prediction of clutter loss;
2. that Report ITU-R M.2320 addresses future technology trends of terrestrial IMT systems;
3. that Report ITU-R M.2370 analyses trends impacting future IMT traffic growth beyond the year 2020 and estimates global traffic demands for the period 2020 to 2030;
4. Report ITU-R M.2376, on technical feasibility of IMT in the frequency bands above

6 GHz;

1. Report ITU-R M.2410, on minimum requirements related to technical performance for

IMT-2020 radio interface(s);

1. Report ITU-R M.2481 on the in-band and adjacent band coexistence and compatibility studies between IMT systems in 3 300-3 400 MHz and radiolocation systems in 3 100-3 400 MHz,

*recognizing*

1. that there is a lead time between the allocation of frequency bands by world radiocommunication conferences and the deployment of systems in those bands, and that timely availability of wide and contiguous blocks of spectrum is therefore important to support the development of IMT;

1. that in order to ensure the future development of IMT it is important to ensure the timely identification of additional spectrum;
2. that any identification of frequency bands for IMT should take into account the use of the bands by other services and the evolving needs of these services,

*resolves to invite ITU-R*

1 to conduct and complete in time for WRC-23 the appropriate studies of technical, operational and regulatory issues pertaining to the possible use of the terrestrial component of IMT in the frequency bands in *resolves to invite ITU-R* 2, taking into account:

* evolving needs to meet emerging demands for IMT;
* technical and operational characteristics of terrestrial IMT systems that would operate in these specific frequency bands, including the evolution of IMT through advances in technology and spectrally efficient techniques;
* the deployment scenarios envisaged for IMT systems and the related requirements of balanced coverage and capacity;
* the needs of developing countries;
* the time-frame in which spectrum would be needed;

2 to conduct and complete in time for WRC-23 the sharing and compatibility studies[[2]](#footnote-2), with a view to ensuring the protection of services to which the frequency band is allocated on a primary basis, without imposing additional regulatory or technical constraints on those services, and also, as appropriate, on services in adjacent bands, for the frequency bands:

* 3 600-3 800 MHz and 3 300-3 400 MHz (Region 2);
* 3 300-3 400 MHz (amend footnote in Region 1);
* 7 025-7 125 MHz (globally);
* 6 425-7 025 MHz (Region 1);
* 10 000-10 500 MHz (Region 2),

*resolves*

1. to invite CPM23-1 to define the date by which technical and operational characteristics needed for sharing and compatibility studies are to be available, to ensure that studies referred to in *resolves to invite ITU-R* can be completed in time for consideration at WRC-23;

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1. to invite WRC-23 to consider, based on the results of the above studies, additional spectrum allocations to the mobile service on a primary basis and to consider identification of frequency bands for the terrestrial component of IMT; the frequency bands to be considered being limited to part or all of the bands listed in *resolves to invite ITU-R* 2,

*invites administrations*

to participate actively in these studies by submitting contributions to ITU-R.

RESOLUTION 656 (REV.WRC-19)

**Possible secondary allocation to the Earth exploration-satellite service (active) for spaceborne radar sounders in the range of frequencies around 45 MHz**

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

*considering*

1. that spaceborne active radio-frequency sensors can provide unique information on physical properties of the Earth and other planets;
2. that spaceborne active remote sensing requires specific frequency ranges depending on the physical phenomena to be observed;
3. that there is an interest in using active spaceborne sensors in the vicinity of the 4050 MHz frequency range for measurements of the Earth’s subsurface to provide radar maps of subsurface scattering layers with the intent to locate water/ice/deposits;
4. that worldwide, periodic measurements of subsurface water deposits require the use of spaceborne active sensors;
5. that the 40-50 MHz frequency range is preferable to satisfy all requirements for spaceborne radar sounders;
6. that spaceborne radars are intended to be operated only in either uninhabited or sparsely populated areas of the globe, with particular focus on deserts and polar ice fields, and only at nighttime from 3 a.m. to 6 a.m. locally,

*recognizing*

1. that the 40-50 MHz range is allocated to the fixed, mobile and broadcasting services on a primary basis;
2. that the frequency range 40.98 to 41.015 MHz is used by the space research service on a secondary basis;
3. that country footnotes in the Table of Frequency Allocations for the 40-50 MHz frequency range provide primary allocations for the aeronautical radionavigation and radiolocation services in certain parts of the world;
4. that Recommendation ITU-R RS.2042-1 provides typical technical and operating characteristics for spaceborne radar sounder systems using the 40-50 MHz frequency range that should be used for interference and compatibility studies;
5. that Report ITU-R RS.2455-0 provides preliminary results of sharing studies between a 45 MHz radar sounder and incumbent fixed, mobile, broadcasting and space research services operating in the 40-50 MHz frequency range,

*resolves to invite the 2023 world radiocommunication conference*

to consider the results of studies on spectrum needs for a possible new secondary allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, and take appropriate action,

*invites ITU-R*

to conduct studies on spectrum needs and sharing studies between the Earth exploration-satellite (active) service and the radiolocation, fixed, mobile, broadcasting, amateur and space research services in the 40-50 MHz frequency range and in adjacent bands,

*invites administrations*

to participate actively in the studies by submitting contributions to the ITU Radiocommunication

Sector,

*instructs the Secretary-General*

to bring this Resolution to the attention of international and regional organizations concerned.

RESOLUTION 662 (WRC-19)

**Review of frequency allocations for EESS (passive) in the frequency range**

**231.5-252 GHz and consider possible adjustment according to observation requirements of passive microwave sensors**

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

*considering*

1. that, within the frequency range 231.5-252 GHz, the frequency bands 235-238 GHz and 250-252 GHz are allocated to the Earth observation-satellite service (EESS) (passive) for the use of passive microwave remote sensing systems;
2. that these allocations were agreed at WRC-2000, under agenda item 1.16,

Resolution **723 (WRC-97)**;

1. that scientific and technology developments for passive microwave sensor measurements have evolved over the last 20 years;
2. that it is appropriate to ensure that the frequency allocations to EESS (passive) agreed in 2000 correspond to the up-to-date observation requirements for passive microwave sensing,

*recognizing*

1. that some passive sensor systems under development plan to operate some channel(s) in the frequency range 239-248 GHz, given the specific characteristics of this frequency band for ice-cloud analysis;
2. that, as a result, it may be necessary to consider some adjustment/extension of the EESS

(passive) allocations within the frequency range 231.5-252 GHz;

1. that the effect on the other primary services in the frequency range 231.5-252 GHz would have to be studied and the EESS (passive) allocations possibly adjusted,

*resolves to invite ITU-R*

1. to review the existing primary allocations to the EESS (passive) in the frequency range 231.5-252 GHz in order to analyse if these allocations are aligned with observation requirements of passive microwave sensors;
2. to study the impact that any change to the EESS (passive) allocations in the frequency range 231.5-252 GHz might have on the other primary services in these frequency bands;
3. to study, as appropriate, possible adjustments to the EESS (passive) allocations in the frequency range 231.5-252 GHz, taking into account the results under *resolves to invite ITU-R* 1 above,

*invites the 2023 world radiocommunication conference*

to review the results of these studies with a view to adjusting existing allocations or adding possible new allocations, as appropriate, to EESS (passive) in the frequency range 231.5-252 GHz without unduly constraining the other primary services currently allocated in this frequency range,

*invites administrations*

to participate actively in the studies by submitting contributions to ITU-R,

*instructs the Secretary-General*

to bring this Resolution to the attention of the international and regional organizations concerned.

RESOLUTION 248 (WRC-19)

**Studies relating to spectrum needs and potential new allocations to the mobile satellite service in the frequency bands 1 695-1 710 MHz, 2 010-
2 025 MHz, 3 300-3 315 MHz and 3 385-3 400 MHz for future development of narrowband mobile-satellite systems**

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

*considering*

1. that a preliminary assessment of the spectrum requirements would suggest a pairing of no more than 5 MHz in uplink and 5 MHz in the downlink, may suffice for the applications of low-data rate systems for the collection of data from, and management of terrestrial devices, in the

MSS;

1. that the frequency bands under consideration 1 695-1 710 MHz, 2 010-2 025 MHz, 3 300-3 315 MHz, 3 385-3 400 MHz are allocated on a primary and secondary basis to the mobile service (MS), fixed service (FS), fixed-satellite service (FSS), radiolocation and meteorological services;
2. that previous studies only addressed spectrum requirements for the satellite component of IMT-2000 and system beyond IMT-2000 (Report ITU-R M.2077) and spectrum requirements for new broadband mobile satellite service (MSS) applications in the 4-16 GHz range (Reports

ITU-R M.2218 and ITU-R M.2221);

1. that Report ITU-R M.2218 suggests that the operational characteristics of incumbent MSS systems may constrain and effectively hamper the sharing of existing MSS spectrum, resulting in the requirement of additional spectrum for new applications;
2. that Report ITU-R SA.2312 suggests that MSS bands already allocated above 5 GHz are outside of the inherent size, weight, and power restrictions of small satellites (usually having a mass of less than 100 kg);
3. that earth and space stations used for the applications of the systems in *considering b)* may include a combination of low power and intermittent transmissions to facilitate spectrum sharing and spectrum requirements,

*noting*

1. the existing MSS allocation and current use of the frequency band 2 010-2 025 MHz, in particular in Region 2;
2. that the number of mobile satellite systems using small satellites for the systems described in *considering b)* is growing and the spectrum demand for suitable MSS allocations is increasing;
3. the examples, technical characteristics and benefits of such satellites given in Report

ITU-R SA.2312;

1. the contribution of the applications described in *considering a)*, delivering actionable information, to the promotion of human welfare;
2. the insufficient spectrum opportunities for new applications described in *considering a)* to operate in MSS bands below 5 GHz;
3. that Recommendation ITU-R SA.1158-3 summarized that narrow-band short duration type of data transmissions in the mobile-satellite service (Earth-to-space) may feasibly share the frequency band 1 670-1 710 MHz with the meteorological-satellite service (space-to-Earth),

*recognizing*

1. that the existing primary allocated services, in the bands considered and adjacent to, shall be protected;
2. the need for regulatory certainty regarding the available spectrum for both satellite and earth station design and planning purposes;
3. that the studies, envisaged in the *resolves* part of this Resolution, are to be limited to those systems with space stations that have a maximum e.i.r.p. of 27 dBW or less, with a beamwidth of no more than 120 degrees, and earth stations that individually communicate no more than once every 15 minutes, for no more than 4 seconds at a time, with a maximum e.i.r.p. of

7 dBW;

1. that some of the frequency bands listed in *resolves b)* are identified for IMT in accordance with Nos. **5.429D**, **5.430A**, **5.431B**, **5.441A** and **5.441B**;
2. that the introduction of the applications of the possible new MSS allocation should not impose constraints to other existing allocated primary services in the bands under consideration and adjacent to, operating in accordance with the Radio Regulations,

*resolves to invite ITU-R*

1. to conduct studies on spectrum and operational requirements as well as system characteristics of low-data rate systems for the collection of data from, and management of, terrestrial devices in the MSS as described in *considering a)* and limited to the basic characteristics in *recognizing c)*;
2. to conduct sharing and compatibility studies with existing primary services to determine the suitability of new allocations to the MSS, with a view to protecting the primary services, in the following frequency bands and adjacent frequency bands:
	1. 695-1 710 MHz in Region 2,
	2. 010-2 025 MHz in Region 1,
	3. 300-3 315 MHz, 3 385-3 400 MHz in Region 2;
3. to consider possible new primary or secondary allocations, with the necessary technical limitations, taking into account the characteristics described in *recognizing c),* to the MSS for nonGSO satellites operating low-data rate systems for the collection of data from, and management of, terrestrial devices based on the result of sharing and compatibility studies, while ensuring the protection of existing primary services in those frequency bands, and adjacent bands, without causing undue constraints on their further development,

*resolves to invite WRC-23*

to determine, on the basis of the studies conducted under the *resolves to invite ITU-R* above, appropriate regulatory actions,

*invites administrations*

to participate in the studies by submitting contributions to ITU-R.

RESOLUTION 657 (REV.WRC-19)

**Protection of radio spectrum-reliant space weather sensors used for global prediction and warnings**

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

*considering*

1. that space weather observations are important for detecting solar activity events that impact services critical to the economy, safety and security of administrations and their population;
2. that these observations are made from ground-based and space-based systems;
3. that some of the sensors operate by receiving signals of opportunity, including, but not limited to, low-level natural emissions of the Sun, Earth’s atmosphere, and other celestial bodies, and therefore may suffer harmful interference at levels which could be tolerated by other radio systems;
4. that spectrum-reliant space weather sensor technology has been developed and operational systems have been deployed without much regard for domestic or international spectrum regulations, or for the potential need for protection from interference;
5. that a wide variety of spectrum-reliant space weather sensors currently operate relatively free of harmful interference; however, the radio interference environment could change as a result of changes made to the Radio Regulations;
6. that spectrum-reliant space weather sensors may be vulnerable to interference from both terrestrial and spaceborne systems;
7. that, while all spectrum-reliant space weather observation systems are important, the most critical need for radio regulatory protection is for those systems that are used operationally in the production of forecasts and warnings of space weather events that can cause harm to important sectors of national economies, human welfare and national security;
8. that frequency use is not consistent across the limited number of operational systems,

*recognizing*

1. that no frequency bands have been documented in any manner in the Radio Regulations for space weather sensor applications;
2. that Report ITU-R RS.2456-0 – Space weather sensor systems using radio spectrum contains a summary of spectrum-reliant space weather sensors and identifies the most critical operational systems (hereafter referred to as operational systems);
3. that the systems used for operational space weather monitoring, prediction and warnings, documented in Report ITU-R RS.2456-0 are deployed globally;
4. that while the number of systems is currently limited, the interest in and the importance of data from space weather monitoring systems is growing with time;
5. that certain, receive-only space weather applications may operate in a manner consistent with the definition of the meteorological aids (Metaids) service, but for scientific reasons observations cannot be conducted in frequency bands currently allocated to the Metaids service;
6. that the ITU Radiocommunication Sector (ITU-R) has a Study Question ITU-R 256/7 to study the technical and operational characteristics, frequency requirements and appropriate radio service designation for space weather sensors,

*noting*

1. that any regulatory action associated with space weather sensor applications should take into account incumbent services that are already operating in the frequency bands of interest;
2. that ITU-R studies may show that protection of some systems to be strictly a national matter rather than requiring WRC action;
3. that while data products are used for forecast and warnings related to public safety, among other purposes, the provisions of Nos. **1.59** and **4.10** of the Radio Regulations do not apply to spectrum-reliant space weather sensors,

*resolves to invite ITU-R*

1 to identify, in time for WRC-23, and based on existing and possible further ITU-R studies on the technical and operational characteristics, specific space weather sensors which need to be protected by appropriate regulation, including:

* to determine if receive-only space weather sensors shall be designated as applications of the Metaids service;
* to determine the appropriate radiocommunication service, if any, for cases where it is determined that receive-only space weather sensors do not fall under the Metaids service;
1. to conduct, in time for WRC-23, any necessary sharing studies with incumbent systems operating in frequency bands used by space weather sensors with the objective of determining potential regulatory provisions that can be provided to receive-only operational space weather sensors for their appropriate recognition in the Radio Regulations, while not placing additional constraints on incumbent services;
2. to develop potential solutions to describe in the Radio Regulations in Articles **1** and **4**, and/or as a WRC resolution, if deemed appropriate, for consideration by WRC-23, space weather sensor systems and their corresponding usage, as well as protection requirements for receive-only space weather sensors;
3. to conduct studies, in time for WRC-23, on the technical and operational characteristics of active space weather sensors and conduct necessary sharing studies with incumbent systems operating in frequency bands used by active space weather sensors, with the objective of determining the appropriate radiocommunication service for those sensors,

*instructs the Director of the Radiocommunication Bureau*

to report on the results of the ITU-R studies to WRC-23,

*invites administrations*

to participate actively in the studies and provide the technical and operational characteristics of the systems involved by submitting contributions to ITU-R,

*instructs the Secretary-General*

to bring this Resolution to the attention of the World Meteorological Organization (WMO) and other international and regional organizations concerned.

RESOLUTION 774 (WRC-19)

**Studies on technical and operational measures to be applied in the frequency band 1 240-1 300 MHz to ensure the protection of the radionavigation-satellite service (space-to-Earth)**

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

*considering*

1. that the frequency band 1 240-1 300 MHz is allocated worldwide to the amateur service on a secondary basis;
2. that the amateur-satellite service (Earth-to-space) may operate in the band 1 260-

1 270 MHz under No. **5.282** of the Radio Regulations;

1. that the frequency band 1 240-1 300 MHz is important for the amateur community and has been used for many years for a range of applications;
2. that the frequency band 1 240-1 300 MHz is also allocated worldwide to the radionavigation-satellite service (RNSS) in the space-to-Earth direction on a primary basis;
3. that RNSS systems using the band 1 240-1 300 MHz are operational, or becoming operational, in various parts of the world, with the aim of supporting a wide range of new satellite positioning services, for example enhanced accuracy and position authentication,

*noting*

1. that Recommendation ITU-R M.1732 contains the characteristics of systems operating in the amateur and amateur-satellite services for use in sharing studies;
2. that Recommendation ITU-R M.1044 should be used as a guide in studies of the compatibility between systems operating in the amateur and amateur-satellite services and systems operating in other services;
3. that Recommendation ITU-R M.1787 contains the description of RNSS systems and the technical characteristics of space stations operating in the frequency band 1 240-1 300 MHz;
4. that Recommendation ITU-R M.1902 contains the characteristics and protection criteria for RNSS (space-to-Earth) receivers operating in the frequency band 1 240-1 300 MHz,

*recognizing*

1. that some cases of harmful interference caused by emissions in the amateur service into RNSS (space-to-Earth) receivers have occurred, and resulted in investigations and in instructions to the operator of the interfering station to cease transmissions;
2. that the number of RNSS receivers in the band 1 240-1 300 MHz is currently limited in certain regions, but will increase dramatically in the near future with the ubiquitous deployment of receivers used in mass-market applications;

1. that according to No. **5.29** of the Radio Regulations, stations of a secondary service shall not cause harmful interference to stations of primary services to which frequencies are already assigned or to which frequencies may be assigned at a later date;
2. that administrations will benefit from the availability of studies and guidelines about the protection of the RNSS (space-to-Earth) by the amateur and amateur-satellite services in the frequency band 1 240-1 300 MHz;
3. that some RNSS receivers in the band 1 240-1 300 MHz may be equipped with pulse blanking, which may facilitate sharing with certain amateur service applications;
4. that the amateur service in the band 1 240-1 300 MHzis currently used for amateur voice, data and image transmission in several countries in Europe and around the globe and may transmit a variety of emission types including wideband, continuous and/or high e.i.r.p. transmissions,

*resolves to invite ITU-R*

1. to perform the detailed review of the different systems and applications used in the amateur service and amateur-satellite service allocations within the frequency band 1 240-1 300 MHz;
2. taking into account the results of the above review, to study possible technical and operational measures to ensure the protection of RNSS (space-to-Earth) receivers from the amateur and amateur-satellite services within the frequency band 1 240-1 300 MHz, without considering the removal of these amateur and amateur-satellite services allocations,

*instructs the Director of the Radiocommunication Bureau*

to include the results of these studies in his Report to WRC-23 for the purpose of considering appropriate actions in response to *resolves to invite ITU-R* above.

RESOLUTION 772 (WRC-19)

**Consideration of regulatory provisions to facilitate the introduction of sub-orbital vehicles**

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

*considering*

*a)* that sub-orbital vehicles are being developed which are intended to operate at higher altitudes than conventional aircraft, with a sub-orbital trajectory;

*b)* that sub-orbital vehicles are also being developed to fly through the lower levels of the atmosphere, where they are expected to operate in the same airspace as conventional aircraft;

*c)* that sub-orbital vehicles may perform various missions (e.g. conducting scientific research or providing transportation) and then return to the Earth’s surface without completing a full orbital flight around the Earth;

*d)* that stations on board sub-orbital vehicles have a need for voice/data communications, navigation, surveillance and telemetry, tracking and command (TT&C);

*e)* that sub-orbital vehicles must be safely accommodated into airspace used by conventional aircraft during certain phases of flight;

*f)* that there is a need to ensure that equipment installed on such vehicles can communicate with air traffic management systems and relevant ground control facilities;

*g)* that vehicles operating at the boundary of space and the atmosphere or re-entering the atmosphere may generate a plasma sheath that may envelop all or most of the vehicle;

*h)* that the plasma-sheath attenuation does not allow for radiocommunications directly to either ground or space stations,

*recognizing*

*a)* that there is no internationally agreed legal demarcation between the Earth’s atmosphere and the space domain;

*b)* that there is no formal definition of sub-orbital flight, although it has been assumed in Report ITU-R M.2477 to be an intentional flight of a vehicle expected to reach the upper atmosphere with a portion of its flight path that may occur in space without completing a full orbit around the Earth before returning back to the surface of the Earth;

*c)* that stations on board sub-orbital vehicles may use systems operating under space and/or terrestrial services;

*d)* that the current regulatory provisions and procedures for terrestrial and space services may not be adequate for international use of relevant frequency assignments by stations on board suborbital vehicles;

*e)* that Annex 10 to the Convention on International Civil Aviation contains Standards and Recommended Practices for aeronautical radionavigation and radiocommunication systems used by international civil aviation;

*f)* that the studies on spectrum requirements for voice/data communications, navigation, surveillance and TT&C on stations on board sub-orbital vehicles have not been completed;

*g)* that some space launch systems may include components or items not reaching orbital trajectories, and that some of these components or items may be developed as reusable items operating on sub-orbital trajectories;

*h)* that conventional space launch systems currently have a radiocommunication regulatory framework that may differ from the future radiocommunication framework of sub-orbital vehicles,

*noting*

*a)* Question ITU-R 259/5, on operational and radio regulatory aspects for planes operating in the upper level of the atmosphere;

*b)* that Report ITU-R M.2477 provides information on the current understanding of radiocommunications for sub-orbital vehicles, including a description of the flight trajectory, categories of sub-orbital vehicles, technical studies related to possible avionics systems used by suborbital vehicles, and service allocations of those systems;

*c)* that the provisions of No. **4.10** may apply to certain aspects of these operations;

*d)* that the development of compatibility criteria between International Civil Aviation Organization (ICAO) standardized aeronautical systems is the responsibility of ICAO;

*e)* that the definitions and future applicable radiocommunication services for sub-orbital vehicles should be clarified by the ITU Radiocommunication Sector (ITU-R), with necessary coordination with ICAO,

*resolves to invite the ITU Radiocommunication Sector*

1 to study spectrum needs for communications between stations on board sub-orbital vehicles and terrestrial/space stations providing functions such as, *inter alia*, voice/data communications, navigation, surveillance and TT&C;

2 to study appropriate modification, if any, to the Radio Regulations, excluding any new allocations or changes to the existing allocations in Article **5**, to accommodate stations on board suborbital vehicles, whilst avoiding any impact on conventional space launch systems, with the following objectives:

* to determine the status of stations on sub-orbital vehicles, and study corresponding regulatory provisions to determine which existing radiocommunication services can be used by stations on sub-orbital vehicles, if necessary;
* to determine the technical and regulatory conditions to allow some stations on board suborbital vehicles to operate under the aeronautical regulation and to be considered as earth stations or terrestrial stations even if a part of the flight occurs in space;
* to facilitate radiocommunications that support aviation to safely integrate sub-orbital vehicles into airspace and ensure interoperability with international civil aviation;
* to define the relevant technical characteristics and protection criteria for the studies to be undertaken in accordance with the bullet point below;
* to conduct sharing and compatibility studies with incumbent services that are allocated on a primary basis in the same and adjacent frequency bands in order to avoid harmful interference to other radiocommunication services and to existing applications of the same service in which stations on board sub-orbital vehicles operate, having regard to the sub-orbital flight application scenarios;

3 to identify, as a result of the studies above, whether there is a need for access to additional spectrum that should be addressed after WRC-23 by a future competent conference,

*invites the International Civil Aviation Organization*

to participate in the studies and provide to ITU the relevant technical characteristics required for the studies called for in *resolves to invite the ITU Radiocommunication Sector*,

*invites the 2023 World Radiocommunication Conference*

to consider the results of the studies above and take the appropriate action,

*instructs the Director of the Radiocommunication Bureau*

to bring this Resolution to the attention of the relevant ITU-R study groups,

*invites administrations*

to participate actively in the studies by submitting contributions to ITU-R,

*instructs the Secretary-General*

to bring this Resolution to the attention of the United Nations Committee on the Peaceful Uses of Outer Space and ICAO and other international and regional organizations concerned.

RESOLUTION 430 (WRC-19)

**Studies on frequency-related matters, including possible additional allocations, for the possible introduction of new non-safety aeronautical mobile applications**

The World Radiocommunication Conference (Sharm el-Sheikh, 2019),

*considering*

1. that the number of aircraft equipped with sensors has grown significantly in the past 20 years;

*b)* that the need for bidirectional low to high data rate communications between aeronautical stations and aircraft stations, or between aircraft stations, is consequently increasing;

*c)* that the frequency bands to be considered should preferably be chosen close to frequency bands already used by aeronautical communication systems, in order to enable extended tuning ranges for such new aeronautical communication systems;

*d)* that these new aeronautical communications are not related to safety of flights;

*e)* that there is no clear identification of the frequency bands in which these new aeronautical communication systems may be developed with a sufficient level of confidence for long-term investment by industry;

*f)* that the decisions of previous conferences have introduced some restrictions on the use and imposed constraints on the development of these communication systems within several existing mobile allocations traditionally used by aeronautical mobile applications;

*g)* that the existing mobile allocations which can be used by these communication systems have some limitations due to coexistence with other services in the frequency band;

*h)* that in Region 1 there are allocations to the mobile, except aeronautical mobile, service in some frequency bands which are allocated to the mobile service in Regions 2 and 3;

*i)* that harmonized worldwide allocation would facilitate the implementation of these new aeronautical communication systems;

*j)* that an adaptation of the regulatory framework for further visibility, protection and development of non-safety aeronautical mobile applications may be required,

*recognizing*

1. that the use of innovative sharing methods may be considered to ensure the protection of existing services while offering the possibility to have access to new frequency bands;

*b)* that the introduction of the new aeronautical mobile systems in the possible new allocations should not impose constraints on existing and planned systems of primary services,

*noting*

1. that the frequency band 15.4-15.7 GHz is allocated on a primary basis to the radiolocation service, the aeronautical radionavigation service and, in part, the fixed-satellite service (Earth-tospace);

*b)* that the frequency band 22-22.21 GHz is allocated on a primary basis to the mobile, except aeronautical mobile, service;

*c)* that the frequency band 15.4-15.7 GHz is adjacent to the frequency band 15.35-15.4 GHz which is allocated to the radio astronomy service (RAS) on a primary basis;

*d)* that frequency band 22.01-22.21 GHz is adjacent to the frequency band 22.21-22.5 GHz which is allocated to the RAS, the Earth exploration-satellite service (passive) and the space research service (passive) on a primary basis;

*e)* that the frequency bands 22.01-22.21 GHz and 22.21-22.5 GHz are covered by No. **5.149**,

*resolves to invite the ITU Radiocommunication Sector*

to conduct, and complete in time for WRC-23:

1 studies on spectrum needs for new non-safety aeronautical mobile applications for air-air, ground-air and air-ground communications of aircraft systems;

2 sharing and compatibility studies in the frequency band 22-22.21 GHz, already allocated on a primary basis to the mobile, except aeronautical mobile, service, in order to evaluate the possible revision or deletion of the “except aeronautical mobile” restriction, while ensuring the protection of primary services in the frequency bands considered and, as appropriate, in adjacent frequency bands;

3 sharing and compatibility studies on possible new primary allocations to the aeronautical mobile service (AMS) for non-safety aeronautical applications in the frequency band 15.4-15.7 GHz, while ensuring the protection of primary services in the frequency bands considered and, as appropriate, in adjacent frequency bands;

4 definition of appropriate protection for the passive services and the RAS allocated in adjacent frequency bands from unwanted emissions of the AMS,

*invites the 2023 World Radiocommunication Conference*

to review the results of the ITU Radiocommunication Sector (ITU-R) studies and take appropriate actions,

*invites administrations*

to participate actively in the studies by submitting contributions to ITU-R.

**Extract from the Preliminary agenda for the 2027 world radiocommunication conference Res 812 (WRC-23)\***

Agenda Items

2.1 to consider, in accordance with Resolution **663 (WRC-19)**,additional spectrum allocations to the radiolocation service on a co-primary basis in the frequency band 231.5-275 GHz and identification for radiolocation applications in frequency bands in the range 275-700 GHz for millimetre and sub-millimetre wave imaging systems;

2.6 to consider regulatory provisions for appropriate recognition of space weather sensors and their protection in the Radio Regulations, taking into account the results of ITU-R studies reported to WRC-23 under agenda item 9.1 and its corresponding Resolution **657 (Rev.WRC-19)**;

2.13 to consider a possible worldwide allocation to the mobile satellite service for the future development of narrowband mobile-satellite systems in frequency bands between the range [1.5-5 GHz, in accordance with Resolution **248 (WRC-19)**.

1. 1 This agenda sub-item is strictly limited to the Report of the Director on any difficulties or inconsistencies encountered in the application of the Radio Regulations and the comments from administrations. Administrations are invited to inform the Director of the Radiocommunication Bureau of any difficulties or inconsistencies encountered in the Radio Regulations. [↑](#footnote-ref-1)
2. Including studies with respect to services in adjacent bands, as appropriate. [↑](#footnote-ref-2)