

*DRAFT INDIA PRELIMINARY
VIEWS ON WRC AGENDA ITEMS
FOR APG23-5
(APT CONFERENCE
PREPARATORY GROUP FOR
WRC-23)*

WG 1: Fixed, Mobile and Broadcasting Issues

PRELIMINARY VIEWS ON WRC-23 AGENDA ITEMS 1.2, 1.3, 1.4, 1.5, 9.1 TOPIC C AND NO.21.5

Agenda Item 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. Background

Resolution 245 (Rev.WRC-19) invites

i) the ITU Radiocommunication Sector to conduct and complete in time for WRC-23 the sharing and compatibility studies, 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);
- 10.0-10.5 GHz (Region 2),

ii) the 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.

2. Preliminary Views

India views on the following bands:

- 3 300-3 400 MHz (amend footnote in Region 1, and Region 2);

India has identified 3 300 – 3 670 MHz for IMT usages while providing geographical separation to existing radiocommunications services in band 3 400 – 3 425 MHz at few locations and by shifting few in-band assignments.

India supports the band for IMT identification as it would lead towards global harmonization of band, bringing in economies scale; subject to ensuring protection to services in adjacent band based upon studies.

Considering above India supports following methods with a view that any actions being decided at WRC-23 shall not affect existing primary services operating in the same frequency bands in Region 3

Band 1 – 3 300-3 400 MHz (amend footnote in Region 1):

Method 1D: Primary allocation to the mobile (except aeronautical mobile) service in the frequency band 3 300-3 400 MHz in interested Region 1 countries and identification of IMT.

Band 2 – 3 300-3 400 MHz (Region 2)

Method 2C: Allocation of the frequency band 3 300-3 400 MHz to the mobile (except aeronautical) service on a primary basis and identification of IMT in Region 2.

Agenda Item 1.3:

to 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. Background

Resolution 246 (Rev.WRC-19) invites

(i) the ITU Radiocommunication Sector to conduct sharing and compatibility studies in time for WRC-23 between the mobile service and other services allocated on a primary basis within the frequency band 3 600-3 800 MHz and adjacent frequency bands in Region 1, as appropriate, to ensure protection of those services to which the frequency band is allocated on a primary basis and not impose undue constraints on the existing services and their future development

ii) the 2023 World Radiocommunication Conference based on the results of studies in resolves to invite the ITU Radiocommunication Sector, to consider possible upgrade of the allocation of the frequency band 3 600-3 800 MHz to the mobile, except aeronautical mobile, service on a primary basis within Region 1, and to take appropriate regulatory actions,

Compatibility and sharing studies has been done to know the separation distance with FSS system and FS system indicated in the CPM text. As per Report ITU-R S.2368, FSS system maximum separation distance for co-channel could be as large as 400 km for short term protection criterion, and 100 km for long term protection criterion. And as per Report ITU-R F.2328 for FS system maximum separation distance for co-channel could be as large as 92 km.

Seven studies (A to G) has been done indicating various separation distance with FSS system, Study G has shown for the in-band case the results lead to separation distances of 150-218 km to meet the long-term interference criteria and of 460-505 km to meet the short-term interference criteria. And with FS system the required maximum separation distances shown in the direction of the FS points towards the MS are 65 km (with 60 m FS antenna height).

2. Preliminary Views

India supports the upgrading of the allocation of the frequency band 3 600-3 800 MHz to the mobile, except aeronautical mobile service on a primary basis in Region 1 based on the sharing and compatibility studies as per Resolution 246 (Rev.WRC-19) while ensuring protection to the existing and planned satellite usages in the band in Region 3.

Agenda Item 1.4:

to 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. Background

Resolution 247 (Rev.WRC-19) among others,

resolves to invite the ITU Radiocommunication Sector

1 to study spectrum needs, as appropriate, for HIBS to provide mobile connectivity in the mobile service, taking into account:

- the existing identification in recognizing b);
- the usage and deployment scenario envisioned for HIBS as complementary for terrestrial IMT networks;
- the technical and operational characteristics and requirements of HIBS;

2 invites the ITU Radiocommunication Sector to conduct and complete in time for WRC-23, taking into account the results of studies already performed and those in progress within ITU-R, sharing and compatibility studies to ensure the protection of services, without imposing any additional technical or regulatory constraints in their deployment, to which the frequency band is allocated on a primary basis, including other IMT uses, existing systems and the planned development of primary allocated services, and adjacent services, as appropriate, for certain frequency bands below 2.7 GHz, or portions thereof, globally or regionally harmonized for IMT, i.e.:

- 694-960 MHz;
- 1 710-1 885 MHz (1 710-1 815 MHz to be used for uplink only in Region 3);
- 2 500-2 690 MHz (2 500-2 535 MHz to be used for uplink only in Region 3, except 2 655-2 690 MHz in Region 3)

Sharing studies between the broadcasting satellite service in the frequency range 2 520 2 630 MHz and HIBS operating in the frequency range 2 500 2 690 MHz indicates following.

- One study indicates that sharing between the broadcasting satellite service (BSS) in the frequency range 2 520-2 630 MHz and HIBS operating in the frequency range 2 500-2 690 MHz may be feasible under certain circumstances, such as the definition of a HIBS pfd hard limit.
- Another study indicates that sharing between the BSS in the frequency range 2 520-2 630 MHz and HIBS operating in the frequency range 2 500-2 690 MHz may not be feasible. This study indicates that, considering the amount of exceedance over the protection criteria, the coexistence of HIBS and the BSS is not possible in this frequency band when BSS user terminals are located within the service area of the HIBS base station.

Sharing and compatibility studies between the mobile-satellite service in the frequency bands 2 500-2 535 MHz (space-to-Earth) and 2 655-2 690 MHz (Earth-to-space) in Region 3 and HIBS operating in the frequency range 2 500-2 690 MHz indicates following.

- Some studies indicate that sharing between the mobile-satellite service (MSS) in the frequency bands 2 500-2 535 MHz (space to-Earth) and 2 655-2 690 MHz (Earth-to-space) in Region 3 and HIBS operating in the frequency range 2 500 2 690 MHz may be feasible under certain circumstances, such as a minimum distance of up to 42 km between the coverage border of the two systems. Other studies indicate that no additional measures are required for this feasibility, when HIBS is operating in Region 1, and MSS is operating in Region 3.
- Another study indicates that sharing between the MSS in the frequency bands 2 500-2 535 MHz (space-to-Earth) and 2 655-2 690 MHz (Earth-to-space) in Region 3 and HIBS operating in the frequency range 2 500 2 690 MHz may not be feasible. This study indicates that considering the amount of exceedance over the protection criteria, the coexistence of HIBS and the MSS is not possible in this frequency band. In addition, this study indicates that the adjacent frequency band compatibility on OOB interference from HIBS BS operating in the frequency band 2 535-2 555 MHz into MSS user terminals operating in the frequency band 2 500-2 535 MHz may only be feasible if measures such as a guardband between HIBS and the MSS and/or constraining the OOB from HIBS are required.

2. Preliminary Views

While considering the feasibility of HIBS in the IMT bands below 2.7 GHz, India supports technical and regulatory provision for the protection of existing and planned satellite services in the band 2500-2690 MHz and in the adjacent band 2483.5 -2500 MHz. The frequency bands includes 2483.5-2500MHz used in NavIC users receivers 2500-2535MHz, 2555-2635MHz and 2655-2690MHz used in S-MSS satellites of India and currently experiencing interference into the satellite receivers,

In addition, India supports technical and regulatory provisions required for protection of existing and planned IMT services in the proposed bands below 2.7 GHz

In view of above usages, India may support following Method

- Band A - 694-960 MHz
Method A3 : Use by HIBS in single footnote not claiming protection
- Band B - 1 710-1 885 MHz
Method B3 : Use by HIBS in single footnote not claiming protection
- Band C - 1 885-1 980 MHz, 2 010-2 025 MHz, and 2 110-2 170 MHz
Method C3 : Use by HIBS in single footnote not claiming protection
- Band D - 2 500-2 690 MHz
Method D1 : No change to the Radio Regulations (RR)

Agenda Item 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. Background

Resolution 235 (Rev.WRC-15) invites

i) ITU-R, after the 2019 World Radiocommunication Conference and in time for the 2023 World Radiocommunication Conference

1 to review the spectrum use and study the spectrum needs of existing services within the frequency band 470-960 MHz in Region 1, in particular the spectrum requirements of the broadcasting and mobile, except aeronautical mobile, services, taking into account the relevant ITU Radiocommunication Sector (ITU-R) studies, Recommendations and Reports;

2 to carry out sharing and compatibility studies, as appropriate, in the frequency band 470-694 MHz in Region 1 between the broadcasting and mobile, except aeronautical mobile, services, taking into account relevant ITU-R studies, Recommendations and Reports;

3 to conduct sharing and compatibility studies, as appropriate, in order to provide relevant protection of systems of other existing services,

ii) the 2023 World Radiocommunication Conference to consider, based on the results of studies above, provided that these studies are completed and approved by ITU-R, possible regulatory actions in the frequency band 470-694 MHz in Region 1, as appropriate.

2. Preliminary Views

India is of the preliminary view that any changes made to Radio Regulation for Region 1 shall not impact existing and planned usages in this band in Region 3 and also shall not impose any procedural or regulatory constraints on existing services in Region 3.

India has identified part of band for IMT usage, hence, may support primary allocation to mobile services and identification of IMT services in the frequency band 612-694 MHz in Region 1.

Agenda Item 9.1 topic c):

to 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);

1. Background

Resolution 175 (WRC-19) invites the ITU Radiocommunication Sector to conduct any necessary studies on the use of IMT systems for fixed wireless broadband in the frequency bands allocated to the fixed service on primary basis, taking into account the relevant ITU-R studies, Handbooks, Recommendations and Reports, and instructs the Director of the Radiocommunication Bureau to report to WRC-23 on the results of these studies

2. Preliminary Views

India supports discussing modification of the existing ITU-R Recommendations, Reports and/or Handbooks and, if required, development of new ITU-R deliverable(s), in response to the ongoing studies in ITU-R. The IMT systems for fixed wireless broadband shall not impose restrictions or shall not cause interference to other radiocommunications services

India supports NO CHANGES to the Radio regulations under Agenda item 9.1 Topic C. A new ITU-R Question may be developed, if necessary, to progress the work on existing or new ITU-R Reports, Recommendations and Handbook relating to this issue.

RR No. 21.5

1. Background

Doc 550 of WRC-19 states that:

ITU-R is invited to study, as a matter of urgency, the applicability of the limit specified in No. 21.5 of the Radio Regulations to IMT stations, that use an antenna that consists of an array of active elements, with a view to recommend ways for its possible replacement or revision for such stations, as well as any necessary updates to Table 21-2 related to terrestrial and space services sharing frequency bands.

Furthermore, the ITU-R is invited to study, as a matter of urgency, verification of No. 21.5 regarding the notification of IMT stations that use an antenna that consists of an array of active elements, as appropriate.

At present ITU-R WP5D is responsible for carrying out studies in this matter. As per ongoing studies at WP5D, it is difficult to measure conducted power of the IMT stations with integrated Active Antenna System (AAS). This has raised difficulties for administrations to provide notification data against the Item Identifier 8AA "Power delivered to the antenna" (see RR Appendix 4 Table 1). To deal with the situation WP5D studies has been split into two approaches, i) TRP with reference bandwidth, and ii) derive conducted power from TRP for single transmitter. (see WP-5D Chairman's Report Doc. 5D/1361)

2. Preliminary Views

India would continue to participate in the ITU-R Working Party 5D meetings with a view to support the approach which will ensure appropriate protection to satellite services and give opportunities for IMT growth and innovation in active antenna system.

Other Contributions:

Agenda item 1.1:

to consider, based on the results of 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 power flux-density criteria in No. 5.441B in accordance with Resolution 223 (Rev.WRC 19);

The following contribution documents forwarded by WG 1 propose modifications to the text in the draft CPM Report related to WRC-23 Agenda Item 1.1.



IAFI-Modification to
draft CPM text.docx



WG1
chair-Modification to (

PROPOSED MODIFICATION TO THE CHAPTER 1 OF THE DRAFT CPM REPORT

(Note: For the preparation of documents for proposed modification on the Draft CPM Report please refer to the [ITU Guideline for the Preparation of Contributions for CPM23-2](#))

Agenda Item 1.1:

1.1 to consider, based on the results of 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 power flux-density criteria in No. 5.441B in accordance with Resolution 223 (Rev.WRC 19);

The Administration of India proposes the following modifications to the text in the draft CPM Report related to WRC-23 Agenda Item [1.1]

[Views of stake holders:]

View 1 Views were expressed by Govt. user that in the band 4800 -4990 MHz they have running assignment and hence support Method A. Their concern and recommendation is, Govt. should not identify IMT in this band specifically from 4800 - 4940 MHz . Also Govt. user does not support Method C for this AI and recommend Method A for this AI 1.1.

View 2 : 1 Views were expressed by Erric that method reviewing pfd will not impact use of existing assignments under FS.

View 3 : Views were expressed by GMRT that they have no objections in sending in this contribution. Concern over the continued protection of RAS bands to the levels laid down in RA.769-2 which are right adjacent the bands proposed here (RAS bands are 4 825-4 835 MHz, 4 950 - 4 990 MHz, 4 990- 5 000 MHz).

View 4 : Views were expressed by IAFI that RA has been protected and continue to be protected and should not fear.

View 5 : Nokia - Method C alt 5 look more viable.]

[NPC WG-1 Chairman remark : With the views of stakeholders as recorded above contribution may be sent as it does not shows any inclination towards any methods]

MOD Section 1/1.1/4.3 Method C (CPM Report Section)

1/1.1/4.3 Method C – Modification of the existing pfd criterion in RR No. 5.441B, as well as other consequential changes as reflected in section 1/1.1/5

Under this method, while considering that both the regulatory mechanisms (i.e. i) an appropriate pfd criteria on IMT stations, and ii) application of RR No. **9.21**) are required to address protection of stations in the AMS and MMS located in international airspace and waters in the frequency band 4 800-4 990 MHz, from IMT stations, based on the results of studies, the current pfd criterion is reviewed and replaced, with new pfd criteria. The sentences in RR No. **5.441B** stating that “this pfd criterion is subject to review at WRC-23” and stipulating that “identification shall be effective after WRC-19” are deleted.

The current pfd value of “ $-155 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$ ”, produced up to 19 km above sea level at 20 km from the coast, defined as the low-water mark, as officially recognized by the coastal State”, in RR No. **5.441B**, is replaced with a new pfd value(s) for the protection of AMS/MMS:

Alternative 5— $117 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$ produced up to 19 km above sea level at the external boundary of the exclusive economic zone, as officially recognized by the coastal State, for the protection of AMS in the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz and $-115 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$ produced up to 30 m above sea level at the external boundary of the exclusive economic zone, as officially recognized by the coastal State, for the protection of MMS in the frequency band 4 800-4 990 MHz.

MOD Section 1/1.1/5.3 For Methods C and D

MOD

5.441B In Angola, Armenia, Azerbaijan, Benin, Botswana, Brazil, Burkina Faso, Burundi, Cambodia, Cameroon, China, Côte d’Ivoire, Djibouti, Eswatini, Russian Federation, Gambia, Guinea, Iran (Islamic Republic of), Kazakhstan, Kenya, Lao P.D.R., Lesotho, Liberia, Malawi, Mauritius, Mongolia, Mozambique, Nigeria, Uganda, Uzbekistan, the Dem. Rep. of the Congo, Kyrgyzstan, the Dem. People's Rep. of Korea, Sudan, South Africa, Tanzania, Togo, Viet Nam, Zambia and Zimbabwe, the frequency band 4 800-4 990 MHz, or portions thereof, is identified for use by administrations wishing to implement International Mobile Telecommunications (IMT). This identification does not preclude the use of this frequency band by any application of the services to which it is allocated and does not establish priority in the Radio Regulations. The use of IMT stations is subject to agreement obtained under No. **9.21** with concerned administrations, and IMT stations shall not claim protection from stations of other applications of the mobile service. In addition, before an administration brings into use an IMT station in the mobile service, it shall ensure that the **aggregate** power flux-density (pfd) produced does not exceed:

Alternative 5: $-117 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$ produced up to 19 km above sea level at the external boundary of exclusive economic zone, as officially recognized by the coastal State, for the protection of the aeronautical mobile service in the frequency bands 4 800-4 825 MHz and 4 835-4 950 MHz and $-115 \text{ dB(W/(m}^2 \cdot 1 \text{ MHz))}$ produced up to 30 m above sea level at the external boundary of exclusive economic zone, as officially recognized by the coastal State, for the protection of the maritime mobile service in the frequency band 4 800-4 990 MHz.

This pfd criterion is subject to review at WRC-23. Resolution **223 (Rev. WRC-23)** applies. (WRC-23)

PROPOSED MODIFICATION TO THE CHAPTER 1 OF THE DRAFT CPM REPORT

(Note: For the preparation of documents for proposed modification on the Draft CPM Report please refer to the [*ITU Guideline for the Preparation of Contributions for CPM23-2*](#))

Agenda Item 1.1:

to consider, based on the results of 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 power flux-density criteria in No. 5.441B in accordance with Resolution 223 (Rev. WRC-19)

The Administration of INDIA (REPUBLIC OF) proposes the following modifications to the text in the draft CPM Report related to WRC-23 Agenda Item 1.1

1/1.1/4.1 (Background)

MOD

Situation at WRC-15

WRC-15 established No. 5.441B of the Radio Regulations (RR) which provided International Mobile Telecommunications (IMT) identification for three Region 3 countries in the 4 800- 4 990 MHz frequency band, already allocated to the mobile service (MS) on a primary basis, and

introduced, inter alia, additional criterion consisting of a limit on the pfd produced by IMT station up to 19 km above sea level at 20 km from the coast in order to protect AMS. This criterion was subject to review at WRC-19.

Due to diverging views with regards to the relevance of pfd criterion to protect AMS, its value, conditions and frequency band for its application, noting that preparatory work was not finalized, WRC-15 invited ITU-R to study the technical and regulatory conditions for the use of IMT in this band in order to protect AMS and review pfd criterion in RR No. 5.441B at WRC-19.

Situation at WRC-19

As invited by WRC-15, in accordance with Resolution 223 (Rev.WRC-15), ITU-R carried out but did not finalize studies mentioned above. The report on the above-mentioned ITU-R studies were submitted to WRC-19 for its consideration and necessary action, as appropriate. WRC-19 updated RR No. 5.441B and Resolution 223 (Rev.WRC-19) and as a result additional countries were included in the IMT identification in RR No. 5.441B (now the footnote includes 40 countries) and for 11 of these countries the pfd criterion in footnote RR No. 5.441B was deactivated. However, due to diverging views on whether or not to apply a pfd criterion, WRC-23 was invited, in accordance with Resolution 223 (Rev.WRC-19), to consider possible measures to address 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 criterion in RR No. 5.441B.

Additional information

It has been noted that radio communication is only possible above external noise. External noise values provided in Recommendation ITU-R P.372 (Radio noise) varies between -148 (dB(W/MHz)) and -164 (dB(W/MHz)) for the frequency 4800 MHz depending upon the elevation angle of radio receiver antenna, consequently pfd values will also varies. Studies at WP5D used various receiver antenna gain for studies and has shown that pfd value decreases when receiver antenna gain increases. This is also complimented by Recommendation ITU-R P.372 (Radio noise) e.g Given the higher external noise -148 (dB(W/MHz)) at 4800 MHz for the receiver antenna gain 19 dB and 31 dB, the pfd values are -132 dB(W/m². MHz)) and -144 dB(W/m². MHz)), respectively. The pfd is calculated as per the formula from chapter 4 of Spectrum handbook, which is follow.

$$s(\text{dB(W/m}^2)) = p(\text{dB(W)} - a_e(\text{dB(m}^2)))$$

$$a_e(\text{dB(m}^2)) = 38.55 + g - 20\log(f/\text{MHz})$$

where:

s power flux density dB(W/m²)

p received power (dB(W))

a_e effective area (dB(m²))

g gain dB

WRC-19 therefore adopted WRC-23 AI 1.1 referred to above.



National Justification (attach supporting documents if any)

WG 2: Aeronautical and Maritime Issues

PRELIMINARY VIEWS ON WRC-23 AGENDA ITEMS 1.7, 1.9, 1.10 AND 1.11

Agenda Item 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. Background

Resolution 428 (WRC-19) resolves to invite ITU-R

i) to define the relevant technical characteristics and to study compatibility between potential new AMS(R)S systems that operate within the frequency band 117.975-137 MHz in the Earth-to-space and space-to-Earth directions and existing primary services in that frequency band and in adjacent frequency bands, while ensuring the protection of systems using existing primary services in those frequency bands and not constraining planned usage of those systems; considering:

- a) that, to meet the evolving requirements of modern civil aviation, satellite systems may be used for the relay of VHF communications compliant with International Civil Aviation Organization (ICAO) standards, operating under the aeronautical mobile (R) service (AM(R)S), in order to complement terrestrial communication infrastructures when aircraft are operating in oceanic and remote areas;
 - b) that under Nos. 5.201 and 5.202, the frequency bands 132-136 MHz and 136-137 MHz are also allocated in several countries to the aeronautical mobile (OR) service on a primary basis;
- ii) to take into account the results of the studies to provide technical and regulatory recommendations relative to a possible new AMS(R)S allocation within the frequency band 117.975-137 MHz, taking into consideration that the development of compatibility criteria between new AMS(R)S systems proposed for operations in the frequency band 117.975-137 MHz and ICAO-standardized aeronautical systems in this frequency band is the responsibility of ICAO;

As per the draft CPM report (Document CPM23-2/1-E dated 25 November, 2022), in liaison with the ICAO, ITU-R has studied the architecture, parameters, and baseline link budgets of a reference AMS(R)S system for the provision of standardized communications for air traffic management, without modification to aircraft equipment.

In order to support compatibility studies, example of link budgets for satellite-to-aircraft (downlink) and aircraft-to-satellite (uplink) VHF links have been developed, based on propagation considerations discussed with the relevant ITU-R group.

Studies with existing systems operating under an in-band/adjacent band allocation to a primary service has been assessed in close liaison with ICAO and the relevant ITU-R Working Parties to ensure the protection of existing systems from possible interference resulting from the introduction of a new AMS(R)S system in this frequency band.

Analysis of the results of studies divided into five subsections as follows:

- i. In-band sharing between the systems operating in the AMS(R)S service and systems operating in the aeronautical mobile (route) service.
- ii. Adjacent band compatibility between systems operating in the AMS(R)S service above 117.975 MHz and systems operating in the aeronautical radionavigation service below 117.975 MHz.
- iii. Adjacent band compatibility with systems operating above 137 MHz.
- iv. In-band sharing with other services.
- v. Compatibility between systems operating in the aeronautical mobile (route) service from different administrations.

Methods proposed to solve this agenda item:

- i. Method A: No change to the Radio Regulations
- ii. Method B:

- a. New allocation to the aeronautical mobile-satellite (route) service within the frequency band 117.975-137 MHz
- b. Create a new co-primary allocation for the AMS(R)S in the Earth-to-space and space-to-Earth directions in the frequency band 117.975-137 MHz, or part thereof, under the following conditions:
 - c. the use of frequency band 117.975-137 MHz is limited to non-geostationary satellite systems only;
 - d. limiting the use of the new AMS(R)S allocation to internationally standardised aeronautical systems;
 - e. Method B is not an independent and standalone Method as such and thus should be considered together with Methods B1 or B2.
- iii. Method B1: Method B1 is containing the elements of Method B, and proposes to add a power flux-density (pfd) limit, where appropriate, on AMS(R)S space stations unwanted emissions falling above 137 MHz, in order to ensure protection of adjacent band services above 137 MHz.
- iv. Method B2: Method B2 is containing the elements of Method B, and proposes that systems operating under an allocation to the AMS(R)S be subject to the application of regulatory and technical measures to ensure compatibility with existing systems operating under an allocation to a different service in co-frequency bands and in the adjacent bands.

2. Preliminary Views

India supports a new co-primary allocation for the AMS (R)S in the band 117.975 MHz-137 MHz in the Earth-to-space and space-to-Earth directions limited to internationally standardized aeronautical systems operating in accordance with ICAO Standards and Recommended Practices (SARPs), while ensuring protection and not constraining the systems of the incumbent services in the band and adjacent bands. India also supports Method B2 for satisfying this Agenda Item.

Agenda Item 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. Background

Resolution 429 (WRC-19) resolves to invite the ITU Radiocommunication Sector

- i) to identify any necessary modifications to Appendix 27 for the AM(R)S between 2 850 and 22 000 kHz, noting that the modernization of aeronautical HF communications will not require any changes to Article 5 of the Radio Regulations;
- ii) to identify any necessary transition arrangements for the introduction of new digital aeronautical wideband HF systems and any consequential changes to Appendix 27;

to recommend how new digital aeronautical wideband HF systems can be introduced while ensuring compliance with safety requirements and that any channel aggregation needs to be performed in a manner that protects other primary services operating in band and in adjacent frequency bands;

iii) to define the relevant technical characteristics and to conduct any necessary sharing and compatibility studies, taking into account that inter-system compatibility between internationally standardized aeronautical equipment is the responsibility of ICAO, with incumbent services that are allocated on a primary basis in the same or adjacent frequency bands to avoid harmful interference in accordance that any channel aggregation needs to be performed in a manner that protects other primary services operating in band and in adjacent frequency bands;

iv) to complete the studies in time for WRC-23.

As per the draft CPM report (Document CPM23-2/1-E dated 25 November, 2022), since the approach followed for the analyses was to keep the provisions of this RR Appendix 27 for the individual channels unchanged, for wideband communication using aggregation of channels no technical studies were required.

Methods proposed to solve this Agenda Item are:

(i) Method A: No change to the Radio Regulations

Reason: It may be considered that the current version of RR Appendix 27 does not preclude the digital HF communication for the relevant type of classes. This method could support some applications.

(ii) Method B: Inclusion of the relevant part of the Rules of Procedure relating to RR Appendix 27 into the Radio Regulations and the introduction into RR Appendix 27 of other provisions related to wideband digital communications.

Reasons: This agenda item could be the opportunity to include in RR Appendix 27 the relevant part of current text of the Rules of Procedures and make other changes to this Appendix on the use of wideband digital emissions.

In Both methods, the suppression of Resolution 429 (WRC-19) is also proposed.

2. Preliminary Views

India supports the proposed changes to Appendix 27 of Radio Regulations to allow new modern/digital wideband HF communication systems using contiguous and/or non-contiguous 3 kHz channels coexisting with current HF voice and data systems.

Agenda Item 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);

Background

Resolution 430 (WRC-19) resolves to invite the ITU-R to conduct, and complete in time for WRC-23:

- i) studies on spectrum needs for new non-safety aeronautical mobile applications for air-air, ground-air and air-ground communications of aircraft systems;
- ii) 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;
- iii) 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;
- iv) definition of appropriate protection for the passive services and the RAS allocated in adjacent frequency bands from unwanted emissions of the AMS

This agenda item considers possible new allocations to the AMS in the frequency bands 15.4-15.7 and 22-22.21 GHz to support the growing use of Wideband line-of-sight data links (WB LOS DLs). WB LOS DL operate in the AM(OR)S and are not related to safety of life.

The frequency band 15.4-15.7 GHz is allocated to the radiolocation service (RLS) and, to the aeronautical radionavigation service (ARNS). The ARNS in the frequency band 15.4-15.7 GHz is used for landing systems and unmanned aircraft detect and avoid systems. Some previous ITU-R studies have shown that sharing between RLS and AMS could be difficult. The sub-band 15.43- 15.63 GHz is allocated to the fixed-satellite service (FSS) (Earth-to-Space) used by feeder links of non-geostationary systems. A working document towards a preliminary draft new (WDPDN) Recommendation ITU-R M.[15.4-15.7_GHZ_ARNS] is currently being developed to provide characteristics and protection requirements for these ARNS systems. The lower adjacent frequency band 15.35-15.4 GHz is allocated to the Earth exploration-satellite service (EESS) (passive), radio astronomy service (RAS) and space research service (SRS) (passive), subject to RR No. 5.340. The upper adjacent frequency band at 15.7-17.3 GHz is allocated to the RLS.

The frequency band 22-22.21 GHz is allocated to the fixed service (FS) and mobile service (except aeronautical mobile). The lower adjacent frequency band 21.4-22 GHz has allocations to the fixed and mobile services and to the broadcasting-satellite service in Regions 1 and 3. The upper adjacent frequency band at 22.21-22.5 GHz has allocations to the fixed and mobile services (except aeronautical mobile), RAS, SRS (passive) and EESS (passive). Under the EESS (passive) allocation, the frequency band 22.21-22.5 GHz allows for remote sensing observations near a water absorption line that is essential for measuring atmospheric water vapour, which in turn helps reducing error in other geophysical parameters due to the presence of water vapour.

As per the draft CPM report (Document CPM23-2/1-E dated 25 November, 2022), the summary of Sharing and Compatibility Studies are:

- (i) Frequency band 15.4-15.7 GHz:
 - 1) Radio astronomy operating in the frequency band 15.35-15.4 GHz - Studies demonstrate the overall ability of new non-safety aeronautical systems to respect the protection criteria of the RAS.
 - 2) Radiolocation operating in the frequency band 15.4-15.7 GHz- Studies show that interference can be precluded by introducing additional separation distances.
 - 3) Aeronautical radionavigation operating in the frequency band 15.4-15.7 GHz
 - 4) Fixed satellite operating in the frequency band 15.43-15.63 GHz- The long-term and short-term protection criteria of systems operated in the FSS (Earth-to-space) were met in all of the studied operational scenarios.

- (ii) Frequency band 22-22.21 GHz:
 - 1) Broadcasting satellite operating in the frequency band 21.4-22 GHz- The long-term and short-term protection criteria of systems operated in the BSS were met in all of the studied operational scenarios
 - 2) Fixed service operating in the frequency band 22-22.21 GHz- The study comes to the conclusion that the long-term and the short-term protection criteria of FS are met in the four scenarios
 - 3) Mobile service operating in the frequency band 22-22.21 GHz - No characteristics were available regarding the mobile service. Hence, no study was performed
 - 4) Radio astronomy operating in the frequency band 22.21-22.5 GHz
 - 5) Earth exploration-satellite service (passive) operating in the frequency band 22.21-22.5 GHz- It shows that the protection criterion of EESS (passive) systems operating in the frequency band 22.21-22.5 GHz is met in all of the studied operational scenarios
 - 6) Space research service operating in the frequency band 22.21-22.5 GHz- No characteristics were available regarding the space research service. Hence, no study was performed.

Methods proposed to solve this Agenda Item are:

- (i) Method A: No change to the Radio Regulations.
- (ii) Method B: New primary aeronautical mobile (off-route) service allocation in the frequency band 15.4-15.7 GHz. This method proposes to add an AMS allocation in the frequency band 15.4-15.7 GHz with an associated footnote.
- (iii) Method C: Remove the exception of aeronautical mobile (off-route) service in the frequency band 22-22.21 GHz. This method proposes to remove the exception of aeronautical mobile service of the mobile service allocation in the frequency band 22-22.21 GHz, and to add associated footnotes.
- (iv) Method D: Combination of Methods B and C. This method proposes to add an AM(OR)S allocation in the frequency band 15.4-15.7 GHz with an associated footnote, and to remove the exception to aeronautical mobile (off-route) service of the MOBILE allocation in the frequency band 22-22.21 GHz, and to add associated footnotes.

2. Preliminary Views:

India supports NOC for this Agenda Item.

Agenda Item 1.11:

to 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. Background

Resolution 361 (Rev.WRC-19) – Consideration of possible regulatory actions to support modernization of the Global Maritime Distress and Safety System and the implementation of e-navigation

Issue A: GMDSS Modernization: Resolves 1 of Resolution 361 (Rev.WRC-19) invites WRC-23 to consider possible regulatory actions in support of the modernization of the global maritime distress and safety system (GMDSS) which has been finalized by the International Maritime Organization (IMO). Considering the decisions of IMO and after an analysis of all the Radio Regulations (RR) provisions impacted by these decisions, the following measures have been proposed in a unique method:

- The deletion of narrow-band direct-printing (NBDP) for distress and safety communications from GMDSS in RR Appendices 15 and 17 for MF and HF in all bands.
- Introduction of a new automatic connection system (ACS) which will be proposed to be implemented on the frequencies which had previously been used by NBDP for GMDSS in all MF and HF bands in RR Article 5 and Appendix 17 by a footnote.
- Introduction of the NAVDAT frequencies in MF and HF in RR Appendix 15 and modification of the relevant provisions in RR Articles 5, 32, 33 and 52. Those frequencies have been already introduced by WRC-19 in RR Appendix 17, the difference is that now NAVDAT is part of the GMDSS.
- To implement automatic identification system search and rescue transmitter (AIS SART) as locating equipment for which frequencies are protected by reference in RR Appendix 15. Taking into account studies performed within ITU-R, especially in Recommendation ITU-R M.1371, it is proposed to amend RR No. 31.7 that survival craft stations may carry this equipment as an alternative to the RADAR-SART to be in line with SOLAS Chapter IV.

Issue B: e-navigation: Resolves 2 of Resolution 361 (Rev.WRC-19) invites WRC-23 to consider possible regulatory actions in support of e-navigation. E-navigation is developed by IMO which has concluded that various existing satellite networks already support the e-navigation concept, and usability studies have been conducted. The VHF data exchange system (VDES) and NAVDAT systems, for which IMO has agreed to develop performance standards,

would also support e-navigation by means of enabling broadcasting (by NAVDAT) and exchange of digital files (by VDES). From a spectrum regulatory point of view, the requirements for e-navigation are thus covered.

Issue C: Introduction of additional satellite systems into the GMDSS: Resolves 3 of Resolution 361 (Rev.WRC-19) invites WRC-23 to consider regulatory provisions, if any, based on the results of ITU-R studies referred to in invites the ITU Radiocommunication Sector, to support the introduction of additional satellite systems into the GMDSS.

2. Preliminary Views

Issue A: Global Maritime Distress and Safety System modernization: India supports modernization of GMDSS and supports the unique method which proposes to update the RR Appendices in line with IMO updates and practical usages.

Issue B: e-navigation: India supports the **only** method proposed to solve this Agenda Item no additional allocation is necessary in RR Article 5 for e-navigation. Therefore, it is proposed a no change to RR Article 5.

WG 3 : Science Issues

PRELIMINARY VIEWS ON WRC-23 AGENDA ITEMS 1.12, 1.13, 1.14, 9.1 TOPIC A & 9.1 TOPIC D

Agenda Item 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. Background

A secondary allocation to the EESS (active) for spaceborne radar sounders in the frequency range 40-50 MHz will enable the collection of scientific data from space-based ground penetrating radar (GPR) type missions. The radar returns from such sounder emissions will result in sub-surface data with a vertical resolution of 5-7 m. Such scientific data can be used to

determine the thickness, inner structure, and thermal stability of ice sheets, as well as the occurrence, distribution, and dynamics of aquifers in desert environments.

In this context, ITU invites for 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,

In India, in 40-47 MHz band there are primary allocations to Fixed & Mobile and band 47-50 MHz is allocated for Fixed, Mobile and Broadcasting services. Further, the use of frequency band 47-50 MHz (and beyond that) by wind profiler radars in the radiolocation service is permitted on case-to-case basis. In the frequency range 40-50 MHz, Space Research services have secondary allocation from 40-40.2 MHz and 40.98-41.015 MHz. There is extensive usage in 40-50 MHz band by Indian Administration and also future plans for usage.

Studies to support this agenda item have been developed in PDN Report ITU-R RS.[SPACEBORNE VHF RADAR SOUNDER]. Specifically, this Report contains the results of compatibility studies, based on the proposed EESS (active) radar characteristics provided in Recommendation ITU-R RS.2042 and the characteristics of the incumbent services as provided by the responsible Working Parties.

2. Preliminary Views

India supports 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). However, as the current sharing and compatibility studies have not fully demonstrated that incumbent services could be protected from potential harmful interference from the operation of spaceborne radar sounders in the frequency band 40-50 MHz, India may support Method D which proposes “No Change” to Radio Regulations.

Agenda Item 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. Background

The frequency band 14.8-15.35 GHz is currently allocated on a primary basis to the FS and the MS, and on a secondary basis to the SRS. Within the SRS, the frequency band is expected to be used for high-speed direct downlinks from space science missions to a limited number of earth stations located globally. Additionally, the frequency band is also currently used in two capacities by Data Relay Satellite (DRS) systems operated by multiple administrations. These uses include forward feeder uplinks from DRS earth stations to relay satellites in the GSO

orbit, as well as inter-satellite return links to relay data from non-GSO space science spacecraft (including crewed space vehicles and stations) through DRS satellites to the Earth.

The space research satellite requirements for use of the frequency band are expected to continue to increase in the coming years as a result of increasing numbers of robotic science satellites and crewed vehicles, limited bandwidth and/or increasing congestion in other SRS frequency bands, and increasing science mission data transport needs.

The purpose of this agenda item is to explore the feasibility of establishing a regulatory framework to provide for the operation of SRS systems in this frequency band on a primary basis, consistent with not causing harmful interference to nor constraining the operation of systems operating in other primary services in the frequency band.

In India, the 14.8-15.35 GHz band is extensively used for fixed services providing microwave backhaul connectivity to the IMT networks. The frequency band 15.2-15.35 GHz is currently allocated to the EESS (passive) and SRS (passive) on a secondary basis (**RR No. 5.339**). Further, the frequency band 15.35-15.4 GHz is currently allocated to the EESS (passive), the radio astronomy service and the SRS (passive) on a primary basis;

Annex 1 of Recommendation ITU-R SA.2141-0, Characteristics of space research service systems in the frequency range 14.8-15.35 GHz, provides representative technical and operational characteristics for SRS systems in this frequency band. The PDN Report ITU-R SA.[15 GHz SRS SHARING] contains the sharing and compatibility studies performed by the ITU-R in association with this agenda item.

2. Preliminary Views

India supports upgrading the SRS allocation to primary status in the frequency band 14.8-15.35 GHz, while ensuring protection to incumbent services and its/their planned usages without imposing constraints; in this frequency band as well as in the adjacent bands 14.44 – 14.50 GHz and 15.35 - 15.4 GHz based on the result of the ITU-R studies. However, several studies were performed to determine pfd levels corresponding to the interference criteria, and the results of those studies have diverging conclusions, which are reflected by the various methods to resolve the agenda item. The results of some of the studies raised a question around whether the proposed pfd mask in Recommendation ITU-R SA.1626-1 is suitable to satisfy Resolution 661 (WRC-19) and ensures the protection of incumbent primary allocated services operating in the frequency band 14.8-15.35 GHz. There also remains disagreements over if the other proposed pfd masks are sufficient to ensure protection of incumbent primary services in the band. Considering the above and the fact that India has extensive usage of the band 14.8-15.35 GHz for existing services in India, at this stage India may support Method A proposed in Draft CPM Report according to which there should be “No Change” to Radio Regulations.

Agenda Item 1.14:

to review and consider possible adjustments of the existing or possible new primary frequency allocations to Earth exploration-satellite service (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. Background

Resolution 662 (WRC-19), WRC-23 agenda item 1.14 calls for WRC-23 to “Review of frequency allocations for the Earth exploration-satellite service (passive) in the frequency range 231.5-252 GHz and consideration of possible adjustment according to observation requirements of passive microwave sensors” without unduly constraining the other primary services currently allocated in this frequency range.

EESS (passive) microwave sensing mainly includes Ice Cloud Measurements and atmosphere gases measurement. The Ice Cloud Imager (ICI) instrument which is a conical scanning millimetre/sub-millimetre wave radiometer, performs measurements of cloud ice water paths and cirrus clouds operating in two symmetric spectral bands of 239.2-242.2 GHz and 244.2-247.2 GHz. The Microwave Limb Sounder (MLS) instrument continuously observes thermal emission from utilizing spectrometers of numerous channels within the frequency band 231.5-252 GHz to measure the chemical processes and compounds within Earth’s atmosphere. More details on the scientific background can be found in the PDN Report ITU-R RS.[231.5-252 GHz EESS].

Compatibility studies show that, in the frequency bands 239.2-242.2 GHz and 244.2-247.2 GHz, the sharing between the conical scanning passive sensors (like ICI) and systems of the fixed service (FS)/mobile service (MS) is not feasible. Studies also show that limb sounding passive sensors are compatible with systems of the FS/MS in the whole frequency range 231.5-252 GHz. Further, the sharing between the fixed-satellite service (FSS) (GSO, space-to-Earth) and EESS (passive) is feasible within the whole frequency range 232-240 GHz.

The PDN Report ITU-R RS.[231.5-252 GHz EESS] is in development which compiles elements related to background on WRC-23 agenda item 1.14 as well as technical considerations and results of relevant sharing studies on the EESS (passive) with the allocated services in the frequency range 231.5-252 GHz.

2. Preliminary Views

India supports the consideration of possible adjustments of the existing or new primary frequency allocations to EESS (passive) in the frequency range 231.5-252 GHz in accordance with Resolution 662 (WRC-19) subject to the outcome of the results of ITU-R studies. Therefore, India supports Method B which proposes addition of new primary allocations to the EESS (passive) in the frequency bands 239.2-242.2 GHz and 244.2-247.2 GHz, and shifting of the existing FS and MS allocations to the frequency band 235-238 GHz. With such a shift, the potential of interference to the EESS (passive) could be avoided and no constraints would have to be placed on the FS and MS services. On the contrary, the FS and MS would gain 1.2 GHz of

additional primary allocations, and the two frequency ranges 231.5-235 GHz (3.5 GHz of BW) and 238-241 GHz (3 GHz of BW) would be transformed into one block of contiguous allocations in the frequency range 231.5-239.2 GHz (7.7 GHz of contiguous BW). Since there is no FS/MS stations deployment at present, this shift has no impact on the future usage of the FS/MS.

Agenda Item 9.1 Topic a:

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;

1. Background

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. These observations are made from ground-based and space-based systems. 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. 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;

In this context, ITU invites for 2023 World Radiocommunication Conference 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 Metoids 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 Metoids service.

ITU-R WP 7C provided the following definition to the ITU Coordination Committee for Terminology (CCT): “*Space Weather*: information relating to the characteristics of natural phenomenon in space and in high atmosphere that impact Earth's environment and human activities.”

CCT mentioned to ITU-R WP 7C that the expression “high atmosphere” was too vague and does not correspond to a precise level. CCT also highlighted that usually proposed terms and definitions are included in source draft recommendations or reports being developed.

ITU-R WP 7C reviewed its proposal by using terms already used in the RR, an example for definition in the RR Article 1 that could be considered is:

“*space weather*: natural phenomena, mainly originating from solar activity and occurring beyond the major portion of the Earth's atmosphere, that impact Earth's environment and human activities.”

2. Preliminary Views

India considers it necessary to develop appropriate recognition of space weather sensors in the Radio Regulations and determine the appropriate radio service for space weather sensors. India supports further study on spectrum requirements and the relevant interference criteria for space weather sensors, without any additional adverse effects on existing services to which the same and adjacent frequency bands are allocated. However, the discussions on definition of space weather and determining radiocommunication service for space weather sensors has not concluded yet. Therefore, India supports further studies on this Agenda Item.

Agenda Item 9.1 Topic d:

Protection of Earth exploration-satellite service (EESS) (passive) in the frequency band 36-37 GHz from non-GSO FSS space stations;

1. Background

Under WRC-23 agenda item 9.1, topic d), which is a continuation of study matters that began but were not fully resolved under WRC-19 agenda item 1.6, there are two potential interference scenarios that were studied, while taking into account the fixed-satellite service (FSS) characteristics provided by the relevant ITU-R contributing group and the Earth exploration-satellite service (EESS) (passive) characteristics contained in Recommendation ITU-R RS.1861-1:

- interference into the sensing channel of EESS (passive) from non-geostationary-satellite orbit (non-GSO) FSS constellations operating in the frequency band 37.5-38 GHz at a lower altitude than EESS (passive) sensors;
- interference into the cold calibration channel of EESS (passive) from non-GSO FSS constellations operating in the frequency band 37.5-38 GHz at a higher altitude than EESS (passive) sensors.

With regard to the first scenario, the results of one study considering two different non-GSO FSS systems indicate that an unwanted emission power density limit of -31 dBW/100 MHz in the frequency band 36-37 GHz would be needed. This would be applicable to non-GSO FSS constellations operating at altitudes below 970 km (maximum altitude of EESS (passive) sensors in this frequency band). The results of another study considering one non-GSO FSS system show that there is a minimum positive margin of 10-15 dB to the EESS (passive) protection criteria. Both studies consider a side lobe level of 0 dBi, no additional satellite body blockage loss, and no apportionment of the EESS (passive) protection criterion. When considering an additional 30 dB attenuation provided by the FSS satellite body, all studies conclude that no specific unwanted emission limit would be needed to cover this scenario.

With regard to the second scenario, the results of two studies considering three different non-GSO FSS systems indicate that an unwanted emission power density limit of -31 dBW/100 MHz in the frequency band 36-37 GHz would be needed, without apportionment of the EESS (passive) protection criterion. This would be applicable to non-GSO FSS constellations operating at altitudes above 407 km (minimum altitude of EESS (passive) sensors in this frequency band).

Another study that considers a different set of operational FSS characteristics has shown that there is a minimum margin of approximately 7 dB to the EESS (passive) protection criteria when only assessing interference from the particular constellation considered, and this study concludes that no specific unwanted emission limit would be needed to cover this scenario.

2. Preliminary Views

India supports further work w.r.t the studies that have been conducted with a view to protection of EESS (passive) sensors operating in the band 36-37 GHz from non-GSO fixed satellite service space stations in the band 37.5-38 GHz, and development of Recommendations and Reports as appropriate. As the results of studies are not conclusive with respect to unwanted emission power limits, India supports further studies to determine appropriate unwanted emission power limits for the protection of EESS (passive) sensors operating in the band 36-37 GHz from non-GSO FSS systems operating in the band 37.5-38 GHz with due consideration of operational aspects of non-GSO FSS system.

WG 4: Satellite Issues

PRELIMINARY VIEWS ON WRC-23 AGENDA ITEMS 1.15,1.16,1.17,1.18 AND 7.

Agenda Item 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. Background

ITU has addressed earth stations on aircraft and vessels, hereafter referred to as A-ESIM and M-ESIM respectively, at previous WRCs.

WRC-23 agenda item 1.15 calls for studies on the possible operation of A-ESIM and M-ESIM communicating with geostationary space stations in the fixed-satellite service in the frequency band 12.75-13.25 GHz (Earth-to-space). The use of the frequency band 12.75-13.25 GHz by geostationary-satellite networks in the fixed-satellite service is subject to RR Appendix **30B**, which contains a worldwide fixed-satellite service allotment Plan and assignments in the List and has its own regulatory procedures and technical criteria.

In RR Appendix **30B**, the explicit agreement of an administration for the inclusion partially or wholly of its territory in the service area of a proposed RR Appendix **30B** assignment (§ 6.6 of

RR Appendix **30B**) is required. A review by the BR of the service areas of the RR Appendix **30B** assignments recorded in the MIFR showed that generally the service areas of RR Appendix **30B** networks are non-contiguous and the number of countries in these service areas ranges from one to fifty countries. Additionally, § 6.16 of RR Appendix 30B provides that an administration may at any time exclude its territory from the service area of an RR Appendix 30B assignment. Therefore, A-ESIM and M-ESIM in the frequency band 12.75-13.25 GHz need to have the capability to restrict operations as discussed below in Section 3.2 to territories of those administrations where agreement under § 6.6 has been obtained and authorization for such operations has been granted. Also, a distinctive aspect of RR Appendix 30B is the existence of a Reference situation for all Plan allotments and assignments in the List.

Moreover, for the operation of A-ESIM and M-ESIM, the technical, operational and regulatory provisions including responsibilities of administrations and entities responsible for the operation, authorization and the interference management system of these earth stations need to be defined.

2. Preliminary Views

India supports Method A

No changes to the Radio Regulations and suppression of Resolution 172 (WRC-19).

3. Justification

The sanctity of Plan providing equitable access to all the member countries should not be touched. Considering the crowded GSO arc coordination in non-plan Ku band is next to impossible. The only option available now for new/existing countries to acquire/augment capacity for meeting the national requirement is only Plan bands.

As per the information provided by ITU BR during WP 4A meeting, no country has obtained explicit service area agreement from contiguous administration. ESIM being global in nature and without such explicit service area agreement, complying with the AP30B 6.6 provision, it is not possible to provide ESIM over wider coverage. If allowed, the coordination situation become like non-plan band depriving other administration of acquiring/augmenting orbit-spectrum resource for their own use over their national territory.

Apart from FSS, this band is used for Fixed Service in India. Therefore any global harmonization of this band for M-ESIM & A-ESIM under FSS may constraint the existing and future planned terrestrial fixed and mobile services in this band and adjacent bands.

Therefore, we suggest NOC for this agenda

Agenda Item 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. Background

World Radiocommunication Conference 2019 (WRC-19) adopted agenda item 1.16 and Resolution 173 that calls for studies for possible operation of ESIMs communicating with Non GSO FSS space stations in 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)*

The frequency bands 17.7-18.6 GHz, 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) are globally allocated on a co-primary basis to the fixed-satellite service (FSS). The frequency bands 17.7-18.6 GHz, 18.8-19.3 GHz and 19.7-20.2 GHz and 27.5-29.1 GHz are allocated on primary basis to Fixed and Mobile. The frequency band 20.1-20.2 GHz and 29.9 to 30 GHz is also allocated for Mobile Satellite Service on primary basis. The frequency band 28.5-30 GHz (Earth-to-space) is allocated to the Earth exploration-satellite service (EESS) on a secondary basis.

There are existing and planned non-GSO satellite constellations in the frequency bands 17.7-20.2 GHz (space-to-Earth) and 27.5-30 GHz (Earth-to-space) to serve the growing need for access to broadband connectivity. A consistent approach to the deployment of these ESIMs will support important and growing global communication requirements and provide adequate protection to other services in the frequency bands.

Working Party (WP) 4A is the responsible group for the Agenda Item 1.16 to prepare a CPM text for WRC-23 on this agenda item (see Annex 23 of Doc [4A/0856](#)) based on contributions received from member states and the sharing studies conducted in the Radiocommunication sector for protection of the other services in the band.

The studies carried out so far have identified example provisions to protect such services and example “guidelines” to assist an administration wishing to authorize ESIM to operate on the territory under its jurisdiction. For this agenda item, two methods have been identified: Method A proposes no changes to the RR and suppression of Resolution **173 (WRC-19)**. Method B proposes to add a new RR No. **5.A116** in RR Article **5** and a reference to a new WRC Resolution providing the conditions for the operation of ESIM and protection of the services to which the frequency bands are allocated, and consequential suppression of Resolution **173 (WRC-19)**.

2. Preliminary Views

India Supports Method B: add a new footnote in RR Article 5 that refers to a new WRC Resolution with technical, operational and regulatory conditions for the operation of non-

GSO maritime and aeronautical ESIMs while ensuring protection of allocated services, and consequential suppression of Resolution 173 (WRC-19)

3. Justification

Discussion is at a matured stage with conclusions on the sharing studies between terrestrial and space services with non-GSO ESIM reflected in the draft CPM text. Support for Method B is recommended given the favorable outcome of the sharing and compatibility studies and the aim to provide a global harmonized framework for non-GSO ESIM in the Ka-band.

Possible interference management issues and the control and monitoring of ESIMs are additional details that will be discussed further at CPM23-2 in the context of Method B

Agenda Item 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;

Background

There is growing interest by some members of ITU for utilizing satellite-to-satellite links for relaying data to/from the Earth using a GSO or a non-GSO FSS service provider¹ space station that is operating at an orbital altitude greater than that of the non-GSO user space station² generating the data. Utilization of satellite-to-satellite links needs to be done in an appropriate manner to fully preserve the incumbent services in the planned and non-planned bands where such satellite-to-satellite service is not currently deployed. As most of these non-GSO missions are in low-Earth orbit (LEO) in the order of 300 to 900 km, the user space station download is mostly related to the short duration access they have to their respective earth stations, normally about 10 minutes per orbit. For low latency applications that require access to instrument data in near-real time (e.g. weather forecasting, disaster risk reduction), this can limit the amount of data that is made available to end users within an acceptable time delay. By utilizing inter-satellite links to relay data to the ground, data can be made available in near-real time across a much greater portion of the user space station's orbit, enhancing the availability and value of instrument data for low latency applications.

Both small and large satellite missions would benefit from satellite-to-satellite transmission services. Even nano-satellites (1-25 kg) may carry a satellite-to-satellite transmission payload. The use of the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz and 18.8-20.2 GHz (space-to-Earth) and 27.5-30 GHz (Earth-to-space), or parts thereof, for transmissions between space stations should ensure compatibility with, and impose no additional regulatory or technical constraints on, services to which the frequency bands are currently allocated on a primary basis and services using adjacent frequency bands allocated on a primary basis in accordance with Resolution 773 (WRC-19).

1 A service provider space station is a FSS space station transmitting in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz and 18.8-20.2 GHz (space-to-Earth), or parts thereof, towards space stations at lower altitudes and receiving in the frequency band 27.5-30 GHz (Earth-to-space), or parts thereof, from space stations at lower altitudes.

2A user space station is a space station transmitting in the frequency band 27.5-30 GHz (Earth-to-space), or parts thereof, towards space stations at higher altitudes and receiving in the frequency bands 11.7-12.7 GHz, 18.1-18.6 GHz and 18.8-20.2 GHz (space-to-Earth), or parts thereof, from space stations at higher altitudes.

Preliminary Views

India supports Method B in the draft CPM Text to enable the operation of satellite-to-satellite links and the development of regulatory framework and technical conditions to ensure protection of incumbent services in the relevant frequency bands and in the adjacent frequency bands without imposing any new constraints as currently provided in the RR in the frequency bands as under:

F2	F3	F4	F5
18.1-18.6, 18.8-19.3, 19.7-20.2 GHz (service provider-to- user)	19.3-19.7 GHz (service provider-to- user)	27.5-29.1, 29.5-30 GHz (user-to- service provider)	29.1-29.5 GHz (user-to- service provider)

India also proposes following regulatory measures:

- i. the protection of NGSO FSS using a set of hard limits and accordingly support option N2.
- ii. the protection of GSO FSS within the envelop of typical Earth Stations and accordingly support option G1.
- iii. the satellite-to-satellite operations use the “within the cone” concept.

Agenda Item 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);

Background

Non-geostationary orbit satellites narrowband MSS systems are designed with a view to providing means to transfer data collected from user terminals deployed over a geographic area (e.g. region or subregion). WRC-23 agenda item 1.18 invited ITU-R to conduct studies

relating to spectrum needs and potential new allocations to the MSS for applications of low data rate systems for the collection of data from, and management of, terrestrial devices in the MSS; the aim was to consider possible new primary or secondary allocations, with the necessary technical limitations, taking into account the characteristics described in *recognizing c)* of Resolution 248 (WRC-19), to the MSS for non-geostationary orbit satellites, based on the findings of the sharing and compatibility studies, while ensuring the protection of existing primary services in these frequency bands and adjacent bands as well as not imposing undue restrictions on their further development.

Preliminary Views

In the meeting it was discussed to remain silent on this Agenda item as it relates to Region 1. It was also discussed that India can use this Agenda Item as a leverage, if opportunity arises.

Agenda Item 1.19:

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);

Background

In the 2019 World Radiocommunication Conference, Resolution 174 (WRC-19) was established to consider a new primary allocation to the FSS in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 2, which is already allocated to the broadcasting-satellite service (BSS) on primary status.

An FSS (space-to-Earth) emission is similar to a BSS (space-to-Earth) emission. Both consist of a space station transmitting a signal towards the Earth that will be received by fixed earth station terminals. In principle, the interference scenario with respect to other services should not be different; however, with this new allocation, the flexibility in possible uses of the band would be increased.

In Region 1, the frequency band is already allocated to the FSS, a new allocation in Region 2 progresses the principle of Regional harmonization, which allows for synchronization of frequency bands across both Regions. The consideration of Recommendation ITU-R BO.1834 and Recommendation ITU-R BO.1835, which address compatibility and sharing between the BSS networks using the Region 2 BSS allocation in the frequency band 17.3-17.8 GHz and feeder links of BSS networks using the worldwide FSS (Earth-to-space) allocation in the frequency band 17.3-17.8 GHz, is well suited for addressing an approach to study the proposed FSS (space-to-Earth) allocation with existing feeder links of BSS networks using the frequency band 17.3-17.8 GHz.

For the coordination between new FSS (space-to-Earth) frequency assignments with respect to BSS frequency assignments and between new FSS (space-to-Earth) frequency assignments, no modification to Radio Regulations would be required, since RR No. 9.7

already covers the coordination process and RR Appendix 5, Table 5-1 already contemplates a coordination trigger (8° of orbital arc).

Preliminary Views

In the meeting it was discussed to remain silent on this Agenda item as it relates to Region 2. It was also discussed that India can use this Agenda Item as a leverage, if opportunity arises.

Agenda Item 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; Resolution 86 (Rev.WRC-07) – Implementation of Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference

Topic A; Tolerances for certain orbital characteristics of non-GSO space stations in the FSS, BSS or MSS

Preliminary Views

India supports Method A2 with an adequate absolute value in kilometres or a formula that defines the tolerance based on the orbit altitude. India believes that +/- 100 km provides adequate flexibility for operators to safely fly their satellites and to accommodate other systems in similar altitudes. Alternatively, India could also support method A3.

Justification:-

India supports efforts to define tolerances for the four orbital characteristics identifying a “notified orbital plane” (the inclination of the orbital plane, the altitude of the apogee of the space station, the altitude of the perigee of the space station and the argument of the perigee of the orbital plane).

India believes that the ultimate tolerances defined need to provide adequate flexibility for NGSO systems to deploy as planned. For example, India maintains a separation of several kilometers between each of its planes to avoid the possibility of collisions between its own satellites. Further, providing adequate flexibility would enable NGSO operators to accommodate new systems without having a negative impact on the status of their ITU filing.

Topic B; Non-GSO bringing into use post-milestone procedure

Preliminary Views:

India recommends that the this issue may be postponed until WRC-27. This issue may be addressed after experience is gained with the Resolution 35 milestone process

Justification:-

The first NGSO systems subject to milestones will reach their 100% milestone as of 1 February 2028, after WRC-27 (see resolves 8c) of Resolution 35). Thus, no system will be in a post milestone situation until after WRC-27 and it makes sense to wait until that conference to develop post milestone procedures.

Topic D – Topics for which consensus was achieved in ITU-R

Topic D2 – Inclusion of new Appendix 4 Parameters from S.1503 updates

Preliminary Views:

India supports the modification to Recommendation ITU-R S.1503 to improve the modelling of NGSO systems while ensuring that Article 22 EPFD limits are met to protect GSO systems.

Justification:-

The current version of Recommendation ITU-R S.1503-3 does not adequately account for interferences from NGSO systems to GSO systems needs further updates (currently being pursued in Working Party 4A) that are required to better model NGSO FSS systems recognising various technological developments and potential preclusion of locations with excessive interference.

Topic D3-BR reminders for BIU/BBIU

Preliminary Views:

India supports additional reminders from the BR to support administrations in maintaining their ITU filings.

Justification:-

Under this Topic, BR reminders would be sent with respect to the need to confirm the bringing into use or bringing back into use of satellite networks.

Topic J – Modifications to Resolution 76 (Rev.WRC-15)

Preliminary Views:

Further discussion are needed at the national level on this issue, particularly if we should follow RES609 pattern where both operational and planned systems are involved in the consultation meetings or limit such consultations to the existing systems only. Permitting planned systems in these discussions will help the late entrant also to assess the feasibility of coordination/co-existence/compliance to Art.22.

RES609 also states that when the limit is exceeded actual operational systems can be considered for evaluating the aggregate epfd of all NGSO systems.

Justification:-

India supports inclusion of operational NGSO systems in any consultation meetings, with a minimum number of operational satellites identified under Resolution 35. Further, the NGSO FSS systems included should be providing regular operations as envisioned under the associated ITU filing.

In addition, we believe that an NGSO system operating under multiple ITU filings should be treated as a single system for purposes of Resolution 76; additional provisions may be required to manage such situations & EPFD compliance.

Critically, prior to conducting any consultation meetings, an accurate aggregate calculation method is needed to determine the EPFD statistics resulting from multiple NGSO FSS systems operating together. Otherwise, there will be no meaningful information on the situation vis a vis the aggregate EPFD limits and the meetings will not be productive.

WG 5: General Issues**PRELIMINARY VIEWS ON WRC-23 AGENDA ITEM 2, 4 AND 9.1 (TOPIC B)****Agenda Item 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;

Background

This is a standing agenda item in every WRC and its main purpose is to examine revised ITU-R Recommendations to determine their suitability for incorporation by reference in RR, contained in Volume-IV. Resolution 27 (Rev.WRC-19) resolves that WRC reviews the ITU-R Recommendations that have been revised during the preceding study period and determines, whether the corresponding reference to the Recommendation in the Radio Regulations should be updated to reflect the revised version of the ITU-R Recommendation, otherwise the earlier

version of the Recommendation is retained. The revised ITU-R Recommendations will be examined based on the results of the CPM23-2 for arriving at a final position.

Preliminary Views

India supports the draft CPM report “in response to Resolution 27 (Rev.WRC-19), the Director of the Radiocommunication Bureau is preparing a Report to the second session of CPM-23”.

Agenda Item 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;

Background

This is a standing agenda item in every WRC and its main purpose is to review the Resolutions and Recommendations of previous conferences in RR Volume-III, **Edition 2020**. WRC-23 shall determine whether there is a need for any modification or suppression of the concerned Resolutions or Recommendations from previous WRCs in accordance with Resolution **95 (Rev.WRC-19)**. **It may be noted that review will focus** only on those Resolutions/ Recommendations that are not related to any other agenda item of WRC-23.

Preliminary Views

India supports the draft CPM report “in response to Resolution 95(Rev.WRC-19), the Director of the Radiocommunication Bureau is preparing a Report to the second session of CPM-23”.

Agenda Item 9.1 (Topic b):

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:

b) 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);

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)

Background

In the RR, the frequency band 1240 – 1300 MHz is globally allocated to the radio navigation satellite service (Space-to-Earth) on a primary basis and the amateur service on a secondary basis. The portion 1260 – 1270 MHz is also allocated to the amateur satellite service on a secondary basis by footnote **5.282**.

ITU-R WP5A is the responsible group for this agenda item and has responsibility for developing the CPM text in collaboration with ITU-R WP 3M, WP 4C, WP 7C(contributing group), which has responsibility for coexistence studies under this issue.

Preliminary draft new (PDN) Report ITU-R M. [AMATEUR.CHARACTERISTICS] provides the detailed information on the review of amateur and amateur-satellite service applications and

a compilation of appropriate and relevant parameters and operational characteristics for the studies, while PDN Report ITU-R M. [AMATEUR-RNSS] details the potential interference analysis and related studies. Furthermore, ITU-R is developing a Recommendation ITU-R M. [AS.

GUIDANCE] providing guidelines to assist administrations and the amateur and amateur-satellite services to ensure the protection of the RNSS (space-to-earth) in the frequency band 1 240-1 300 MHz from harmful interference. Annex-6 to WP 5A Chair's Report (Document 5A/597-E) contains Draft CPM Text for this agenda item.

Preliminary Views

India supports ongoing studies in various Study Groups of ITU-R in line with Resolution 774(WRC-19) to ensure the protection of RNSS (space-to-Earth) receivers from the amateur and amateur-satellite services in the frequency band 1240-1300MHz and supports continued use of this frequency band for amateur and amateur satellite service as secondary service.

Agenda item 10:

to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention.

WG 5 has forwarded to NPC the following three documents related to Agenda item 10



DOC 1 contribution Doc-3 contribution Doc-4 contribution
document on AI10-Vdocument from IAFI cdocument from IAFI c

Preliminary Views

[TBD]

IDENTIFICATION OF FREQUENCY BANDS FOR IMT IN PORTION(S) OF THE FREQUENCY RANGES 7.125-24 GHZ AND 92-275GHZ INCLUDING POSSIBLE ADDITIONAL ALLOCATIONS TO THE MOBILE SERVICE ON A PRIMARY BASISOR THE FUTURE DEVELOPMENT OF IMT FOR 2030 AND BEYOND

WRC-23 Agenda Item 10:

to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention,

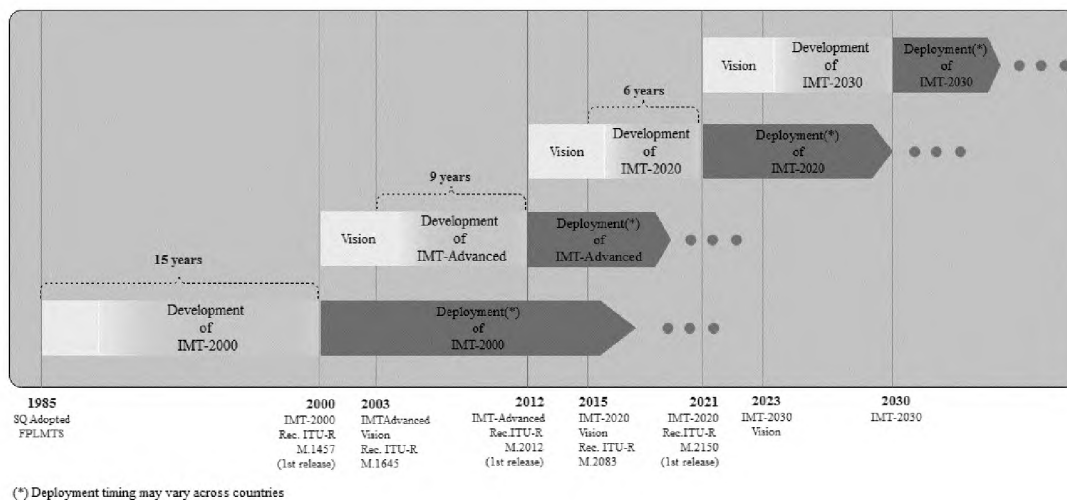
Agenda item 10 requests WRC-23 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention.

Spectrum is critical and essential for future IMT development for 2030. It is therefore essential that WRC-23 consider the future need of spectrum for 2030 and beyond in a new agenda item for WRC-27

BACKGROUND OF IMT

Following the adoption by International Radio Consultative Committee (CCIR) of the Study Question on the Future Public Land Mobile Telecommunication Systems (FPLMTS) in 1985, it took a total of 15 years for the identification of the radio spectrum in 1992 and development of IMT-2000 specifications (Recommendation ITU-R M.1457). After this development, deployment of IMT-2000 systems started. The ITU then started to develop the vision Recommendation (Recommendation ITU-R M.1645, June 2003) in 2000, and it took a total of nine years for the development of IMT-Advanced specifications (Recommendation ITU-R M.2012, January 2012). After this development, deployment of the IMT-Advanced systems started. The ITU then immediately started to develop the vision Recommendation (Recommendation ITU-R M.2083, September 2015) on Framework and overall objectives of the future development of IMT for 2020 and beyond. Based on this Recommendation, the ITU has released the Recommendation ITU-R M.2150 in the terrestrial radio interfaces of IMT-2020 in 2021. It took six years for the ITU to develop the second phase of IMT after the completion of the vision recommendation. After this development, deployment of the IMT-2020 systems started.

Diagram below provides an overview of the timeline for IMT development:



Role of IMT for 2030 and beyond

IMT systems have been serving as a communication tool for people and a facilitator which assists the development of other industry sectors, such as medical science, transportation, and education. Considering the key trends described in § 2, IMT for 2030 and beyond will not only continue to serve and reach the ultimate level of connectivity supremacy, but also open up new possibilities with integrated sensing, learning and computing capabilities, enabling the fusion of

physical, biological, and cyber worlds. Meanwhile, it will serve as an effective tool to help fulfil the sustainable development goals proposed by the United Nation for the next decade to come.

Usage scenarios for IMT for 2030 and beyond

IMT for 2030 and beyond is envisaged to expand and support diverse usage scenarios and applications that will continue beyond the current IMT. It will not only support enhanced human communication usage scenarios, providing the ultimate immersive experience with true human perception to places with rich connection capabilities and high-speed connections to the places that are not connected by the current IMT, but also enable novel machine communication usage scenarios, providing new syntax for efficient machine-oriented access and connectivity. Meanwhile, IMT for 2030 and beyond will expand usage scenarios beyond just communication. It will integrate new functions such as sensing and computing for connected intelligence, enabling new services and leveraging enhanced knowledge of the environment for machine learning. Networked sensing distributed intelligence are two usage scenarios of this kind. A broad variety of capabilities would be tightly coupled with these intended different usage scenarios and applications for IMT for 2030 and beyond.

Report ITU-R M.2376 completed in 2015 was essential for pioneering studies of new frequency ranges (6-80 GHz) for IMT technologies. Towards the future, it is envisioned that future IMT systems, in addition to other features, will need to support very high throughput data links to cope with the growth of the data traffic, new extremely bandwidth demanding use cases, as well as new capabilities of integrated sensing and communication (ISAC). There has been academic and industry research and development ongoing related to suitability of mobile broadband systems in various frequency bands including the spectrum between 7.125 GHz to 24 GHz and also above 92 GHz.

The future 6G mobile communication system will provide higher data rates to better support high-throughput services. One of the effective ways to obtain high data rates is to increase the system bandwidth. However, the available bandwidth of low frequency bands is always limited. Such limiting factors have prompted researchers to consider the technical feasibility of higher frequency bands in IMT. Although spectrum between 7.125 GHz to 24 GHz and spectrum above 92 GHz has a wide frequency range, it is difficult to allocate all frequency bands to IMT services. It can be seen from the spectrum allocation of RR that a total of over 10 GHz of spectrum in 7.125-24 GHz and 110 GHz in 92-275 GHz is identified for mobile services, and a total of 137 GHz in 275-450 GHz can be used for LMS services. Although these frequency bands are also allocated to other types of services, there are problems of coexistence and interference, especially some passive services need to be protected.

However, considering that a large number of frequency bands are available in this frequency range, there exists an opportunity for identification of continuous bandwidth for IMT applications.

Accordingly, two draft resolutions are provided below for IMT in 7.125-24 GHz (**Annex 1**) and IMT above 92 GHz (**Annex 3**).

Annex 1

DRAFT NEW RESOLUTION [IMT_BETWEEN_7.125GHZ_AND_24GHZ]

Studies on frequency-related matters for IMT identification including possible additional allocations to the mobile services on a primary basis in portion(s) of the frequency range between 7.125 GHz-24 GHz for the future development of IMT for 2030 and beyond

The World Radiocommunication Conference (Geneva, 2023),

considering

- a) that International Mobile Telecommunications (IMT) systems have contributed to global economic and social development as the main method of providing mobile broadband applications.
- b) that IMT systems are now being evolved to provide diverse usage scenarios and applications such as enhanced mobile broadband, massive machine type communications and ultra-reliable and low latency communications;
- c) that ITU-R is developing the framework and overall objectives of the future development of IMT for 2030 and beyond
- d) that the technical feasibility of IMT in bands between 7.125-24 GHz is addressed in the Report ITU-R M.[IMT.7.125 GHz-24 GHz];
- e) that it may be required to study additional spectrum requirements to meet the gigabit-per-second user data rate, high quality of user experience (QoE) and user demands in dense urban areas and/or in peak times;
- f) that ITU-R developed a work plan, timeline, process and required deliverables for the IMT for 2030 development in order to transform the above framework and overall objectives into the reality of IMT systems, which are expected to be deployed from the year 2030 onwards;
- g) that ITU-T has initiated the study of network standardization for IMT for 2020 and beyond;
- h) that adequate and timely availability of spectrum and supporting regulatory provisions is essential to realize the objectives in Recommendation ITU-R M.[IMT-2030..VISION];
- j) 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;
- k) the need to protect existing services when considering frequency bands for possible additional allocations to any service;

noting

- a) that Question ITU-R 229/5 seeks to address the further development of IMT;
- b) that IMT encompasses IMT-2000, IMT-Advanced, and IMT-2020 collectively, as described in Resolution ITU-R 56-2;

recognizing

- a) that timely availability of spectrum is important to support the future development of IMT,

- b) that the possibility of securing contiguous wide bandwidth in the higher frequency ranges is more promising;
- c) the usage of relevant parts of the spectrum by other radiocommunication services, many of which involve significant investment in infrastructure or represent significant societal benefit, and the evolving needs of these services,
- c-bis) the developments in new spectrum sharing techniques including use of AI, ML and Dynamic spectrum sharing
- d) there should be no additional regulatory or technical constraints imposed to services to which the band is currently allocated on a primary basis,
- e) that the preamble of the Radio Regulations provides objectives including:
- to facilitate the efficient and effective operation of all radiocommunication services; and
 - to provide for and, where necessary, regulate new applications of radiocommunication technology.

resolves to invite ITU-R

1 to study spectrum demands associated with the capabilities required for development of IMT-2030 taking into account:

- evolving needs, such as very high data rates, to satisfy user demand for IMT;
- situations with high data traffic demands, such as in dense urban areas and/or in peak times;
- technical and operational characteristics of IMT systems in the high frequency range, including the evolution of IMT through advances in technology and spectrally-efficient techniques, and their deployment;
- the time-frame in which spectrum would be needed;

2 to study potential candidate frequency bands, taking into account the protection of services to which the bands are allocated on a primary basis, for IMT including possible additional allocations to the mobile service on a primary basis within the ranges contained in Annex 2 to this Resolution, and also taking into account the results of the studies under *resolves to invite ITU-R 1*, and to the extent practicable, the need for harmonization;

further resolves

1 to accelerate development and completion of the technical and operational characteristics required to carry out sharing and compatibility studies involving the systems referred to as IMT-2030

2 that the studies referred to in *resolves to invite ITU-R 2* include sharing and compatibility studies with services already having allocations on a primary basis in the potential candidate bands and in adjacent bands, as appropriate, taking into account potential mitigation techniques that may need to be employed by IMT systems.

3 to invite WRC-27 to consider the results of the above studies and take appropriate actions,

encourages Member States, Sector Members, Academia, and Associates to participate in the studies by submitting contributions to ITU-R.

Annex 2

Potential frequency ranges for consideration for studies for IMT including possible additional allocations to the mobile service on a primary basis

- a) 7.125 – 15.35 GHz: In most of the cases Mobile is already Primary (globally) or Primary at regional level. In a few cases, additional allocation for Mobile is required.
- b) 15.35 – 17.7 GHz: Additional allocation for Mobile required (globally)
- c) 21.2-23.6 GHz : Mobile is already a Primary (globally)

Annex 3

DRAFT NEW RESOLUTION [IMT_ABOVE_92GHZ]

Studies on frequency-related matters for IMT identification including possible additional allocations to the mobile services on a primary basis in portion(s) of the frequency range between 92-275GHz for the future development of IMT for 2030 and beyond

The World Radiocommunication Conference (Geneva, 2023),

considering

- a) that International Mobile Telecommunications (IMT) systems have contributed to global economic and social development as the main method of providing mobile broadband applications.
- b) that IMT systems are now being evolved to provide diverse usage scenarios and applications such as enhanced mobile broadband, massive machine type communications and ultra-reliable and low latency communications;
- c) that ITU-R is developing the framework and overall objectives of the future development of IMT for 2030 and beyond
- d) that the technical feasibility of IMT in bands above 92 GHz is addressed in the Report ITU-R M.[IMT.ABOVE 100GHz];
- e) that it may be required to study additional spectrum requirements to meet the gigabit-per-second user data rate, high quality of user experience (QoE) and user demands in dense urban areas and/or in peak times;
- f) that ITU-R developed a work plan, timeline, process and required deliverables for the IMT for 2030 development in order to transform the above framework and overall objectives into the reality of IMT systems, which are expected to be deployed from the year 2030 onwards;
- g) that ITU-R has started the studies on the propagation characteristics in higher frequency bands above 92 GHz;
- h) that ITU-T has initiated the study of network standardization for IMT for 2020 and beyond;
- j) that adequate and timely availability of spectrum and supporting regulatory provisions is essential to realize the objectives in Recommendation ITU-R M.[IMT-2030.VISION];
- k) 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;
- l) the need to protect existing services when considering frequency bands for possible additional allocations to any service;

noting

- a) that Question ITU-R 229/5 seeks to address the further development of IMT;
- b) that IMT encompasses IMT-2000, IMT-Advanced, and IMT-2020 collectively, as described in Resolution ITU-R 56-2;

recognizing

- a) that timely availability of spectrum is important to support the future development of IMT,
- b) that the possibility of securing contiguous wide bandwidth in the higher frequency ranges is more promising;
- c) the usage of relevant parts of the spectrum by other radiocommunication services, many of which involve significant investment in infrastructure or represent significant societal benefit, and the evolving needs of these services,
- d) there should be no additional regulatory or technical constraints imposed to services to which the band is currently allocated on a primary basis,
- e) that the preamble of the Radio Regulations provides objectives including:
 - *to facilitate the efficient and effective operation of all radiocommunication services; and*
 - *to provide for and, where necessary, regulate new applications of radiocommunication technology.*

resolves to invite ITU-R

- 1 to study spectrum demands associated with the capabilities required for development of IMT-2030 taking into account:
 - evolving needs, such as very high data rates, to satisfy user demand for IMT;
 - situations with high data traffic demands, such as in dense urban areas and/or in peak times;
 - technical and operational characteristics of IMT systems in the high frequency range, including the evolution of IMT through advances in technology and spectrally-efficient techniques, and their deployment;
 - the time-frame in which spectrum would be needed;
- 2 to study potential candidate frequency bands, taking into account the protection of services to which the bands are allocated on a primary basis, for IMT including possible additional allocations to the mobile service on a primary basis within the ranges contained in Annex 4 to this Resolution, and also taking into account the results of the studies under *resolves to invite ITU-R 1*, and to the extent practicable, the need for harmonization;

further resolves

- 1 to accelerate development and completion of the technical and operational characteristics required to carry out sharing and compatibility studies involving the systems referred to as IMT-2030
- 2 that the studies referred to in *resolves to invite ITU-R 2* include sharing and compatibility studies with services already having allocations on a primary basis in the potential candidate bands and in adjacent bands, as appropriate, taking into account potential mitigation techniques that may need to be employed by IMT systems.
- 3 to invite WRC-27 to consider the results of the above studies and take appropriate actions,

encourages Member States, Sector Members, Academia, and Associates

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

Annex 4

Potential frequency ranges for consideration for studies for IMT including possible additional allocations to the mobile service on a primary basis

- a) 92 –109.5 GHz : In most of the cases Mobile is already Primary (globally). In a few cases, additional allocation for Mobile is required
- b) 109.5 - 122.25 GHz : Additional allocation for Mobile required (globally)
- c) 122.25 –158.5 GHz :In most of the cases Mobile is already Primary (globally). In a few cases, additional allocation for Mobile is required
- d) 158.5 – 200 GHz : In most of the cases Mobile is already Primary (globally). In a few cases, additional allocation for Mobile is required
- e) 200 –275 GHz : In most of the cases Mobile is already Primary (globally). In a few cases, additional allocation for Mobile is required

PRELIMINARY VIEWS ON WRC-23 AGENDA ITEMS 10 (13.75-14GHZ GSO AND NGSO FSS)

Agenda Item 10:

to recommend to the ITU Council items for inclusion in the agenda for the next world radiocommunication conference, and items for the preliminary agenda of future conferences, in accordance with Article 7 of the ITU Convention and Resolution 804 (Rev.WRC-19)

1. Background

The fixed-satellite service (FSS) has seen a rapid increase in the number of geostationary (GSO) and non-geostationary (non-GSO) satellite networks in recent decades. The use of smaller FSS earth stations at frequencies around 10-15 GHz has also been increasing with the deployment of satellites providing large throughput and broadband connections. For all three ITU-R Regions, there is a significant mismatch between the uplink and downlink bandwidth in the 10-15 GHz range, not subject to RR Appendices **30, 30A or 30B**, that can efficiently be used to provide services by smaller geostationary and non-GSO FSS earth station antennas, e.g. HTS or broadband user terminals and news gathering etc. The 13.75-14 GHz band was allocated globally by WARC-92 for FSS, but limitations were introduced in RR Nos. **5.502** and **5.503** to enhance compatibilities with other services. WRC-03 modified these footnotes 20 years ago, but still such that efficient use of smaller GSO and non-GSO FSS uplink earth station antennas in this frequency band are not allowed. The system characteristics and their associated usage and application requirements in this frequency band might have changed over the last decades. Therefore, based on the evolving needs for the efficient use of 13.75-14 GHz band for smaller uplink GSO and non-GSO FSS earth station antennas, identification of possible alternative

sharing conditions for this band is required to meet the emerging demands for satellite applications in the FSS.

2. Preliminary Views

To review the usage of the band 13.75-14 GHz and study for possible revisions to the constraints in RR Nos. **5.502** and **5.503**, in accordance with Resolution [13.75-14 GHz] (WRC-23), to enable efficient use of the band by uplink geostationary and non-GSO FSS earth stations

RESOLUTION [AI10_13.75-14 GHZ GSO AND NON-GSO FSS] (WRC23)

Review the usage and sharing conditions of the band 13.75-14 GHz to enable efficient use of the band by uplink geostationary and non GSO FSS earth stations, including FSS earth stations using smaller antenna sizes

The World Radiocommunication Conference ([Dubai, 2023),

considering

- a) that WARC-92 added an allocation to the fixed-satellite service (FSS) (Earth-to-space) in the band 13.75-14 GHz;
- b) that WRC-03 made changes to Nos. **5.502** and **5.503** which enabled the use of earth station antennas with a minimum diameter of 1.2 m for geostationary (GSO) FSS networks under power flux-density and e.i.r.p. density limits;
- c) that the minimum antenna diameter requirements for GSO FSS networks and non-geostationary (*non-GSO*) FSS networks are not aligned since changes were made to Nos. **5.502** and **5.503** for GSO networks in WRC-03, but not for non-GSO networks;
- d) that the antenna diameter for non-GSO networks in FSS in this band are restricted by Nos. **5.502** and **5.503** to a minimum of 4.5 m, which may not match the modern system characteristics of non-GSO FSS operators;
- e) that there is great congestion in the geostationary arc and there is a need to ensure that orbit and spectrum resources are used efficiently and rationally to facilitate introduction of new satellite networks, particularly those of new satellite operators;
- f) that there has been a substantial increase in non-GSO operators using the 10-15 GHz band for FSS with small diameter earth station antennas;
- g) that there is a lack of uplink bandwidth in the 13-15 GHz range that can be used efficiently, including by smaller earth station antennas, globally to feed the downlink capacity in the 10-13 GHz range;
- h) that this band is shared with the radiolocation service under the conditions set out in No. **5.502**;

- i) that the space research service has a secondary allocation in this band;
- j) that for GSO space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 shall operate on an equal basis with stations in the fixed-satellite service; after that date, new geostationary space stations in the space research service will operate on a secondary basis;
- k) that until those GSO space stations in the space research service for which information for advance publication has been received by the Bureau prior to 31 January 1992 cease to operate in this band, the band 13.77-13.778 GHz is shared with the space research service under the conditions set out in No. **5.503**;
- l) that the use of the services sharing this band with the fixed-satellite service and the associated required co-existence conditions may have changed;
- m) that, in some countries, the band is also allocated to the fixed service and the mobile service (Nos. **5.499** and **5.500**), and to the radionavigation service (No. **5.501**);
- n) that improving operating conditions for earth stations in the 13.75-14 GHz band will help meet the evolving needs for satellite applications and enable efficient and rational use of the Earth-to-space and the corresponding space-to-Earth frequency bands in the 13-15 and 10-13 GHz ranges,

recognizing

- a) that studies are required to develop regulatory changes to meet the growing requirements for spectrum that can be used efficiently by GSO and *non-GSO*FSS uplink earth stations, including by smaller earth station antennas in the 13-15 GHz range;
- b) that in consideration of the 13.75-14 GHz band, there is a need to determine the co-existence conditions between the services sharing this band and the appropriate balance between them,

resolves to invite ITU Radiocommunications sector

1. to conduct studies, in time for consideration by WRC-27, on the sharing conditions for earth stations in the fixed-satellite service as outlined in Nos. **5.502** and **5.503**, with a view to reviewing the constraints of these footnotes to enable efficient use of the band by uplink GSO and *non-GSO* FSS earth stations, including those using smaller antenna sizes;
2. to identify, in time for consideration by WRC27, possible alternative sharing conditions to those indicated in Nos. **5.502** and **5.503**;
3. to identify, in time for consideration by WRC-27, possible changes to Nos. **5.502**, **5.503** and/or other relevant regulatory changes to the Radio Regulations.

PRELIMINARY VIEWS ON WRC-23 AGENDA ITEMS 10
(51.4-52.4 NON-GSO FSS)

Agenda Item 10:

to recommend to the ITU Council items for inclusion in the agenda for the next world radiocommunication conference, and items for the preliminary agenda of future conferences, in accordance with Article 7 of the ITU Convention and Resolution 804 (Rev.WRC-19)

1. Background

The 51.4-52.4 GHz frequency band is allocated on a primary basis to the fixed-satellite service (FSS) in the direction Earth-space; in accordance with number 5.555C of the Radio Regulations, the use of the 51.4-52.4 GHz frequency band by the fixed-satellite service (Earth-space) is limited to geostationary satellite networks. Earth stations shall be limited to head-end earth stations with a minimum antenna diameter of 2,4 meters. (WRC-19). Moreover, the use of the 51.4-52.4 GHz band to the FSS (Earth-space) is limited to geostationary satellite networks and associated access earth stations. The need for additional spectrum in the FSS in the 50 GHz range for Earth-to-space links of non-GSO earth station systems was established in response to WRC-19 agenda item 9.1.9 in ITU-R Report S.2461. These studies included the need for spectrum for GSO and non-GSO SFS networks, with the former being resolved in WRC-19.

Non-geostationary orbit (non-GSO) satellite systems provide a wide range of services in the fixed-satellite service (FSS) to a growing number of users worldwide, including regions that lack ground infrastructure and are consequently losing the benefits of new and innovative telecommunications services. In addition to providing broadband connectivity, non-GSO SFS systems also contribute to telehealth and tele-education initiatives, among others.

The satellite industry already incorporates the most efficient technologies for the use of spectrum allowing the reuse of frequencies. However, even with this efficiency, the growing demand for the fixed-satellite service currently exceeds the spectrum available in the C, Ku and Ka bands for this service. Therefore, satellite operators seek access to additional FSS spectrum to meet current and future demand.

The purpose of Agenda item 10 is to recommend to the Council the items to be contained in the agenda of the next WRC and items to be included in the preliminary agendas of future conferences, in accordance with Article 7 of the Convention and Resolution 804 (Rev. WRC-19). In this regard, the proposal is to consider expanding the use of the FSS (Earth-space) band in 51.4-52.4 GHz to address the spectrum needs of non-GSOs.

2. Preliminary Views

The Administration of India supports the inclusion of a WRC-27 Agenda Item that studies and defines the technical and operational measures as well as the necessary regulatory provisions, in order to facilitate the use of the 51.4-52.4 GHz frequency band allocated to the fixed-satellite service (Earth-space) by master earth stations of non-geostationary systems.

DRAFT RESOLUTION [A10 WRC 27] (WRC-23) Agenda for the 2027 World Radiocommunication Conference

The World Radiocommunication Conference (Dubai, 2023),
considering

a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference (WRC) 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 WRCs and Article 7 of the Convention relating to their agendas;

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

a) that this conference has identified a number of urgent issues requiring further examination by WRC27;

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 WRC be held in 2027 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 WRC19 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.x to consider the use of the 51.4 - 52.4 GHz band by gateway earth stations transmitting to non-geostationary satellite orbit systems operating in the fixed-satellite service (FSS) (Earth-to-Space) in accordance with Resolution [AI10_51.4-52.4 Non-GSO FSS] (WRC23);

...

invites the ITU Council

to finalize the agenda and arrange for the convening of WRC27, 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 (CPM) and to prepare a report to WRC27;

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 [AI10_51.4-52.4 NON-GSO FSS] (WRC23)

Studies relating to the use of 51.4-52.4 GHz band by to enable use by gateway earth stations transmitting to non-geostationary FSS satellite orbit systems (Earth-to-space)

The World Radiocommunication Conference (Dubai, 2023),

considering

a) that satellite systems are increasingly being used to deliver broadband services and can help enable universal broadband access;

b) that next-generation fixed-satellite service technologies for broadband will increase speeds, with faster rates expected in the near future;

c) that technological developments such as advances in spot-beam technologies and frequency reuse are used by the FSS in spectrum above 30 GHz to increase the efficient use of spectrum;

d) that fixed-satellite applications in spectrum above 30 GHz, such as feeder links, should be easier to share with other radiocommunication services than high-density fixed-satellite service (HDFSS) applications,

recognizing

a) the need to protect existing services when considering frequency bands for possible additional allocations to any service;

b) that the frequency band 51.4-52.4 GHz is allocated to fixed and mobile services, which will need to be protected, and is available for high-density applications in the fixed service as indicated in No. 5.547;

c) that Report ITU-R S.2461 includes studies on the spectrum needs for additional FSS spectrum in the Earth-to-space direction for both geostationary-satellite orbit (GSO) FSS networks and non-GSO FSS systems in the frequency band 51.4-52.4 GHz;

d) that WRC-19, pursuant to Resolution 162 (WRC-15), allocated the frequency band 51.4-52.4 GHz to the FSS (Earth-to-space) on a primary basis, and also adopted No. 5.555C which limited the use of the FSS allocation to geostationary satellite networks;

e) that the need for additional uplink spectrum in the 50 GHz range for non-GSO FSS gateway use continues,

resolves to invite ITUR

to conduct, and complete in time for WRC27:

1 sharing and compatibility studies with current and planned stations of existing primary services, including in adjacent bands as appropriate, including protection of fixed and mobile services, to determine the suitability of revising the primary allocations to the FSS in the frequency band 51.4-52.4 GHz to enable use by gateway earth stations of non-GSO FSS systems (Earth-to-space);

2 compatibility studies between NGSO FSS (E-s) gateway stations and systems operating in the passive frequency band 52.6-54.25 GHz;

3 studies regarding the protection of GSO FSS networks and associated gateway earth stations from the emissions of non-GSO FSS systems and associated gateways,

instructs the Director of the Radiocommunication Bureau

to report on the results of the ITU-R studies to WRC-27,

invites administrations

to participate actively in these studies by submitting contributions to ITUR.
